Section

Power and electrical engineering

POWER MANAGEMENT FOR A HYBRID POWER GENERATION SYSTEM

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ABSTRACT: The objective in this paper is to describe the utilisation of a simulation model which has been developed for the design of a hybrid system used for electrical and thermal power generation. The system consists of a combined heat and power plant and a photovoltaic array with an additional lithium-ion battery for electrical energy storage.

KEY WORDS: photovoltaic array, lithium-ion battery system, combined heat and power plant

Introduction

During the past years an intensive development and integration of renewable energy sources was implemented. In the upcoming years most estimates of the potential growing consumption predicts that the global energy demand will become double by the year 2050 [1]. One of the most important tasks for the power systems in the coming decades is the demand of transformation from the actual state to a new form of future generation grids. Next generation grids must meet the greenhouse gas emissions requirements (20-20-20 targets of the European Commision) by switching to renewable energy sources[2].

Furthermore a shift from the traditional centralized power generation towards a regional power generation will become more popular. In [3] a decentralized hybrid power generation system was introduced and verified in [4]. It consists of a combined heat and power plant (CHP) with a nominal electrical power of 50 kWel and a thermal power of 81 kWth. A peak load boiler with a rated power of 895 kWth is used to cover the complete energy demand of a residential neighborhood during high consumption via heat storage tanks. In order to reduce the power flow from the public grid a photovoltaic system (PV) with a peak power of 63 kWp has been installed. A lithium-ion battery with a nominal power of 50 kW and a capacity of 135 kWh is integrated to compensate the fluctuating power generation of the PV system. The architecture of the plant is illustrated in Fig. 1. Thermal power is distributed via a district heating network (red line); electrical power is distributed via the low-voltage grid (blue line). The PV and the battery systems are connected to the grid by the use of individual converters. The plant, located in Kelsterbach in the German Frankfurt/ Rhine-Main metropolitan region, supplies a residential area with 180 town houses. In the first construction phase the plant starts its operation in the year 2014 by supplying two thirds of the finished houses. Now at the actual moment the facility operates in a full capacity and it supplies all initially predicted households with electrical and thermal power regarding their demands. Most of the attention is this paper will be focused on the electrical part and moreover on the power injecting process from the hybrid system to the utility grid.

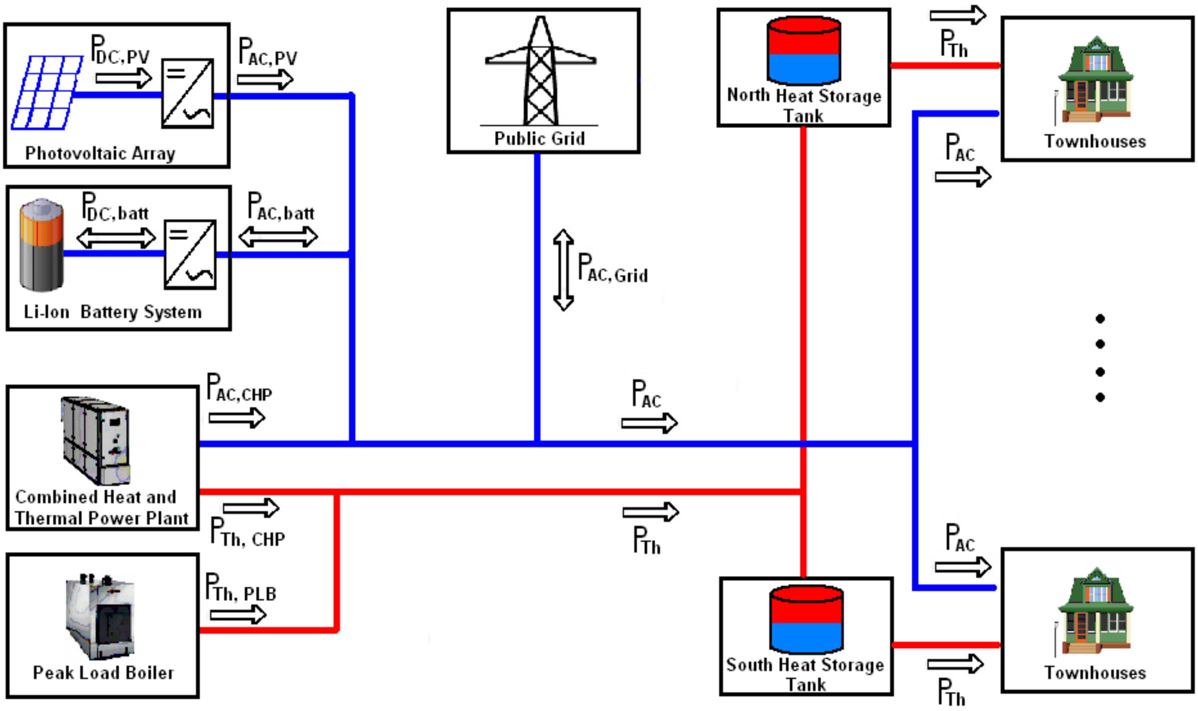


Fig.1. Block diagram of the electrical and heat networks and elements

An impact of the power management

In order to demonstrate the processes of power generation, distribution, utilisation and export of power, a software model has been developed with the help of PSIM 9.3. It enables a detailed analisys of the system performance and a possibility to compare and refer with directly measured and stored data performance of the real facility, demonstrated earlier in one of the previous papers [4]. In this paper a strategy for cutting the power peaks injected from the system during surplus power production to the utility grid will take a place. This strategy directly will impact on the performance of the system in order to bring it in a condition with predictable behavior regarding the injected power in the node of utility grid where the decentralised system is connected. A problem with almost all decetralized renewable energy sources occurs with their uncertainity regarding the amount of generated power and their time of power production. In many cases during power generation not all of the produced power is used from the local consumers. In these cases the available suprlus power is injected into utility grid without caring about the amplitude of the injected power, but that might cause significant negative influences on the amplitude of grid voltage. A strategy for smooth power injection is poroposed by the implementation of a device with a purpose to track and calculate the potential expected surplus production of power during each daily cycle. A block diagram with the conception is represented at Fig.2.

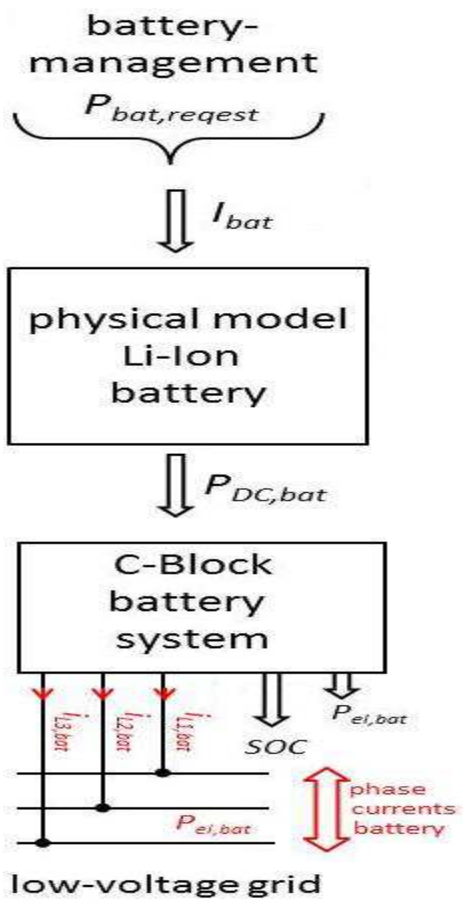


Fig.2. A pattern of battery logical model

The battery management tracks all power sources in the system together with the demand of the consumer and also the state of charge (SOC) for the lithium-ion battery system. If the consumer`s demands are higher than the produced power, then nothing will be stored in the battery system, but if the demands are lower than consumption, then the battery acts like a buffer in order to absorb or redirect the surplus power. As an output three phase currents are generated and they form the output power of the system.

Construction of the device for power management

All circuits have been made in a simulation field of PSIM 9.3 software where most of the dynamic proceses in the real facility can be recreated with a very close acuracy in order to be observed and upgraded with new features. A revealed view of the curcuits is represented on Fig.3. There the battery power management receive measured information from every source of electrical power in the system together with the electrical demands of the consumer. By the usage of a calculating algorythm the battery system absorbs almost all the surplus power while its SOC is lower than 100%. After the battery is fully charged, then it can not accept power anymore hence the rest of the difference between produced and consumed power will be injected in the utility grid. The following equation defines how the battery system works in normal conditions governed by PMS block.

$$P_{\text{bat, request}} = P_{\text{el.CSR}} - P_{\text{el. PV}} - P_{\text{el. CHP}} \qquad (1)$$

But normal opperational conditions cause non-regulated power injection in the utility grid after the battery system is fully charged and the system`s electrical demands are lower than all generated power. At this case is necesairy to be included one more computational blocks with purpose to track the historical information for the system`s performance together with the actual balance of power, forecasted amount of power and SOC. This device calculates an approximate forecasting value regarding the power that can be allowed to be absorbed by the battery or deducted from the total charging power flow in order to maintain a close to constant surplus power value. The main idea is to smooth the injected power rely directly to the values produced as an output of the PMS2 block. It forces the system to absorb more or less surplus power just to keep the quantity of initialy calculated forecast for surplus power during an also calculated time frame for daily injecting time. The expression of this algorythm is as follows:

$$P_{bat,request}=P_{el.CSR}-P_{el.\ PV}-P_{el.\ CHP}\pm P_{deduct} \quad (2)$$

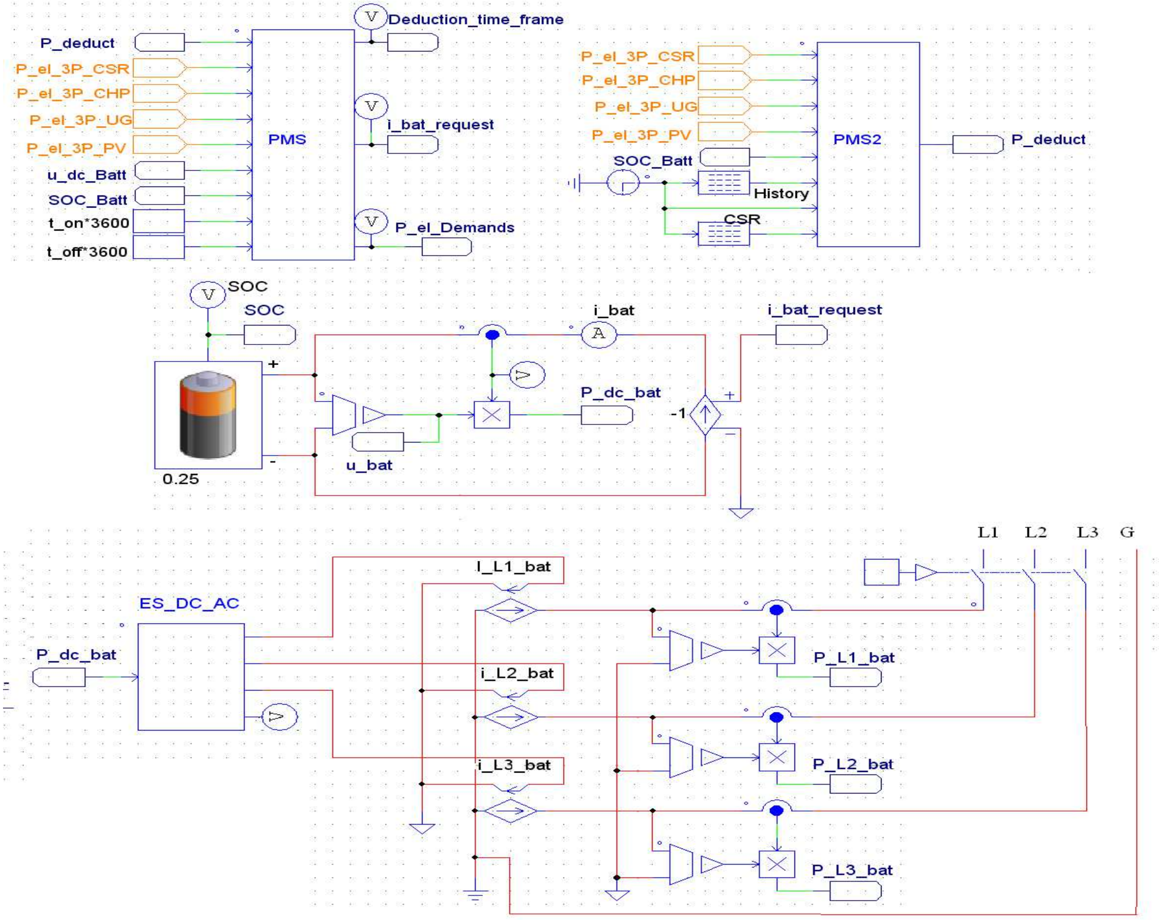
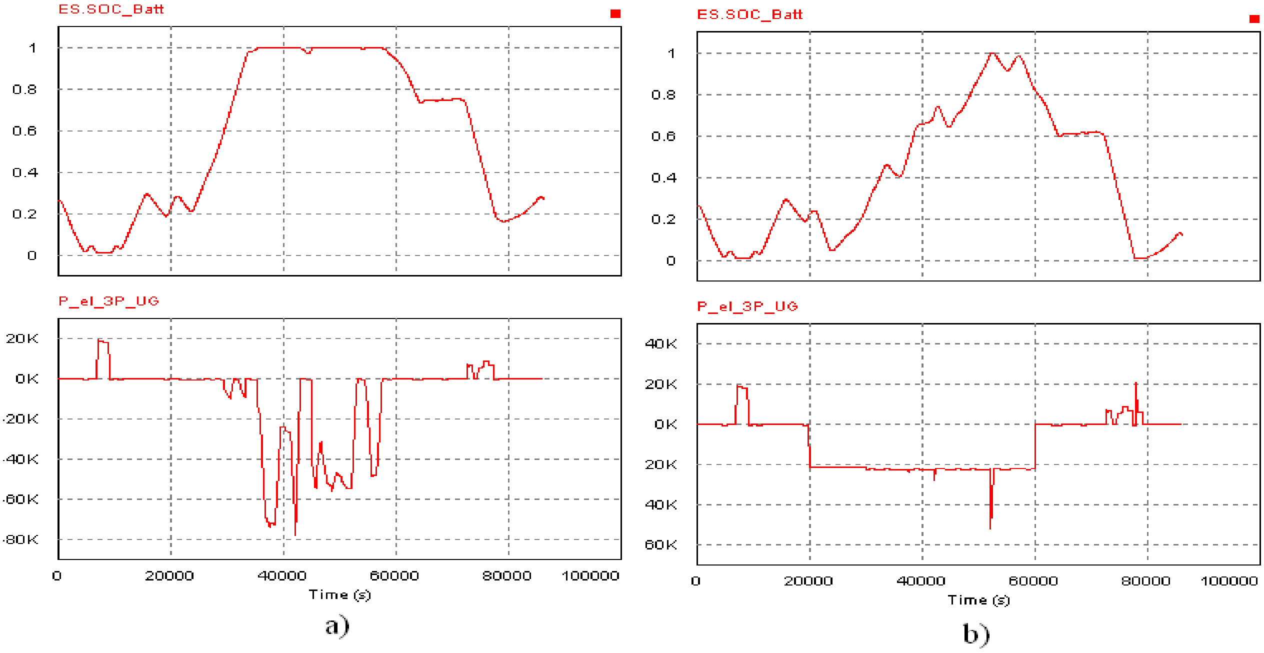


Fig.3. An overview of the circuit solution for smooth injected power with all functional and computing blocks

Simulation results

For the simulations a typical summer day has been used. All the stored data from 01.07.2014 for CHP performance, PV conditions like solar irradiation and module temperature electrical demand of the consumer are set as an input for each device placed in the software model. A simulation with and without the smoothing corrections is performed in order to demonstrate the effect of the calculated deductions which must be applied if the desired solution for peak-cut off should be implemented. On Fig.4 a) is represented the system performance with no precautions for injected peak cut-off. The other simulation plot at Fig.4 b) reveals the effect of the implemented method for peak cut-off. It can be noted that the results are not perfect with 100% flat and smooth line of injected power shown at Fig.4.b), but the controller is not still in its final stage. There will be more efforts to make its performance as close to the idealized case as possible. The controller PMS2 also care about the calculated consumed power after the smooth actions are calculated. The point is to achieve minimal difference in the consumed power from the utility grid

with main point to reduce as much a s possible the injected power spikes.



a)

b)

Fig.4. Results of the implemented peak cut-off .ES.SOC_Batt – state of charge of the storage battery; P_el_3P_UG – is the power flow transferred form the system to the utility grid;

Conclusions

The proposed methodology for injection smoothing by cut-off the peaks of injected power reveals a possibility for a better grid oriented use of hybrid systems with renewable energy sources. The benefits of this strategy will provide the future decentralised power facilities with ability to predict in a very narrow band the estimated power that should be produced and injected in the utility grid by similar systems. In this way the operators of such a kind of power producing units will be able to define with high accuracy the injected portions of power in the connecting point with the utility grid and therefore this will cause better and more stable performance of the future power distribution networks.

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POWER QUALITY AND ENERGY EFFICIENCY IN LOW VOLTAGE ELECTRICAL POWER SYSTEM OF THE TECHNICAL UNIVERSITY OF GABROVO

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ABSTRACT: This paper presents power quality study performed on the distribution low voltage building power system of Technical University of Gabrovo. The study includes measured waveforms, trends and parameters of the electromagnetic compatibility. The results are analyzed and compared with standards for evaluating the quality of power in the electrical distribution power systems of buildings.

KEY WORDS: electromagnetic compatibility, electrical power quality.

INTRODUCTION

Power quality has become an increasing concern for utilities and their electrical customers. In recent years, there is a growth and mass application of modern electronics such as computer power supplies, industrial logic controllers, variable speed drives, fluorescent and led compact lighting. While such devices are sensitive to the variation of the supply voltage, they are also a significant source for power quality disturbances. Due to their nonlinear nature, these loads inject harmonics' currents into the power system and cause voltage harmonics distortion. There is need to understand how the disturbances affect sensitive loads. Harmonics can result in equipment additional heating, communication interference and control malfunctions. Voltage sags of only few cycles can cause loss of computer data or errors. Power systems designed to function at the fundamental frequency, which is 50 Hz in Bulgaria, are prone to unsatisfactory operation and, at times, failure when they are subjected to voltages and currents that contain substantial harmonic frequency elements. Very often, the operation of electrical equipment may seem normal, but under a certain combination of conditions, the impact of harmonics is enhanced, with damaging results. The increased concern for power quality has resulted in significant advance in monitoring and testing equipment that can be used to characterize disturbances and power quality variations. This paper presents a power quality study performed at the point of common coupling of the electrical low voltage building systems of the Technical University of Gabrovo.

EC STANDARDS REGARDING ELECTRICAL POWER QUALITY AND ELECTROMAGNETIC COMPATIBILITY.

The main question is: Besides distorting the shape of the voltage and current sinusoids, what other effects do harmonics cause?

Since harmonic voltages are produced as a result of harmonic currents with frequencies considerably higher than the power system fundamental frequency, these currents encounter much higher impedances as they propagate through the power system than does the fundamental frequency current. This is due to “skin effect,” which is the tendency for higher frequency currents to flow near the surface of the conductor. Since little portion of the high-frequency current penetrates far beneath the surface of the conductor, less cross-sectional area is used by the current. As the effective cross section of the conductor is reduced, the effective resistance of the conductor is increased. This increased heating effect is often noticed in two particular parts of the power system: neutral conductors and transformer windings. Harmonics with orders that are odd multiples of the number three (3rd, 9th, 15th, and so on) are particularly troublesome, since they behave like zero-sequence currents. These harmonics, called triple harmonics, are additive due to their zero-sequence-like behavior. They flow in the system neutral and circulate in delta-connected transformer windings, generating excessive conductor heating.

Measurement of Power quality (PQ) usually characterizes low frequency conducted electromagnetic disturbances. The possible range of disturbances that could be measured include transient overvoltages and transmission of signals (ripple control) on a power system: voltage dips and interruptions, harmonics and interharmonics, temporary overvoltages, swell, transient overvoltages, voltage fluctuations, voltage unbalance, power-frequency variations, DC components in AC networks, signaling voltages. It is not generally necessary to measure each type of disturbance. The types can be placed in four categories, affecting the magnitude, waveform, frequency and symmetry of the voltage.

European standard EN 50160 gives the main characteristics of the voltage, supplied by the public distribution system, at the customer’s supply-terminals in public low voltage and medium-voltage electricity distribution systems under normal operating conditions.

According to EN 50160, a voltage dip is a sudden reduction of the voltage supply to a value between 90% and 1% of the nominal voltage, with duration between 10 ms and 1 minute.

A supply interruption is defined as a condition in which the voltage supply is lower than 1% of the nominal voltage. The interruption is classified as a short interruption if its duration is less than 3 minutes; otherwise the interruption is classified as a long interruption.

A temporary overvoltage is an overvoltage of relatively long duration and a transient overvoltage as a short duration overvoltage with duration of a few milliseconds or less.

Voltage dips and short interruptions have various causes: faults on the transmission (HV) or distribution (LV and MV) networks or on the installation itself. The occurrence of faults causes voltage dips for all users. From an economic point of view the dip frequency, i.e. the annual number of dips, is very important. When assessing the total annual dip related cost one has to find out how many dips are expected. Some rough estimation can be acquired from measurement over a shorter period. Another approach is to use stochastic mathematical methods for assessing more precise figures.

UNIVERSITY LOW-VOLOTAGE ELECTRICITY SYSTEM DESCRIPTION. MASURMENTS RESULTS.

Each one of the university buildings are supplied by different power transformers. Some of the power transformers are supplied in their high-voltage side at 10 kV and other at 20 kV. The secondary low-voltage rating of all the transformers is 400 V line to line.

The transformers’ windings are star connected with directly grounded neutral at the low-voltage side and delta connected at the high- voltage side.

Measurements are performed on a 10 kV transformer stations with university consumers. The latest state-of-the-art power network analyzers (HT Italia, supported by powerful mathematical software) are used for the measurements. Measurements are performed for periods of one week for each electrical customer, according to the requirements of the standard EN 50160. Also all the measurements are done at the low-voltage side (400 V) of the step-down transformers with a Power Quality Analyzer, manufactured by “HT Italia” in buildings where the power transformers are an exclusive property of the university.

The measurments’ duration has been fixed within the normatively required period of 168 hours.

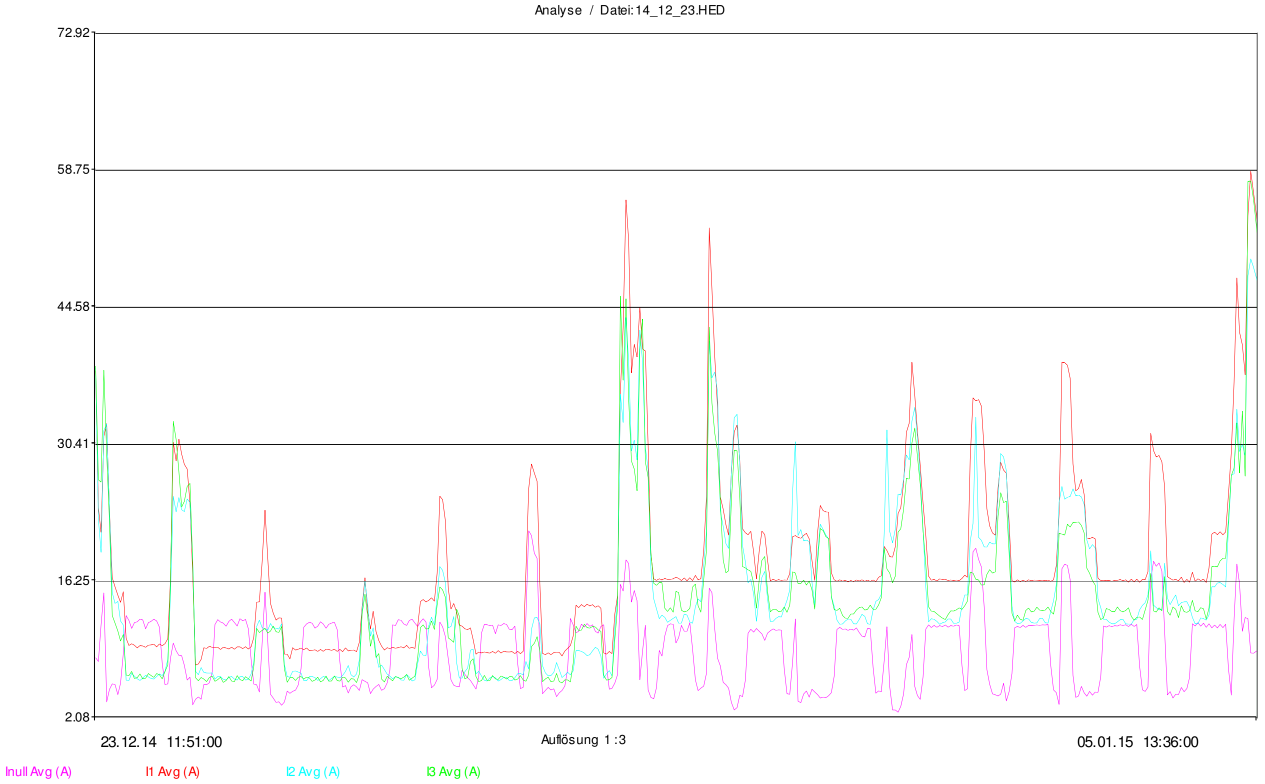

Figure 1. Measured phase currents and current trough the neutral for the period 23.12.14 - 06.01.15.

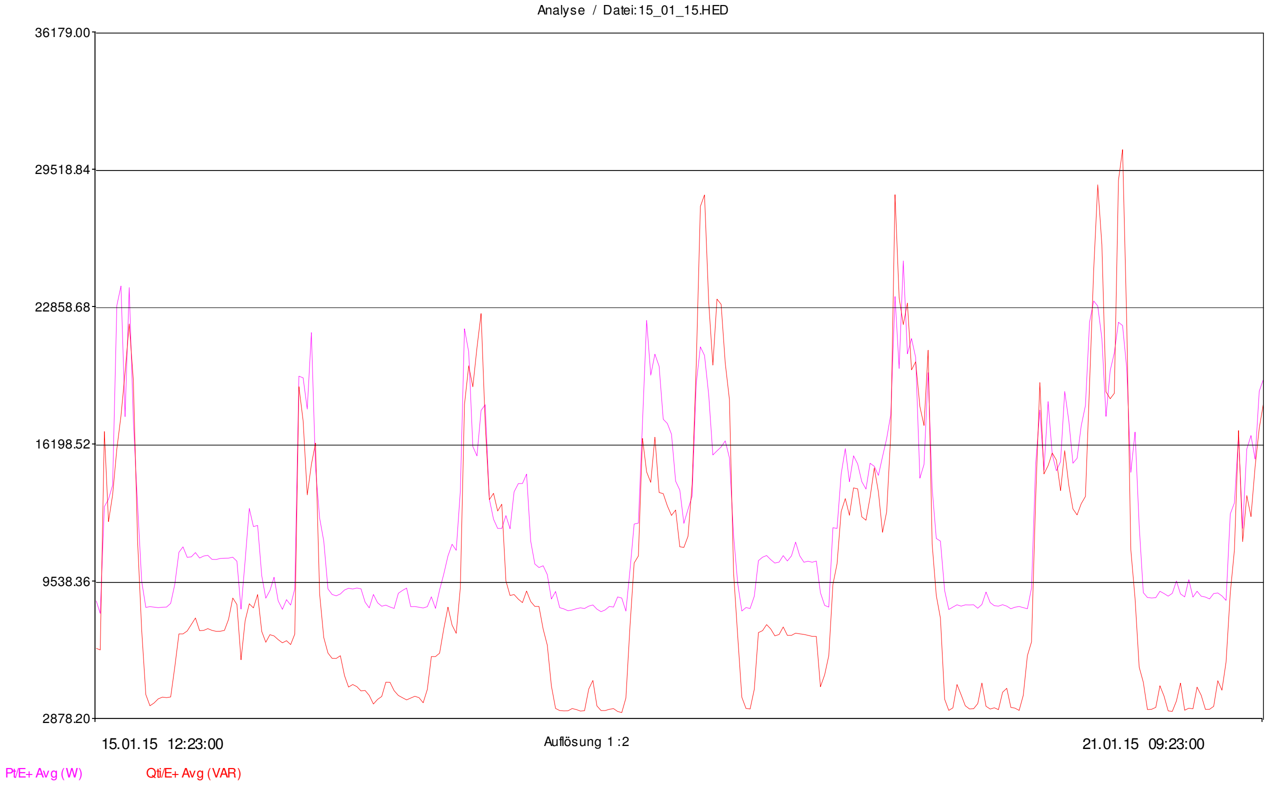

Figure 2. Active and reactive power consumed in the building for the period 15.01.15 - 21.01.15.

Fig. 1 shows the variation of the phase currents and the current through the transformer’s neutral for the period 23.12.14 until 06.01.15. During this period, the university has been in a holiday. The significant uneven distributed phase loads cause an additional current flowing through the transformer’s neutral with a magnitude between 3 and 20A.

Fig. 2 illustrates the variation of active and reactive power, consumed in the building for the period 15.01.15 until 22.01.15.

In periods during the nighttime reactive power consumption is greater than that of the active power due to the new lighting system of the building.

Figure 3. Minimum, maximum and average currents flowing through the transformer’s neutral, measured for intervals of 15 min. during the period 15.01.15 – 21.01.15

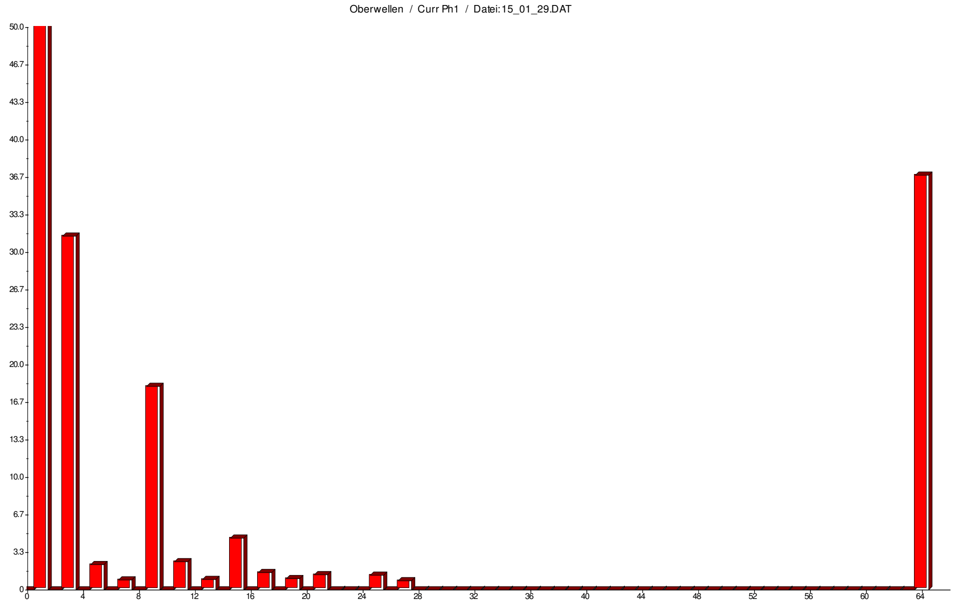

Figure 4. Measured current harmonics in the transformer’s neutral during the period 15.01.15 – 21.01.15

During the same period from 15.01.15 until 22.01.15 (fig. 3)5 Fig. 3 illustrates the variation of the minimum, maximum and the average current through the neutral conductor, measured for time intervals of 15 minutes during the same period - from 15.01.15 until 22.01.15.

Harmonic currents in the neutral in % and the current coefficient of total harmonic distortion (36.85%) for the period from 15.01.15 until 22.01.15 are illustrated in fig. 4. For better visibility the first current harmonic is given as 50%, but in the calculations it is assumed 100%.

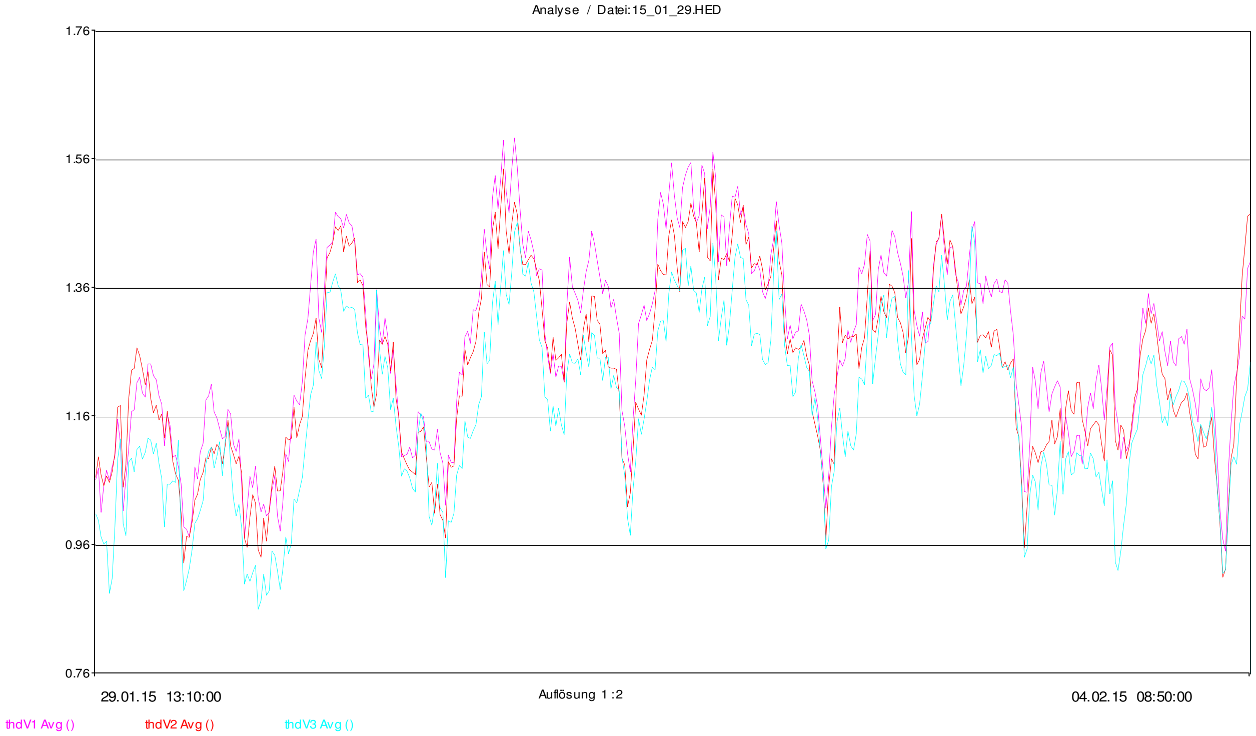

Figure 5. Coefficient of total harmonic distortions regarding the three phase voltages during the period 29.01.15 – 5.02.15

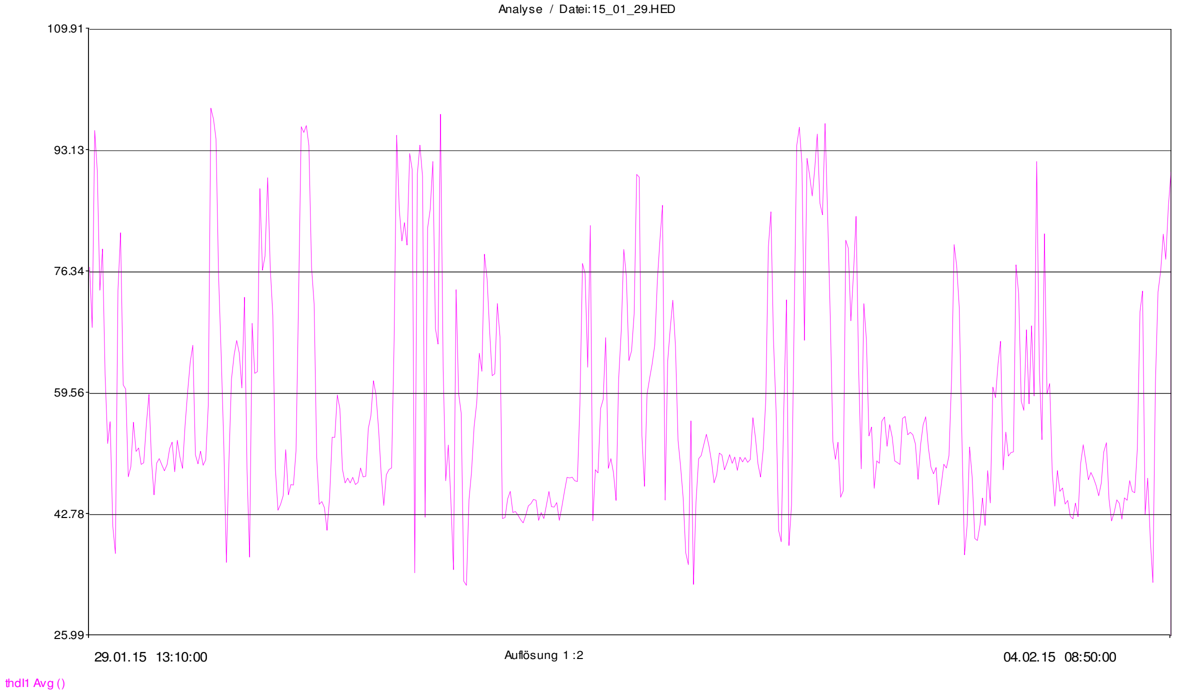

Figure 6. Coefficient of total harmonic distortions regarding one of the phase currents during the period 29.01.15 – 5.02.15

The variation of the coefficient of total harmonic distortions regarding the three phase voltages is illustrated in fig. 5. The harmonic distortion of the respective voltage for the specified period does not exceed 1.6%.

The total harmonic distortion regarding one of the phase currents (the chosen phase conductor supplies the lighting system of the university building) for the period 29.01.15 - 05.02.15 is presented in fig. 6. During this period, this building has had intensive classes with part-time students. The values for the coefficient of total harmonic distortions in the current curve exceed significantly the permissible values in the standard EN 61000.

During the test period between 29.01.2015 and 05.02.2015 there are 5 voltage deviations below the required limits.

One of the phase voltages have been fluctuated between 190,7 and 203,08 V for a time intervals between 0,05 to 0,07 seconds.

CONCLUSION

The recent paper presents power quality study, performed according to the EC standards EN 50160 and EN 61000. All the measurements have been made at the low-voltage side of a building electrical distribution system by means of a power quality analyzer “HT Italia”.

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VOLTAGE BASED SOLUTION OF TRANSIENTS IN LINEAR ELECTRICAL CIRCUITS USING THE LAPLACE TRANSFORMATION

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ABSTRACT: The paper inhere presents the implementation of voltage based solutions of transients using the Laplace transformation in the study course of "Basic principles of electrical engineering II". The proposed approach is intended to expand and improve the knowledge, the skills, and the understanding of students regarding finding the solutions of transients in linear electrical circuits in the Laplace domain.

KEY WORDS: transients, linear circuit, Laplace transform.

INTRODUCTION

In linear circuits with energy storage elements (inductors and capacitors), voltages and currents are calculated as solutions of linear differential equations with constant coefficients, found by application of Kirchhoff's laws for the circuit after the commutation. Engineers almost never solve the differential equations directly.

An easier approach is to use the primary Laplace transformation which actually transforms the system of differential equations regarding the voltages and the currents in the time domain into a completely algebraic system of linear equations which consists same magnitudes, but regarded as functions of the complex operator $p\ (p = a + jb)$. In this way the solution of the system regarding a certain current or voltage within the circuit is easily calculated in the Laplace domain. To get a time domain solution, the reverse Laplace transform is used.

According to a number of literature sources [1, 2, 3] the application of the Operator method engages current based solutions applying mostly the Kirchhoff's laws and the Loop current method in the "p" domain. The Syllabus for university students in the course "Basic principles of electrical engineering II" also discusses only the application of the Operator method for finding of current based solutions regarding transients in linear electrical circuits.

The current paper offers an approach for introducing of voltage based solutions using the Operator method and the Laplace transform that will help students to better understand the nature of the transient processes in linear electrical circuits.

VOLTAGE DROPS AND EQUIVALENT OPERATOR CIRCUITS OF IDEAL PASSIVE ELEMENTS. TRAVIAL CASES

According to the theory the following primary Laplace transformations of simple functions are used in regard with the application in electrical circuits [3, 4]:

- resistor - R

It is obvious that the resistor in the time domain has the same resistance as in the Laplace domain (fig.1):

$$u_R(t) = R \cdot i_R(t) \qquad \textbf{(1)}$$

$$U_R(p) = R\cdot i_R(p) \qquad \textbf{(2)}$$

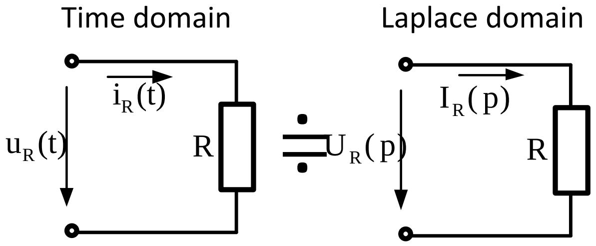


Figure 1. Resistor in the time domain and its operator equivalent circuit

- inductor – L (fig. 2)

The voltage of an inductor in the time domain is calculated as:

$$u_L(t) = L\cdot\frac{di_L(t)}{dt} \qquad \textbf{(2)}$$

Using the Laplace transform, the inductor’s voltage in the Laplace domain is:

$$U_L(p) = pL\cdot I_L(p) - L\cdot i_L(0) \qquad \textbf{(3)}$$

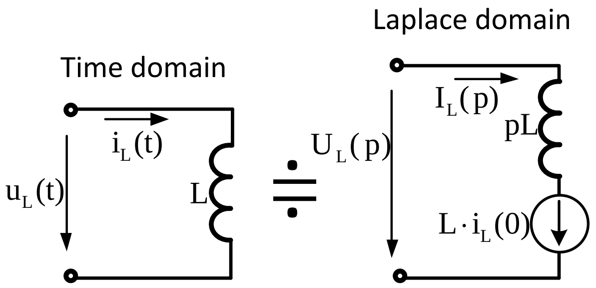


Figure 2. Inductor in the time domain and its operator equivalent circuit

It is obvious that in the operator equivalent circuit the branch with the inductor is substituted with a inductor with operatory resistance pL n series with an impulsive voltage source with a magnitude of $L\cdot i_L(0)$. Equation (3) represents the Kirchhoff’s second law in operator form regarding the inductor.

- capacitor – C (fig. 3)

The voltage of a capacitor in the time domain is calculated as:

$$u_C(t) = \frac{1}{C}\cdot\int_0^t i_C(t)\,dt + u_C(0) \qquad \textbf{(4)}$$

Using the Laplace transform, the capacitor’s voltage in the Laplace domain is:

$$U_C(p) = \frac{1}{pC}\cdot I_C(p) + \frac{u_C(0)}{p} \qquad \textbf{(5)}$$

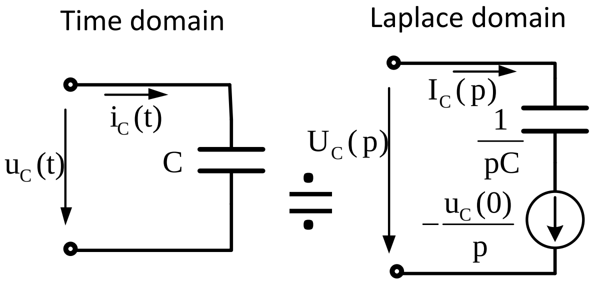


Figure 3. Capacitor in the time domain and its operator equivalent circuit

The operator equivalent circuit of a capacitor is substituted with a capacitor having an operatory resistance $\frac{1}{pC}$ in series with an impulsive voltage source with a magnitude of $-\frac{u_C(0)}{p}$. Equation (5) represents the Kirchhoff’s second law in operator form regarding the capacitor.

DEFINING OF VOLTAGE BASED SOLUTIONS OF TRANSIENTS IN LINEAR ELECTRICAL CIRCUITS IN THE LAPLACE DOMAIN

The above equivalents of ideal elements in the Laplace domain are widely used for creation of overall equivalent circuits, implemented in current based solutions of transients using Kirchhoff’s laws or the Method of loop currents.

In order to improve the knowledge, the understanding and skills of students in the discipline “Basic principles of electrical engineering II” it is a good approach to derive and solve the system linear equations in the Laplace domain not only regarding the transient currents in the branches of a circuit, but also to find voltage based solutions in the Laplace domain.

In order to find a voltage based solution of the transient process, the following rearrangements are made regarding the momentary values of the electrical magnitudes in the time domain and their operator equivalents:

- resistor – R – no change. In some cases it is better to work with resistor’s conductance - G

$$i_R(t) = \frac{u_R(t)}{R} \qquad \textbf{(6)}$$

$$i_R(p) = \frac{1}{R}\cdot U_R(p) = G\cdot U_R(p) \qquad \textbf{(7)}$$

- inductor – L (fig. 4)

If the current in the time domain is expressed as a function of the voltage upon the inductor:

$$i_L(t) = \frac{1}{L}\cdot\int_0^t u_L(t)\,dt + i_L(0) \qquad \textbf{(8)}$$

The inductor’s current in the Laplace domain therefore could be obtained by rearrangement of (3):

$$U_L(p) = pL\cdot I_L(p) - L\cdot i_L(0)$$

$$\Updownarrow$$

$$pL\cdot I_L(p) = U_L(p) + L\cdot i_L(0) \ \ /:pL$$

$$I_L(p) = \frac{U_L(p)}{pL} + \frac{\cancel{L}\cdot i_L(0)}{p\cancel{L}}$$

$$I_L(p) = \frac{U_L(p)}{pL} + \frac{i_L(0)}{p}$$

(9)

The obtained expression represents the Kirchhoff’s I^{-st} law regarding the current of an inductor in the Laplace domain. The term $\frac{i_L(0)}{p}$ then could be substituted in the equivalent operator circuit with an impulsive current source in parallel (fig. 4)

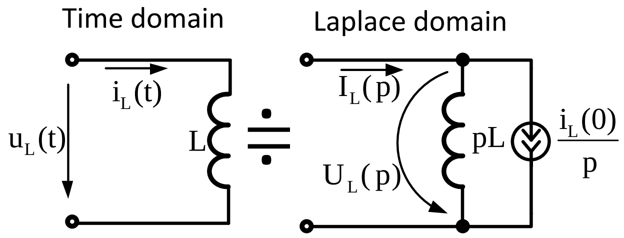


Figure 4. Inductor in the time domain and its operator equivalent circuit according to the Kirchhoff’s I-st law

- capacitor – C (fig. 5)

If the current in the time domain is expressed as a function of the voltage upon the capacitor:

$$i_C(t) = C\frac{du_C(t)}{dt} \qquad \textbf{(8)}$$

The capacitor’s current in the Laplace domain therefore could be obtained by rearrangement of (5):

$$U_C(p) = \frac{1}{pC}\cdot I_C(p) + \frac{u_C(0)}{p}$$

$$\Updownarrow$$

$$\frac{1}{pC}\cdot I_C(p) = U_C(p) - \frac{u_C(0)}{p} \ \ /\cdot pC \qquad \textbf{(9)}$$

$$I_C(p) = pC\cdot U_C(p) - \frac{\cancel{p}C\cdot u_C(0)}{\cancel{p}}$$

$$I_C(p) = pC\cdot U_C(p) - C\cdot u_C(0)$$

The obtained expression represents the Kirchhoff’s I^{-st} law regarding the current of a capacitor in the Laplace domain. The term $-C\cdot u_C(0)$ then could be substituted in the equivalent operator circuit with an impulsive current source in parallel (fig. 5)

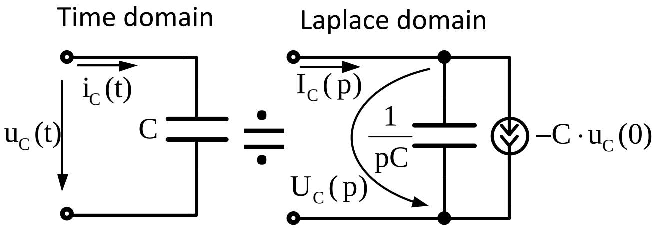
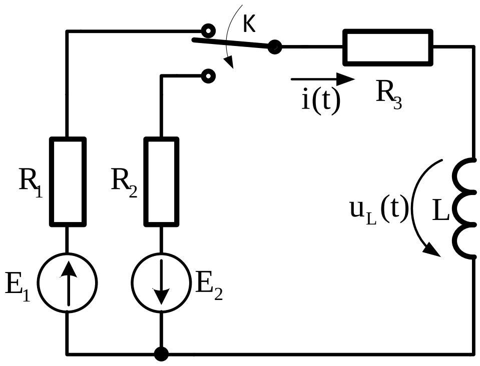


Figure 4. Capacitor in the time domain and its operator equivalent circuit according to the Kirchhoff’s I-st law

APPLICATION IN REAL ELECTRICAL CIRCUITS

The expressions derived in the previous chapter and the operator equivalent circuits of ideal elements will be demonstrated in two simple instances of transient processes solved using the Operator method regarding the transient voltage of an inductor $(u_L(t) = ?)$ and the transient voltage of a capacitor $(u_C(t) = ?)$.

Example 1



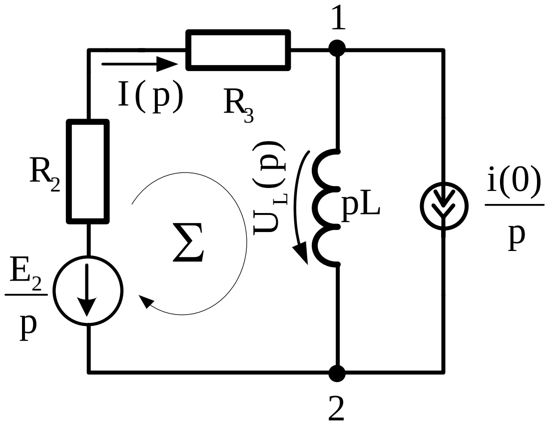
Find the transient voltage $u_L(t) = ?$ upon the inductor if: $E_1 = 200\ \text{V}$, $E_2 = 300\ \text{V}$, $R_1 = 10\ \Omega$, $R_2 = 20\ \Omega$, $R_3 = 5\ \Omega$, $L = 400\ \text{mH}$

Solution:

1) Independent initial conditions for the circuit prior the commutation:

$$i(0) = \frac{E_1}{R_1 + R_3} = \frac{200}{10+15} = 13{,}3\ \text{A}$$

2) Equivalent operator circuit after the commutation:



3) Two equations for the respective operator equivalent:

- Kirhoff's $1^{\text{-st}}$ law for node 1:

$$I(p) = \frac{U_L(p)}{pL} + \frac{i(0)}{p}$$

- Kirhoff's $2^{\text{-st}}$ law for loop Σ:

$$(R_2 + R_3) I(p) + U_L(p) = -\frac{E_2}{p}$$

4) Both equations are combined in a system:

$$\left| \begin{array}{l} I(p) = \dfrac{U_L(p)}{pL} + \dfrac{i(0)}{p} \\ (R_2 + R_3) I(p) + U_L(p) = -\dfrac{E_2}{p} \end{array} \right.$$

5) $I(p)$ from the first eq. is substituted in the second eq.:

$$(R_2 + R_3)\left[\frac{U_L(p)}{pL} + \frac{i(0)}{p}\right] + U_L(p) = -\frac{E_2}{p}$$

$$(R_2 + R_3)\frac{U_L(p)}{pL} + (R_2 + R_3)\frac{i(0)}{p} + U_L(p) =$$

$$= -\frac{E_2}{p}$$

6) An expression is derived regarding $U_L(p)$:

$$(R_2 + R_3)\frac{U_L(p)}{pL} + U_L(p) = -\frac{E_2}{p} - (R_2 + R_3)\frac{i(0)}{p}$$

$$U_L(p)\left(\frac{R_2 + R_3}{pL} + 1\right) = -L \cdot \frac{E_2 + (R_2 + R_3) i(0)}{pL}$$

$$U_L(p)\left(\frac{R_2 + R_3 + pL}{\cancel{pL}}\right) = -\frac{L \cdot \left[E_2 + (R_2 + R_3) i(0)\right]}{\cancel{pL}}$$

$$U_L(p) \cdot (R_2 + R_3 + pL) = -L\left[E_2 + (R_2 + R_3) i(0)\right]$$

$$U_L(p) = \frac{-L\left[E_2 + (R_2 + R_3) \cdot i(0)\right]}{(R_2 + R_3 + pL)} = \frac{G(p)}{H(p)}$$

7) Laplace to time domain conversion is made:

- The roots of $H(p) = 0$ are found:

$$(R_2 + R_3 + pL) = 0$$

$$p_1 = -\frac{R_2 + R_3}{L} = -\frac{20+5}{0{,}4} = -62{,}5$$

- The first derivative $H'(p)$ is found:

$$H'(p) = (R_2 + R_3 + pL)' = L$$

- The time domain solution about $u_L(t)$ is:

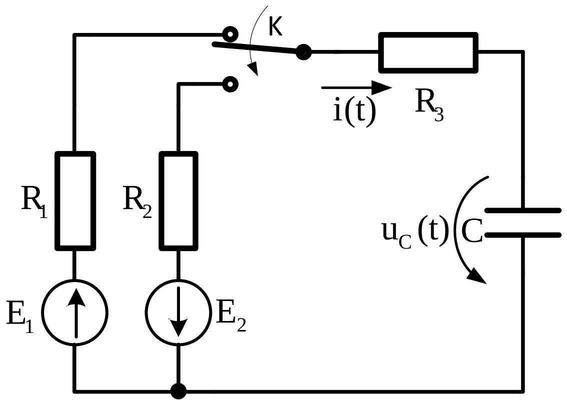
$$u_L(t) = \frac{G(p_1)}{H'(p_1)} \cdot e^{p_1 . t} =$$

$$= \frac{-\cancel{L}\left[E_2 + (R_2 + R_3) \cdot i(0)\right]}{\cancel{L}} \cdot e^{p_1 . t} =$$

$$= \left[-300 - (20+5) \cdot 13{,}3\right] \cdot e^{-62{,}5.t}\ \ \text{V}$$

$$u_L(t) = -632{,}5 \cdot e^{-62{,}5.t}\ \ \text{V}$$

Example 2



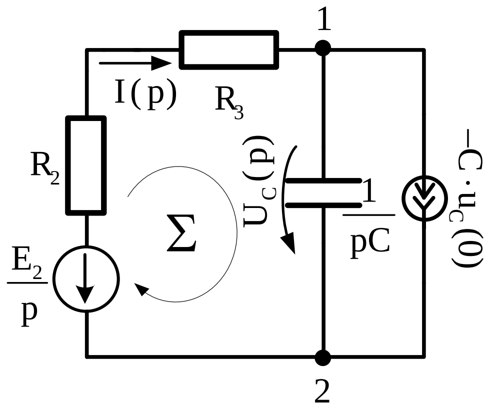
Find the transient voltage $u_C(t)=?$ upon the capacitor if: $E_1=200\ V$, $E_2=300\ V$, $R_1=10\ \Omega$, $R_2=20\ \Omega$, $R_3=5\ \Omega$, $C=250\ \mu F$

Solution:

1) Independent initial conditions for the circuit prior the commutation:

$u_C(0)=E_1=200\ V$

2) Equivalent operator circuit after the commutation:



3) Two equations for the respective operator equivalent:

- Kirhoff's 1-st law for node 1:

$$I(p)=\frac{U_C(p)}{\frac{1}{pC}}-C\cdot u_C(0)$$

- Kirhoff's 2-st law for loop Σ:

$$(R_2+R_3)I(p)+U_C(p)=-\frac{E_2}{p}$$

4) Both equations are combined in a system:

$$\left|\begin{array}{l} I(p)=pC\cdot U_C(p)-C\cdot u_C(0) \\ (R_2+R_3)I(p)+U_C(p)=-\frac{E_2}{p} \end{array}\right.$$

5) $I(p)$ from the first eq. is substituted in the second eq.:

$$(R_2+R_3)\left[pC\cdot U_C(p)-C\cdot u_C(0)\right]+U_C(p)=-\frac{E_2}{p}$$

$$(R_2+R_3)\cdot pC\cdot U_C(p)-(R_2+R_3)C\cdot u_C(0)+U_C(p)=$$
$$=-\frac{E_2}{p}$$

6) An expression is derived regarding $U_C(p)$:

$$(R_2+R_3)\cdot pC\cdot U_C(p)+U_C(p)=-\frac{E_2}{p}+(R_2+R_3)C\cdot u_C(0)$$

$$U_C(p)\left[(R_2+R_3)\cdot pC+1\right]=\frac{-E_2+pC(R_2+R_3)\cdot u_C(0)}{p}$$

$$U_C(p)=\frac{-E_2+pC(R_2+R_3)\cdot u_C(0)}{p\cdot\left[(R_2+R_3)\cdot pC+1\right]}=\frac{G(p)}{H(p)}$$

7) Laplace to time domain conversion is made:

- The roots of $H(p)=0$ are found:

$$p\cdot\left[(R_2+R_3)\cdot pC+1\right]=0$$

$$p_1=0;\ p_2=-\frac{1}{(R_2+R_3)\cdot C}$$

$$p_2=-\frac{1}{(20+5)\cdot 250\cdot 10^{-6}}=-160$$

- The first derivative $H'(p)$ is found:

$$H'(p)=\left\{p\cdot\left[(R_2+R_3)pC+1\right]\right\}'=2p(R_2+R_3)C+1$$

- The time domain solution about $u_C(t)$ is:

$$u_C(t)=\frac{G(p_1)}{H'(p_1)}\cdot e^{p_1.t}+\frac{G(p_2)}{H'(p_2)}\cdot e^{p_2.t}$$

$$u_C(t)=\frac{G(0)}{H'(0)}+\frac{G(-160)}{H'(-160)}\cdot e^{-160.t}=$$

$$=\frac{-E_2}{1}+\frac{-E_2+p_2\cdot(R_2+R_3)C\cdot u_C(0)}{2\cdot p_2\cdot(R_2+R_3)C+1}\cdot e^{p_2.t}=$$

$$=\frac{-300}{1}+\frac{-300+(-160)(20+5)\cdot 250\cdot 10^{-6}\cdot 200}{2(-160)(20+5)\cdot 250\cdot 10^{-6}+1}\cdot e^{-160.t}$$

$$u_C(t)=\text{-}300+500\cdot e^{-160.t}\ V$$

CONCLUSIONS

The derived equivalent operator circuits and their implementation in the Operator method could be successfully included and applied in the syllabus of the discipline "Basic principles of electrical engineering II". That will improve the knowledge and the understanding of students about transient processes in linear electrical circuits.

As a result, voltage based solutions of transient processes in complex linear circuits with energy storage elements in the Laplace domain could be solved by using not only current based methods, but also by using of voltage base methods such as the method of node potentials etc.

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MODERNIZATION OF A SMALL COGENERATION PLANT

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ABSTRACT: During the 2015 Summit, the G7 leading industrial nations have agreed to cut greenhouse gases by phasing out the use of fossil fuels by the end of the century. The European Climate Foundation described the G7 leaders' announcement as historic, saying it signaled "the end of the fossil fuel age". Since the wood waste is available at low cost and the financial support (green certificates) for electricity generation from biomass is guaranteed, several Romanian wood processing companies are interested in becoming electricity producers. The Organic Rankine Cycle (ORC) has been progressively adopted as a significant technology to convert low-temperature heat resources into electricity. This paper presents a running project of a biomass-fuelled cogeneration plant with ORC technology and analyzes the economic viability of the investment through a discounted cash flow analysis.

KEY WORDS: biomass, cogeneration plant.

1. INTRODUCTION

The previous 35 years were characterized in Romania by generation of electricity based mainly on fossil fuels combustion.

According to the European Union requirements (Harmsen et al., 2011), the power and heat generation for industry and household sectors have to gradually glide from fossil fuels to renewable sources of energy. Although the further enlargement of wind, water and solar sources of energy capitalization is encouraged in the current frame of Romania, biomass is still an auspicious source of energy for the future.

Biomass use for energy purposes gained particular interest in recent years (Demirbas et. al., 2009) because: (1) it contributes to poverty reduction in developing countries, (2) it meets energy needs at all times, without expensive conversion devices, (3) it can deliver energy in all forms that people need (liquid and gaseous fuels, heat and electricity), (4) it is carbon dioxide ($CO2$)-neutral and can even act as carbon sinks, and (5) it helps restoring unproductive and degraded lands, increasing biodiversity, soil fertility and water retention.

Biomass sources are basically forests, agricultural plantations, industrial waste, bush trees, crop and processing residues and domestic wastes.

According to Romanian Ministry of Environment and Forests (2010), the forests cover 65,150 km^2, representing 27.32% of the total area of Romania. Fifty two percent of the forests are in the mountains, thirty seven percent in the hilly regions and eleven percent in the plains. Forest composition is diversified: beech 32%, conifers 30%, oak species 17%, different hard broad-leaves 15% and soft broad-leaves 5%.

The current method used to determine the allowable cut aims to maximize the forest development. The average growing stock is 560 m^3/ km^2 /year or 36.5 mil. m^3 /year and the maximum volume of wood approved to be harvested for 2008-2010 was around 17 mil. m^3 /year.

The main function of 53.3 % of the forests is to protect different ecosystems from pollution, soil erosion, to create watershed protection or they are part of national parks. The main function of 46.7% of the forests is biomass production.

The long-term goals are focused on the regeneration of forest areas from which the wood was harvested, on the forestation of non forest land, on the development of the public forest estate and on the preservation of private forests.

The biomass type that was assessed in this paper is the wood waste from wood processing industries. The wood is widely used for manufacturing different products and an undesirable result of the processing consists in large amounts of clean wood fractions. This waste is usually dried and released in a storehouse. Wood industries already use part of this waste for heating and wood drying.

2. TECHNICAL DESCRIPTION OF THE PLANT

The situation of a wood processing company located in Romania is analyzed.

The thermal energy demand of the company for technological process is up to 5.35 MW_{th} as hot water with temperature of 70°C/95°C and maximum 1.2 MW_{th} as hot water with temperature of 125°C/150°C. The heat consumption is relatively constant during the year. During winter the space heating induces a low increase of heat consumption.

In the past, the thermal energy was provided by three old boilers, one of 5 MW_{th} and two of 2 MW_{th} each. Due to the low overall energy efficiency of the boilers, it was necessary to update and upgrade the technology.

For the business opportunity assessment of an investment into the decision to invest in the implementation and operation of a biomass cogeneration plant, the following inputs were considered:

- a significant need of heat to cover the annual consumption of thermal energy in the form of hot water;
- a significant annual electricity demand for technological purposes;
- availability of large amounts of biomass as wood waste resulted from the raw wood processing and furniture manufacturing;
- limited capacity of wood yards; during the summer season, a lot of storage problems may occur (e.g. self heating);

A biomass fuelled cogeneration plant with Organic Rankin Cycle (ORC) technology was chosen, as various worldwide industrial applications demonstrated that is a well proven industrial technology for application in small biomass cogeneration plants.

The company operates 330 days per year, 24 h per day, so it is obvious that the power plant has to operate continuously, as the main objective of the power plant is to fully satisfy the thermal needs for technological process.

The biomass fired ORC cogeneration plant is based on a closed Rankine cycle, the working fluid being an organic fluid- see Figure 1.

The ORC technology is characterized in that the working fluid does not receive directly the heat generated by biomass combustion. An intermediate fluid, usually thermal oil, is initially heated in a biomass fired boiler. The thermal oil at high temperature transfers heat to the working fluid, which vaporizes. The high pressure organic vapour expands into a turbine and a turbo-generator converts the mechanical energy into electricity.

In sizing the ORC plant, the Directive 2004/8/EC requirements were fulfilled: (1) full coverage of total annual consumption of heat, (2) partial coverage of total annual electricity demand.

Based on 2005 – 2010 annual energy consumption - see Table 1, the ORC power plant was designed to generate more than 42,737 $MW_{th}h$ of thermal energy. The investment was made inside the company's location, on a space already available, free of any encumbrances and owned by the company. The main equipment of the cogeneration plant based on biomass is: (1) a biomass fired thermal oil boiler with a rated capacity of 8 MW_{th} and a rated temperature of 320˚C; (2) a hot water boiler with a nominal capacity of 1.25 MW_{th} (125˚C/150˚C) and a hot water boiler with a nominal capacity of 5.35 MW_{th} (75˚C/95˚C); (3) the cogeneration plant based on organic cycle, with 1,317 kW_{el} gross electrical power. To increase the overall efficiency of the ORC cogeneration unit, a regenerator with a rated capacity of 4 MW_{th} was placed before the condenser.

Thus, the ORC plant will annually generate 43,281 $MW_{th}h$ of heat and 6,450 $MW_{el}h$ of electricity.

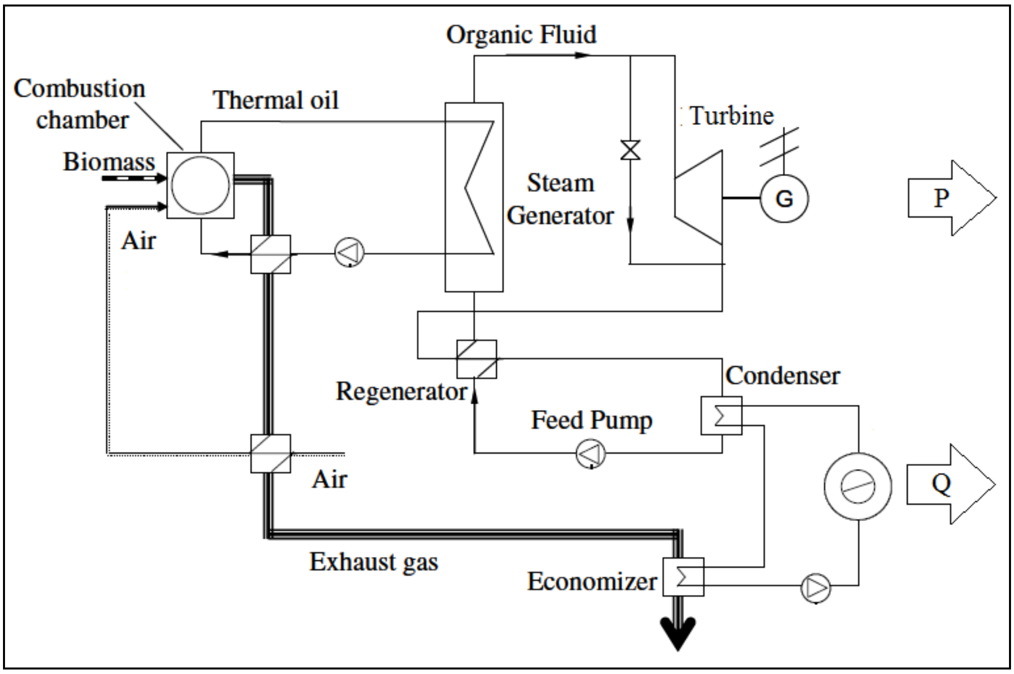

Figure 1- Biomass fired ORC Cogeneration Plant (after Rentizelas et al., 2009).

Table 1 The company's energy consumption

Year		2005	2006	2007	2008	2009	2010
Electricity	$MW_{el}h$	17.800	23.364	15.044	14.919	11.397	12.000
Thermal Energy	$MW_{th}h$	39.662	42.495	31.601	32.019	23.967	42.737
Wood Waste	tonne	18.480	19.800	14.724	14.919	11.167	19.615
Energy Bill	US $	1,438,666	1,886,251	1,214,550	1,204,459	920,129	968,799

3. EVALUATION OF THE PRIMARY ENERGY SAVINGS

Each Member State is free to adopt its own unique renewable energy promotion strategy in order to achieve the final target of the Community, '20-20-20': reducing greenhouse gas emissions by 20%, increasing the share of renewable sources in energy consumption to 20% and improving energy efficiency by 20%, all by 2020.

Romania implemented the first support scheme in 2005. This was based on a combination between quota obligations and tradable green certificates. The initial support scheme was improved periodically with some enactments

In contrast to the provisions of the former Law no. 220/2008, the Government Emergency Ordinance no.88/2011 reduces the number of green certificates from 3 certificates to 2 certificates for the electricity obtained from geo-thermal energy, biomass (other than that coming from energy cultures), bio-liquids, bio-gas and from 3 to 1 for the gas from processing the wastes and fermenting gas from mud.

On the other hand, the producers of electricity through cogeneration plants qualified by the Romanian Energy Regulatory Authority as having high efficiency will supplementary benefit of one green certificate for each MWh generated and delivered.

Authors are assuming that the analyzed company is an eligible customer, in line with the definitions from Directive 2003/54/EC.

In Annex III of the Directive 2003/54/EC is stipulated that ”cogeneration production from cogeneration units shall provide primary energy savings calculated according to point (b) of at least 10% compared with the references for separate production of heat and electricity”.

In Annex III of the Directive 2004/8/EC, the amount of primary energy savings provided by cogeneration production is determined with the formula:

$$\mathrm{PES} = \left(1 - \frac{1}{\frac{\mathrm{CHP\ H}\eta}{\mathrm{REF\ H}\eta} + \frac{\mathrm{CHP\ E}\eta}{\mathrm{REF\ E}\eta}} \right) \times 100\% \quad (1)$$

where:

- PES - the primary energy savings;
- CHP Hη - the heat efficiency of the cogeneration production, defined as an annual useful heat output divided by the fuel input used to produce the sum of useful heat output and electricity from cogeneration;
- REF Hη - the efficiency reference value for separate heat production;
- CHP Eη - the electrical efficiency of the cogeneration production defined as annual electricity from cogeneration divided by the fuel input used to produce the sum of useful heat output and electricity from cogeneration;
- REF Eη - the efficiency reference value for separate electricity production.

The use of this method is motivated by the fact that “Organic Rankine Cycle” is listed in the Annex I of the Directive 2004/8/EC. As indicated in the Annex III of the Directive 2004/8/EC, such technology could be also classified as high-efficiency cogeneration.

As considered in a precedent paper (Voronca et al., 2011), the purposes of using the previously mentioned method consist in promptly delivering valid data referring to an existing situation analyzing the efficiency of the separate production of heat and electricity, while collecting accurate information regarding the efficiency of the Organic Rankine cycle based cogeneration technology.

For energy savings calculation reasons, it was assumed that the electricity market is still dominated by fossil fuel-based electricity producers. Consequently, the efficiency reference value for separate electricity production in thermal power plants in Romania of 31.85% (Voronca et al., 2011) is to be associated to the variable REF Eη from the formula (1).

The value associated to the variable REF Hη from the formula (1) is 92%, by assuming that the heat is produced within a modern thermal plant (a disadvantageous assumption for the intended comparison).

The Annex II of the Directive 2004/8/EC mentions that the overall efficiency for micro-cogeneration units should be calculated based on certified values. The overall efficiency of the biomass based ORC cogeneration unit was considered 85% (Wood and Rowley, 2011, Vescovo, 2009).

The electrical efficiency of the ORC process lies between 6% and 17% (Rentizelas et al., 2009, Vescovo, 2009), being linked with the maximum heat recovery and the thermal efficiency of the boiler. The thermal efficiency of the ORC cogeneration plant lies between 70% and 75% (Duvia et al, 2009, Rentizelas et al., 2009). For the variable CHP Eη from the formula (1) an average value was assigned, 12%, and the associate value for the thermal efficiency of the ORC cogeneration unit, CHP Hη, is 72%.

By introducing the values mentioned above in formula (1), the estimated primary energy savings are 13.76% and this value qualifies the ORC cogeneration plant as high-efficient cogeneration unit.

According to the previously mentioned Romanian legislation, the producer will be granted three green certificates for each MWh generated and delivered: two certificates for the electricity obtained from biomass and one certificate for electricity produced in high efficiency cogeneration plant.

4. ADEQUATE FINANCIAL PROSPECTS

For the biomass based ORC cogeneration unit, the power extraction from waste heat (wood waste) is financially adequate exclusively due to avoided costs related to fuel and power purchasing expenditures. Access to “no cost” or “low cost” wood waste as well as important amounts of heat for drying purposes and power needed in technological processes are opportunities creating a favourable investment environment. The price for biomass is higher the better the quality (lower contamination) is. An average price of €10/ton was considered.

The total investment size for the biomass based cogeneration unit is expected to come to €5,227,273 (Peretti, 2008) - see Table 2.

Costs in Table 2 do not include custom duties (as the manufacturer is an Italian company), storage taxes and VAT, but include transportation fees and authorization taxes.

In the period 2008-2025 the trading value of the green certificates ranges between a minimum trading value of €27/certificate, and a maximum trading value of € 55/certificate. The minimum price was considered in analysis.

Table 2 Investment costs for ORC cogeneration plant

Biomass Cogeneration Project	€
Biomass based ORC cogeneration unit	4,772,727
Other equipments	189,394
Design, Engineering, Erection Works, Commissioning	265,152
TOTAL	5,227,273

The ORC plant will annually generate 43,281 $MW_{th}h$ of heat and 6,450 $MW_{el}h$ of electricity. The remainder 5,550 $MW_{el}h$ of electricity must be purchased from a local distribution company. The average retail price of electricity is 68 €/$MW_{e}h$, VAT excluded.

5. RESULTS AND DISCUSSIONS

The economic viability of the project was assessed using a discounted cash flow analysis. This relates the values of costs and revenues that occur over the economic life of the project in terms of present value. Some standardized financial tools, net present value, internal rate of return, gross payback time and discounted payback time were used to evaluate the investment.

To determine the investment performance indicators, the following notations were adopted (Voronca et al., 2008): a - the discount rate, h - the year of expenditure or earning, d -duration of erection works, D - the lifetime of investment V_h - the annual revenue in year h, C_h - the annual expenditure in year h, and I_h - the annual investment in year h

Net present value (NPV) refers to the difference between the present value of cash inflows and the present value of cash outflows.

Based on the discounted cash flow CF_h, determined with the relation (2):

$$CF_h = [V_h - (I_h + C_h)]\frac{1}{(1+a)^h}, \; h = \overline{1, D+d} \quad (2)$$

the net present value NPV is determined as follows (3):

$$NPV = \sum_{h=1}^{d+D} \frac{V_h}{(1+a)^h} - \sum_{h=1}^{d+D} \frac{I_h + C_h}{(1+a)^h} > 0 \quad (3)$$

The internal rate of return IRR is the interest rate that makes the net present value of all cash flow equal to zero.

For the biomass based ORC cogeneration unit, the values associated to the investment performance indicators were obtained with a discount rate of a = 12%, for a duration of erection works d = 1 year, a lifetime of investment D = 20 years, with annual net revenues V_h = 902,479€ - see Table 3, and annual expenditures C_h = 0, for an investment in the year d of I_h = 5,227,273€ (for any other year h from the interval d, D + d, I_h being null).

Table 3 Annual revenues

		Current situation		Cogeneration		Revenues
	Unit of measure	Quantity	€/year	Quantity	€/year	€/year
Biomass	tonnes/year	19,615	196,150	21,704	217,040	-20,890
Thermal energy	$MW_{th}h$/year	42,737	0	43,281	0	0
Electricity	$MW_{el}h$/year	12,000	816,000	5,550	377,400	438,600
Maintenance	-	-	33,168	-	70,849	-37,681
Personnel	-	-	156,030	-	156,030	0
Green certificates	Pieces/year	-	0	19350	-522,450	522,450
TOTAL			1,201,348		298,869	902,479

For the gross payback time GPT and the discounted payback time DPT relations (4) and (5) are used:

$$\sum_{h=1}^{DPT} \frac{V_h - (I_h + C_h)}{(1+a)^h} = 0 \qquad (4)$$

$$\sum_{h=1}^{GPT} \left[V_h - (I_h + C_h)\right] = 0 \qquad (5)$$

The values determined under this presumption are presented in Table 4.

Table 4 Investment Performance Indicators

a	12	%	C_h	0	€
V_h	902.479	€	I_h	5,227,273	€
GPT	5.8	years	NPV	1,513,473	€
DPT	10.5	years	IRR	16.44	%

5. CONCLUSION

The increasing concern over climate change and unstable fossil fuel prices was driving the development of new technologies to generate electricity from low temperature heat sources. The Organic Rankine Cycle (ORC) system is the most widely used especially in biomass and geothermal applications.

ORC based cogeneration requirements are: the “heat resource” to be available, accessible and affordable and steady heat use demand.

Several years ago, the ORC was not an attractive application because of high investment costs. The recent incentives stipulated in enactments guarantee that for each MWh generated in biomass high efficiency cogeneration plant and delivered, the producer will receive three green certificates, at a minimum tradable value of 28 €. These ensure a positive net present value and an internal rate of return greater than the discount rate or, otherwise said, the financial viability of the application.

The implementation of such applications encourage investors to consider that cogeneration in Romania by using ORC based technologies represents the new investment trend in changing energy end user behaviour, with favourable cost cutting, improvements in security power supply and increasing competitiveness through clean energy.

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AN ALTERNATIVE APPROACH FOR SELECTION OF HEAT TRANSFER AND PRESSURE DROP CORRELATION FOR COMPACT HEAT TRANSFER SURFACES

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ABSTRACT

Selection of the heat transfer and pressure drop correlations is a complicated and multi-faceted issue in the design workflow of compact heat exchangers. There are several reasons behind this issue, the most important being the validity of the correlations over narrow Reynolds number intervals. In practice, heat transfer and pressure drop correlations are derived experimentally under laboratory conditions and for Reynolds interval considered most probable. Depending on the application, the flow regime can deviate significantly from the design conditions, resulting in operation conditions that may be far from the expected ones. The algorithm proposed in this paper allows a flexible choice of the heat transfer and pressure drop correlation that results in a trade-off between thermodynamic effectiveness and operation under controlled conditions.

Keywords: Heat transfer correlation, Pressure drop correlation

INTRODUCTION

Compact heat exchangers tend to replace conventional exchanger wherever possible due to the large area to volume ratio, high effectiveness and compactness. However, the geometrical complexity of the heat transfer surfaces requires development of heat transfer and pressure drop correlations for each surface type. Even for surfaces geometrically similar it is necessary to derive new correlations since the geometrical complexity makes impossible to assess the influence of the geometrical similarities.

Heat transfer surface configurations for plate fin heat exchangers were developed in the attempt to adapt such devices to various working fluids, applications and fluid parameters and to enhance the heat exchanger performance.

It is well known that that transfer and pressure drop correlation are difficult if not impossible to derive by means of analytical techniques in the case of special and complex geometries. Such cases are heat transfer surfaces for compact heat exchangers for gases. Such surfaces have a complicated geometry designed to enhance the heat transfer. However, heat transfer enhancement is accompanied usually by an increase of the pressure drop. Such devices are known for high thermal performances, high heat transfer surface to volume ratio and low maintenance. Experimental data for heat transfer and pressure drop are known in the literature, the reference title being Kays and London [1].

LITERATURE REVIEW

Compact heat exchangers offer due to their wide range of applicability and versatility, low capital cost compared to other heat transfer systems and high reliability. Taboas et al [2] investigated experimentally heat transfer and pressure drop of boiling ammonia/water mixture in a compact heat exchanger of the type plate fin. The author found convective boiling correlations in plate fin heat exchanger channels and showed that the two-phase enhancement factor should be lower than for tubes.

Durmuş et al [3] investigated empirically heat transfer and pressure drop in plate heat exchangers with different geometry layouts. The main factors that affect the heat exchanger effectiveness were identified by means of developing Nusselt-Reynolds and friction factor-Reynolds correlations. It was found that highest heat transfer rate occurs in corrugated type heat exchanger but also the highest pressure drop, which increases significantly the capital cost.

In [4], Arsenyeva et al developed a modified Von Karman analogy of heat and momentum transfer for plate fin heat exchangers. Duct geometry, flow velocity and fluid properties on heat transfer were considered allowing calculation of the convective heat transfer coefficients by employing the generalized correlation for friction factor at the main corrugated field of the inter-plate channel. The equation proposed was confirmed experimentally. Kurganov et al [5] studied heat transfer and hydraulic resistance of supercritical pressure coolants. Applicability of normal heat transfer and pressure drop correlations to supercritical fluids (water and carbon dioxide) was assessed.

METHODOLOGY

Heat transfer surface types presented in this paper are described in detail in Kays and London [1]. Heat transfer data in the form of Re-StPr$^{2/3}$ and pressure drop data in the form Re-f are included for a large number of heat transfer surface types. Geometrical characteristic as well as heat transfer data and friction factors were included in [1]. The following heat surface types were studied experimentally in [1]: tubular surfaces, plate fin surfaces, banks of finned tubes and matrix surfaces. Plate fin surface types studied were plain fins, louvered fins, strip fins, wavy fins, pin fins and perforated fins.

The algorithm of selection the most appropriate heat transfer and pressure drop correlation is based on the observation that same heat transfer surface type may be incorporated in different heat exchangers operating under different conditions. Such conditions may differ in such way that Re number differs by one order of magnitude or more. The heat transfer surface manufacturer will only provide a high accuracy heat transfer and pressure drop correlation over a limited Reynolds number range. Thus, what is a precise correlation for the first heat exchanger may be far from reality for the second exchanger using the same heat transfer surface. Under such circumstances, the user may find that the heat exchanger or the system from which the heat exchanger is c part doesn’t reach the design value of the effectiveness. In extreme conditions, for highly demanding applications, the whole system may become inoperable. The heat transfer surface manufacturer prefers to provide a single correlation valid for a Re number range. This is because of several reasons: (i) a heat transfer/pressure drop correlation developed over a wide Re range is inherently affected by errors; (ii) developing accurate correlations for narrow Re number values is resource-consuming.

Heat transfer and pressure drop correlations for compact heat transfer are of the form $StPr^{2/3} = aRe^{b}$. For heat transfer correlation:

$$StPr^{2/3} = a_{11}Re^{b_{11}} \text{ for } Re < Re_{tr1} \tag{1}$$

and

$$StPr^{2/3} = a_{12}Re^{b_{12}} \text{ for } Re > Re_{tr1} \tag{2}$$

Same applies for pressure drop:

$$f = a_{21}Re^{b_{21}} \text{ for } Re < Re_{tr2} \tag{3}$$

and

$$f = a_{22}Re^{b_{22}} \text{ for } Re > Re_{tr2} \tag{4}$$

The criteria for identifying the Re_{tr} value is minimization of the least squares calculated by employing the experimental data provided in [1]. A detailed discussion on identification of Re_{tr}has been given in [6]. The method that will be presented in this paper attempts to develop a single correlation valid over a wide range of Re number having as a start point several correlations developed over narrow Re number ranges. Dividing the Re interval in a number of subintervals and defining separate correlations for each interval is an approach represented in Figure 1. It has the advantage of generating accurate correlations over small Re number intervals but connections between intervals result in discontinuities, as presented in Figure 1.

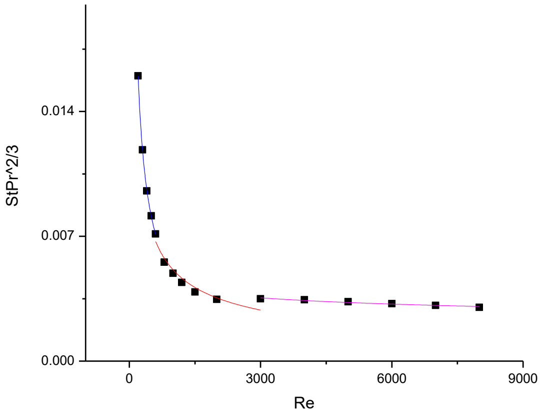

Figure 1. Heat transfer correlation for 12.00T surface type using three Re subintervals

(Figure 1 presents heat transfer correlation for surface type 12.00T, with geometrical characteristics, heat transfer and flow friction data given in reference [1]). A number of three Reynolds number subintervals were defined and heat transfer correlations were identified as shown in detail in [6] using the data provided in [1].

However, by means of optimization the following situation is reached (Figure 2).

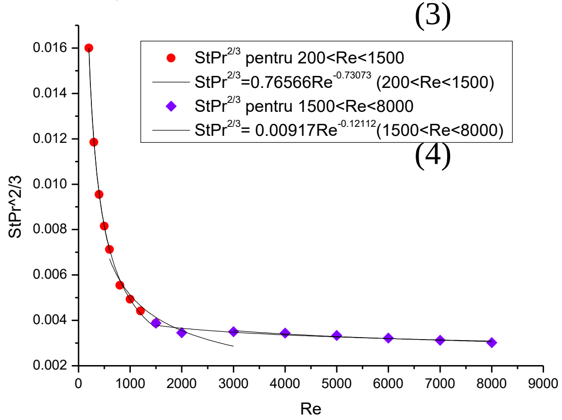

Figure 2. Heat transfer correlation for 12.00T surface type with optimized intervals.

In case of pressure drop correlations the first optimization attempt considered the same Reynolds intervals as in the case of heat transfer correlations.

The results are presented in Figure 3.

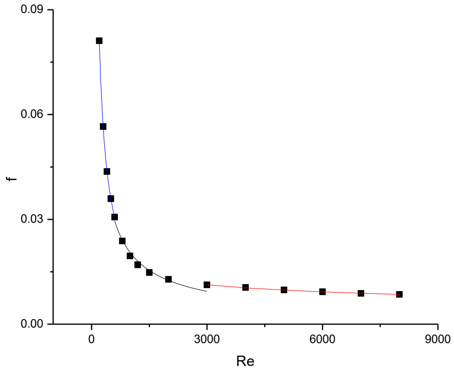

Figure 3. Pressure drop correlations over three Reynolds intervals

Pressure drop correlations can be optimized in the same way, as shown in Figure 4. A number of two intervals for Reynolds was found to optimize the correlation error over a wide Re interval.

The approach can be generalized and implemented in a computer program in order to generate automatically the best interval combination.

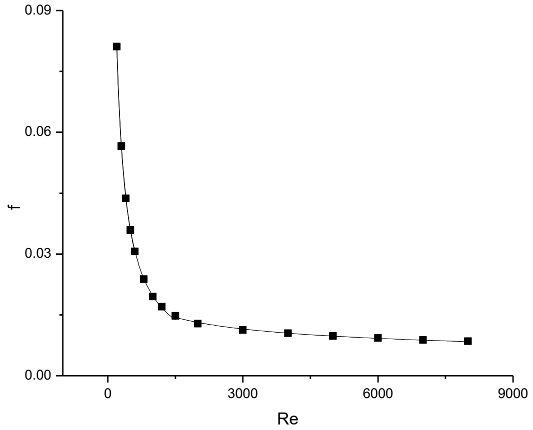

Figure 3. Optimized pressure drop correlations

CONCLUSIONS

Reynolds number intervals over which heat transfer correlations were defined were identified with the purpose of optimizing the heat transfer and pressure drop correlations, in the sense of minimizing the error over a large Reynolds interval.

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MODEL CALCULATION OF A SMALL HYDROPOWER

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Abstract
A hydro scheme with a small hydro is –MHC- towards achieving maximum fall towards the lake of electricity aval.and maxim.

Keyword: small hydro, hydropower, turbines.

Introduction

It shows the general layout of water intake facilities from the lake downstream to produce and distribute energy through processing stations. The general scheme of a small hydro hydropower is shown in Figure 1.

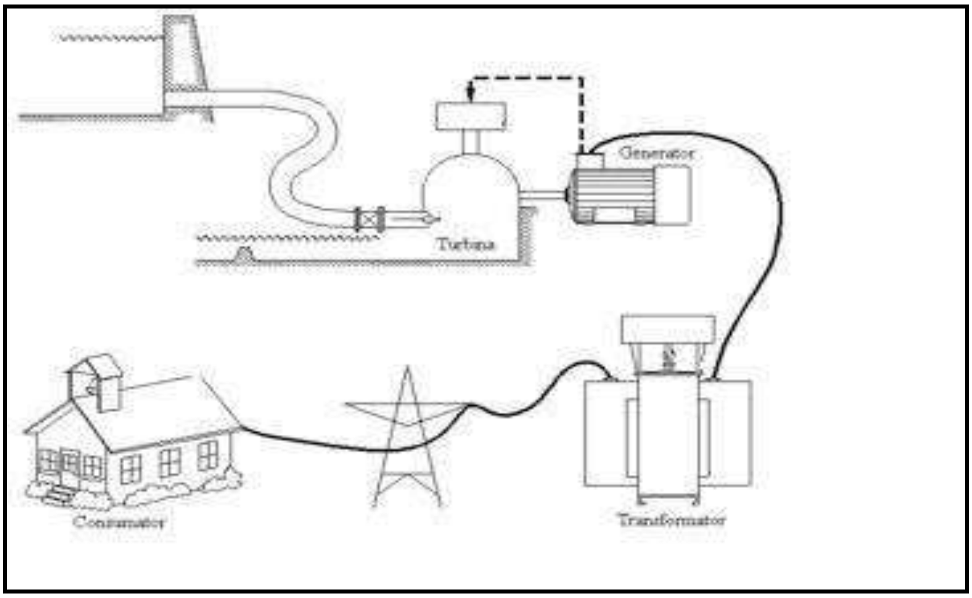

Figure 1. General scheme of hydropower with MHC

Always energy is lost when it is converted from one form to another. Small water turbines rarely have efficiencies greater than 80%. Power will be also lost water pipe through which the turbine due to friction losses. Through careful design, this loss can be reduced but a very small extent.

In a rough approximation, for small systems

of a few kW, overall yield 60% can be considered. As such, the theoretical power is calculated (estimated hydropower potential) multiplied by 0.60 to get a result more realistic about what it can get electrical power from hydropower developments that.

The generators, there are two basic types . generally used in small hydro namely synchronous and asynchronous (induction). A synchronous generator can operate isolated time. Small hydropower can be equipped with:

- Kaplan turbines, small H = 10-70 m drop and high flow Q = 700-800 m3 / s;
- Fracis turbines, falling midway between H = 70-600 m and middle flow;
- Pelton turbines, dropping huge H 1000- 2000 m and very low flows Q = 15 m3 / s.

Features General energy for these types of turbines are shown in Table 2

Table 2. Characteristics turbines

Turbine type	Fastness n_s	Maxim power MW	Maxim falling m
Pelton	< 70	180	1766
Kaplan	600-1200	500	70
Francis	70 - 450	508	522

Landscaping MHC version

Between the hydraulic turbine and the working conditions there is a functional inerdependenţă to be considered when ordering the turbine and its operation to get the results dorite.În fitting considering alternative power supply possibility of a cottage and its outbuildings Figure 3 on the river.

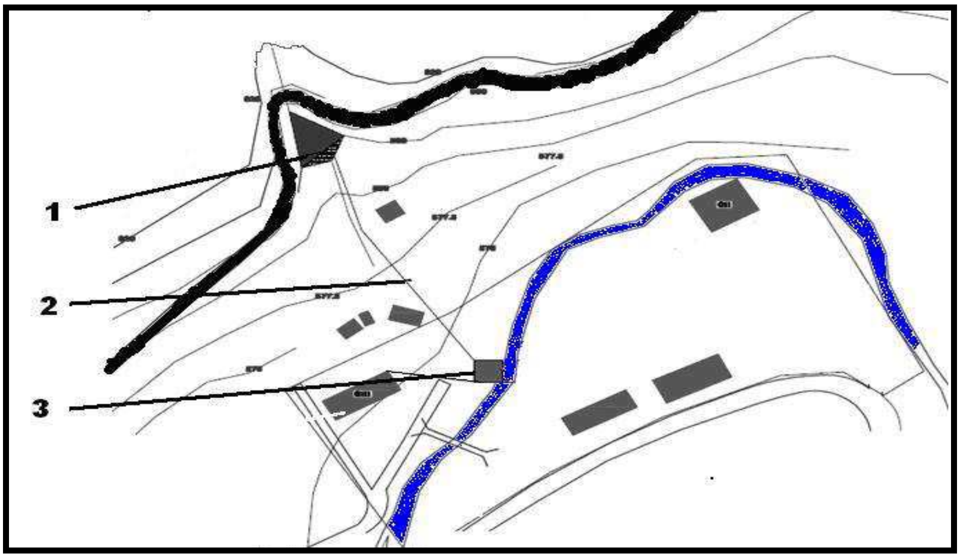

Figure 3. The layout of microhidrocentralei
1- reservoirs; 2 - adduction pipe 3 - small Hydropower

Landscaping involves the formation of a storage pool for the microhidrocentralei whose volume is determined by the relationship::

$$V = 1/6(L \times l \times h)= 687\ [m^3]$$

The calculations are established medium quantities of energy flow hydrometric station data:: Q_{med}. = 0,03 m^3/s.

Lake give power storage available:

$$P_t = 9810 \times Q_{med} \times H \times \eta\ [W]$$

Where: H- fall of turbine;

Q med - mean flow;

η - 60% yield for a very small MHC.

$$P_t = 9810 \times 0,03 \times 42 \times 0,6 = 7,45\ [kW]$$

Choose a hydraulic turbine with a lower flow rate:

$$Q_t = 0.02 \quad m^3/s$$

The necessary power is:

$$P_t = 9810 \times 0,03 \times 42 \times 0,6 = 5,65\ [kW]$$

Bief accumulation, can provide turbine operation:

$$T = \frac{V_{lac}}{D_t} = \frac{0.5 \cdot 637\, m^3}{0.007\, \frac{m^3}{s}} = 38285\, s = 10,52 h$$

Lake will provide a turbine operation for about 14 hours, accumulating in the lake will be restored by the water flow rate. Water flow rate is a variable size over time and can not be accumulated in large quantities.

The calculation parameters of the hydraulic turbine energy

Landscaping solution leads to the possibility of ordering a slow Francis turbine, it uzinează lake water accumulation necessary for energy supply to consumers in the cottage. The flow rate through the pipeline flow calculation:

$$V = \mathbf{4\ Q} / \pi\ d^2$$

$$V = 4 \times 0{,}117 / 3{,}14 \times 0{,}55^2 = 0{,}4\ m^3/s$$

The power output of the turbine shaft that turns into electricity is a shedding useful, H_u.

$$H_u = H - h_p = 24\ [m]$$

The useful power from the turbine shaft is calculated:

$$P_u = 9{,}81 \times Q_{med} \times H\ \ [kW]$$

$$P_u = 9{,}81 \times 0{,}055 \times 24 = 12{,}24\ \ [kW]$$

Useful energy that produces energy by giving water after contact with the turbine

$$E_u = 9{,}81 \times Q_{med} \times H \times \eta\ \ [kWh/an]$$

The electricity produced by the generator depends on the energy yield blades can be calculed by **η – 60**%, a small turbines efficiency:

$$\mathbf{E_u = 9{,}81 \times Q_{med} \times H \times \eta\ \ [kWh/an]}$$

$$\mathbf{E_u = 9{,}81 \times 0{,}01 \times 24 \times 0{,}6 = 14{,}12\ \ [kWh/an]}$$

useful generator, according to the literature found 70% with the relationship:

$$E_u = 9{,}81 \times Q_{med} \times H \times \eta \times \eta g\ \ [kWh/an]$$

$$E_{el.} = 9{,}81 \times 0{,}01 \times 24 \times 0{,}6 \times 0{,}7 = 9{,}08\ [kWh/an]$$

Conclusion

Plants ready to come into operation recently may be a lifetime even longer and serve consumers for several generations without polluting the atmosphere;
Investments in small hydro proved to be safe for several decades.
To assess the location MHC must have some data:

- about precipitation;
- apelorşi about leakage flow regime;
- The terra

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RATIO BETWEEN ELECTROSTATIC FORCES AND GRAVITY CASE OF TWO ELECTRONS

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Abstract: It presents a possible explanation for the large distances between atoms by correlation with the ratio of electrostatic and gravitational forces for the case of two electrons.

Key words: electrostatic, gravitational forces.inertia, repulsion, atomic.

1. INTRODUCTION

To fix notions, were taken Menahem Simhony excerpts from his article, "THE DIRECT RESULTS OF THE MICHELSON-MORLEY AND WHAT DO THEY REALLY experiments PROVE" [1]

"We know Since 1911 thanks to Sir Ernest Rutherford (1871-1937), the radius of the nucleus That is ~ 50,000 times Smaller than the radius of the atom or ion. Nevertheless, the all the mass of the nucleus constitutes the mass of the whole atom, compared to Which the masses and volumes of the atomic electrons is negligible. Hencse, a quadrillionth only of the volumes of Atoms and of atomic nuclei Bodies is occupied by the electrons and, of Which THEY constit. The rest, ie, Almost all the volumes of Atoms and of atomic Bodies is just space.

When dealing with subatomic Processes, particularly with the emission of light by atomic Bodies, therefore we shouldnt I think of atomic Bodies of rare networks of nuclei, very far apart from one Another. For example, if we Represent the nucleus as a node of the net, made of 1 mm thin nylon threads, THEN the distances Between Nearest threads or nodes shouldnt BE ~ 50 meters. Nevertheless, the all atomic Bodies we Perceive, think of Them, and Them treat (also in our mathematics, dynamics, etc.) as if THEY WERE more or less dense, smooth, and continuous. The absolute emptiness of space was the basic assumption of the theories derived by Sir Isaac Newton (1642-1727), concerning motion, inertia, gravitation, and light. The belief in the absolute emptiness of space ruled in science for 140 years, until it was replaced by the belief that space is filled by an imaginary massless "ether".

3. CONCEPT

The ether concept was denied by Michelson and Morley in 1887, and in 1905 Einstein restored the belief in absolutely empty space."

We will present arguments in favor of this significant distances between atoms of a body, a simple calculation of the ratio of electrostatic repulsion and gravitational force for the case of two electrons r distant from each other. Although approximate "electrostatic rejection versus gravitational pull" where the atoms is relatively coarse range of the ratio of the two forces should be close to reality, so that the value obtained constitute a quantitative argument.

The gravitational force between two electrons Fg is given by [2]

$$F_g = G\frac{m_1 m_2}{r^2}$$

in which:

$G = 6{,}67428 \cdot 10^{-11} m^3 kg^{-1} s^{-2}$ $[N(m/kg)^2]$

$m_1 = m_2 = m_e = 9{,}1\ 10^{-31} kg$

Electrostatic Repulsion Between Two electrons, must balance the gravitational force Fe of attraction and the value ratio Between the two forces must BE correlated with the distance Between the electrons. This result, although it is approximate to be correlated with the gravitational forces the Fact That occure at long distances, while at relatively small distances the electrostatic, although, in theory, is inversely proportional to both the square of the distance separating Bodies.

$$F_e = \frac{1}{4\pi\varepsilon_0} \cdot \frac{Q_1 Q_2}{r^2}$$

$$\varepsilon_o = 8{,}854 \cdot 10^{-12} \quad C^2/N \cdot m^2$$

$$Q_1 = Q_2 = e = 1{,}602191 \cdot 10^{-19} \quad C$$

$$k = \frac{1}{4\pi\varepsilon_o} = 9 \cdot 10^9 \quad \frac{N \cdot m^2}{C^2}$$

And the ratio of the two forces leads to value:

$$\frac{F_e}{F_g} = \frac{k}{G} \cdot \frac{e^2}{m^2} = \frac{9 \cdot 10^9}{6{,}6 \cdot 10^{-11}} \cdot \frac{(1{,}6 \cdot 10^{-19})^2}{(9{,}1 \cdot 10^{-31})^2} =$$

$$= \frac{9}{6{,}6} \cdot 10^{20} \left(\frac{1{,}6}{9{,}1}\right)^2 10^{24} = 1{,}36 \cdot 0{,}031 \cdot 10^{44} = 0{,}04 \cdot 10^{44} \cong 10^{42}$$

3. CONCLUSIONS

The physicist H. A. Lorentz [3] stated the first result with a precise amount of 2.2 in 1039 in the context of a scientific hypothesis on antigravity, value very similar order of magnitude as that calculated. Previous calculations about the set of Lorentz checks and at the same time can be an argument for enormous distances between atoms.

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LIVING ORGANISM: BODY ELECTRIC

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Abstract: In the blood, as in fact throughout the body, there is a surplus of negative electric charges, which leads to the idea that the body, at a deeper level, hidden material support, there is a plasma state. It should therefore be calculated electric potential manifested in the existence of such states.

Key words: electric, Avogadro, dissociation, aqueous solution

1. INTRODUCTION

Through direct measurements it can be shown that human blood has a pH value between 7.30 and 7.42. This means that in the blood, as in fact throughout the body, there is a surplus of negative electric charges, which leads to the idea that the body, at a deeper level, hidden material support, there is a plasma state. It should therefore be calculated electric potential manifested in the existence of such states. In addition, the existence of such potential is a strong argument in favor of "electrical operation" of any living beings.

2. PRELIMINARY NOTIONS

1. Avogadro's Number, N_A
N_A=6,023 ·10^{23} molecule ⁄mol, mol^{-1}
2. Water ionization
The water molecules are in equilibrium with the positive ions and negative ions OH^- :
H_2O←-------→H^+ +OH^-
Equilibrium constant (dissociation) water is written as:
K_W=[H^+]·[OH^-]
and it was shown experimentally that:
$H^+ = OH^- = 10^{-7}$
from which :
K_W = [10^{-7}] ·[10^{-7}] =10^{-14}
Note that in aqueous solutions exist simultaneously both types of ions, so both types of electrical charges, observing the equation that defines the equilibrium constant.

Notions pH, pOH, K_W are defined as follows:
pH = -log [H^+]
pOH = -log [OH^-]
pK_W = -log [K_W]
Important: Units of measure, are expressed in [ion moles / liter solution] (and also notes with M).
Example calculation

A solution has $H^+ = 10^{-4}$ M

⇨ pH = -log [H^+] = -log [10^{-4}] = 4 => pH = 4

⇨ pOH = K_W - pH = 14 – 4 = 10 => pOH = 10

⇨ $OH^- = 10^{-10}$ M

And vice versa :
A solution of pH = 4 containing: 10^{-4} M ioni H^+ si 10^{-10} M ioni OH^-
1. Physical quantities for the physiology of blood
 circulate throughout the body about 5.5 liters of blood which is 1/13 - 1/14 of an adult body mass of 55-70 kg.

☐ blood pH values between 7.30 and 7.42 have.

☐ blood viscosity has values of 4.7 in men and 4.4 in women, relative viscosity value of water, considered one.

☐ sperm density has a value of 1061 kg / 1057 kg in men and / women.

All these sizes can occur from causes normal physiological variations, or variations due to pathological causes.

3. FUNDAMENTALS OF PLASMA PHYSICS

Plasma is represented as a homogeneous mixture of neutral particles, particles and electrically charged quanta of electromagnetic radiation. Whole electric system cvasineutru appears as positive charge carrier concentration is equal to the negatively charged particles. Cvasineutralitate accidental deviations from intense electric fields are canceled domestic.

Ex: Suppose that in a volume of radius r there is a deviation from cvasineutralitate due to a surplus of negative electric charge .It will generate a strong electric field, whose manner is calculated as follows: $|\vec{E}| = \frac{Q}{4\pi\varepsilon o} \cdot \frac{1}{r}$ and a negative electric potential value $V = \frac{Q}{4\pi\varepsilon o} \cdot \frac{1}{r}$

So : $|\vec{E}| = \frac{Q}{4\pi\varepsilon o} \cdot \frac{1}{r^2} = \frac{\frac{4}{3\pi r^2} e(N_- + N_+)}{4\pi\varepsilon o} \cdot \frac{1}{r^2} = \frac{e * \Delta N}{3\varepsilon o} \cdot r$

Or: $|\vec{E}| = \frac{e \cdot N}{3\varepsilon o} \cdot \frac{\Delta N}{N} \cdot r$

in which:

$\Delta N = N_- - N_+$ - Deviation from cvasineutralitate $\left[\frac{particule}{m^3}\right]$

$\frac{\Delta N}{N}$ - Relative deviation from cvasineutralitate [%]

$N = N_+ + N_-$: cvasineutralitatea average particle electric charge, [particles/m^3]

And so: $V = \frac{e \cdot \Delta N}{3\varepsilon o} \cdot r^2$

Or: $V = \frac{e \cdot N}{3\varepsilon o} \cdot \frac{\Delta N}{N} \cdot r^2$

Spatial deviation from cvasineutralitate

Debye screening length,: is the distance by which the potential plasma generated by a particle formation of a certain sign, can act on particles of opposite sign.

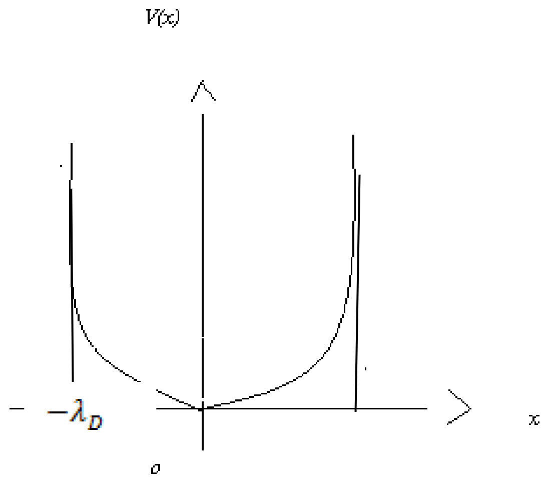
We consider that cvasineutralitate deviation from the plan is the emergence of a parallel layer of negative charge. The potential V (x) generated by the task layer will be described by Poisson equation of the form (dimensional case):

$$\frac{d^2 V}{dx^2} = \frac{\rho_-}{\varepsilon o} = \frac{e \cdot N}{\varepsilon o}$$

A solution is an algebraic equation of order 2 without free term:

$$V(x) = \frac{1}{2} \frac{e N_-}{\varepsilon o} \cdot x^2$$

Graphical representation of algebraic equation is a parable pointing cooordonate origin of the grid, the system of coordinates (x, V (x)) called pit potential.



Asymptotes Ox axis intersects the parabola in points marked and points representing the distance to the potential V (x) can be felt its action on other electrical loads.

In hated calculations involving elements of Boltzmann statistics, give value:

$$\lambda_D{}^{-} = \sqrt{\frac{\varepsilon o KT_{-}}{e^2 N_{-}}}$$

In witch K = $\frac{R}{N_A}$, Boltzmann's constant and linking energy in particle observed in the mass and temperature:K = 1,3806504 · 10^{-23} J· K^{-1}

R = 8,314 J ·K^{-1} · mol^{-1} - constanta gazelor perfecte.

Theoretical reasoning

It all started from empirical observations, apparently separate, but with a common cause:

☐ sanitariums (prventoriile) TB were located only in places where air,, good " help cure patients. It was found in the 60s that in those places the oxygen concentration of negative ions exceeds 2,000 ions /./cm^3 .

In the 80s of the last century it found that ionized alkaline water (pH = 9 to 11) energizes the body.

☐ In all the diets recommended for loose bodies insist on eating raw vegetables that are alkaline.

The common element in all these cases is the fact now reflected in the additional electrical load and to compound. Moreover, although blood is alkaline, pH =7,3 – 7,42.

Because blood carries oxygen, carbon dioxide and complex substances throughout the body, we refer to it. The blood contains electrically positive and negative ions of water, which leads to the conclusion that these ions can be equated with a pathological plasma disguised liquid state. Generating such, potential and electric fields generated by the electric charge density.

We believe that the blood pH has an average value:

pH = 7,36

which means that there is a concentration in the blood:

- $10^{-7,36}$ M ioni H^+
- $10^{-6,64}$ M ioni OH^-

Or :

- $10^{-7,36}$ ion mole H^+ / l aqueous solution
- $10^{-6,64}$ ion mole OH^-/l aqueous solution

And using the value of Avogadro's number, blood contains:

- $10^{-7,36}$ ·N_A ion H^+/l aqueous solution
- $10^{-6,64}$ · N_A ion OH^-/l aqueous solution

Or : N_A = 6,023 ·10^{23} molecules /mole

⇨ 6,023 · $10^{15,64}$ ion/l aqueous solution = N_H

6,023 · $10^{16,36}$ ion OH^-/l aqueous solution = N_{OH}

And also: 1 l = 1dm^3 = $10^{-3}m^3$

from which: N_H = 6,023 · $10^{15,64}$ $\frac{ioni\ H^+}{10^{-3}m^3\ sol}$ = 6,023 · $10^{18,64}$ $\frac{ioni\ H^+}{m^3}$ sol

N_{OH} = 6,023 · $10^{16,36}$ $\frac{ioniOH^-}{10^{-3}m^3}$ sol = 6,023 · $10^{19,36}$ $\frac{ioniOH^-}{m^3}$ sol

In this phase densities are positive and negative respectively.

So blood there is a surplus negative charge density:

N_{-} =N_{OH} - $-N_{H^+}$ = 6,023 ($10^{19,36}$ - $10^{18,64}$) m^{-3}

With this value can be calculated Debye screening length, λ_D :

$$\lambda_D = \left(\frac{\varepsilon_o KT_{-}}{e^2 N_{-}}\right)^{\frac{1}{2}} =$$

$$\left(\frac{8{,}856\cdot 10^{-12}\cdot 1{,}38*10^{-23}\cdot 310}{(1{,}6\cdot 10^{-19})^2\cdot 6{,}023\,(10^{19,36}-10^{18,64})}\right)^{\frac{1}{2}} =$$

$$= \left(\frac{8{,}856\cdot 1{,}38\cdot 310\cdot 10^{-35}\cdot 10^{3}\cdot 10^{15}}{1{,}6^2\cdot 10^{-35}\cdot 6{,}023\cdot 10^{18,64}\,(10^{0,75}-1)}\right)^{\frac{1}{2}}$$

$$= \left(\frac{3788{,}5968\cdot 10^{-15}}{15{,}41888}\right)^{\frac{1}{2}} \approx 50 \cdot 10^{-7}\ m$$

Negative electric potential generated by a sphere of radius will be equal to:

$$V = \frac{e * \Delta N}{3\mathcal{E}o} \cdot r^2 =$$

$$= \frac{1{,}6 \cdot 10^{-19} \cdot 6{,}023 \cdot 10^{18} \left(10^{1{,}36} - 10^{0{,}64}\right)}{3 \cdot 8{,}856 \cdot 10^{-12}} \left(49{,}57 \cdot 10^{-7}\right)^2 =$$

$$= \frac{1{,}6 \cdot 6{,}023 \cdot 10^{-1} \cdot 10^{12}}{3 \cdot 8{,}8656} \cdot 50^2 \cdot 10^{-14} \approx 18 \text{ V}$$

3. CONCLUSIONS

It can be said that the breast there is a potential negative electric tens of volts in this case is confirmed as accurate empirical observations regarding the use of negative ions of oxygen and water ionized alkaline because food everyday involve food intake mainly acid. This negative potential of such a body becomes positive argument in favor Kirilian photo. Its value is still a small positive argument for using ultra-high tensions in this type of photography.
The existence of electric potential is therefore a strong argument in favor of "electrical operation" of any living organism.

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COAL COMBUSTION AIR FRACTIONATION AND REDUCING OF NOx

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Abstract: In the paper below we present a possibility of reducing nitrogen oxides in the lignite boilers from Rovinari CTE. Analyzing that possibility, a solution is found which can be applied with minimum costs. The reduction of NOx emissions is done through series of constructive and functional measures, whose aim is to reduce the levels of NOx in the furnace by limiting the initial formation of NOx and by reducing nitrogen oxides.

Keywords: nitrogen oxides, coal, NOx reducing, power plant, boiler.

INTRODUCTION

When coal is burned in the electric power plants' boilers, in the combustion gases there are also nitrogen oxides in the form of NO (nitrogen monoxide) or NO_2 (nitrogen dioxide) known as NO_x. Nitrogen oxides NO_x result from the oxidation (combustion) of fuels in the furnace. The nitrogen is composed of the fuel nitrogen and combustion air nitrogen (79%).

When the fuel is heated the volatile nitrogen is released together with the other volatile gases (CO, H_2, CH_4). A part of the volatile nitrogen and air combustion nitrogen is turned into NO. The formation of NO depends on the quantity of fuel volatile nitrogen, quantity of air and the temperature in the furnace. The high temperature in the furnace favours the formation of nitrogen oxides, as well as the emission of volatiles. The released volatiles burn fast and contribute subsequently to the reduction of nitrogen oxides formed as a result of the oxygen taking over.

When leaving the furnace there are 95% NO and 5% NO_2. After reaching the atmosphere NO combines with the oxygen in the air and forms NO_2. If there is an excess of air in the boiler, NO_2 can be formed on the route of combustion gases.

1.ANALYSING THE POSSIBILITIES OF REDUCING NOX EMISSIONS RESULTED FROM LIGNITE COMBUSTION

In what follows we will present various possibilities for reducing nitrogen oxides in the lignite boilers from Rovinari CTE. Analyzing these possibilities, a solution is found which can be applied with minimum costs.

The reduction of NO_x emissions is done through series of constructive and functional measures, which aim is to reduce the level of NO_x in the furnace by limiting the initial formation of NO_x and by reducing nitrogen oxides which has formed initially.

Figure 1 presents a geometric tower boiler 1035 t/h and figure 2 overviews the focus performed using the FLUENT program.

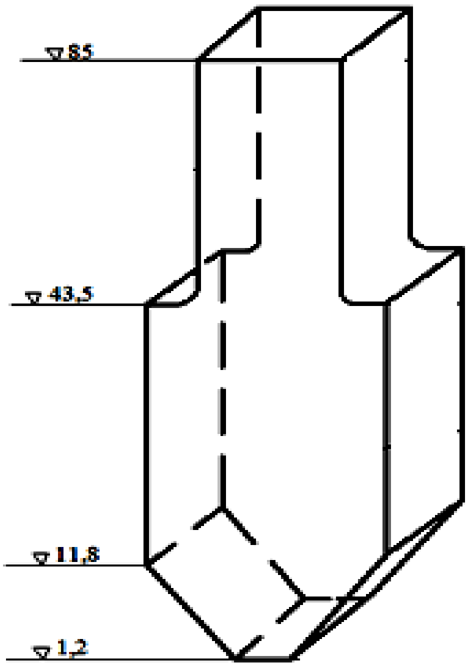

Fig.1 Tower boiler 1035 t/h – geometric form

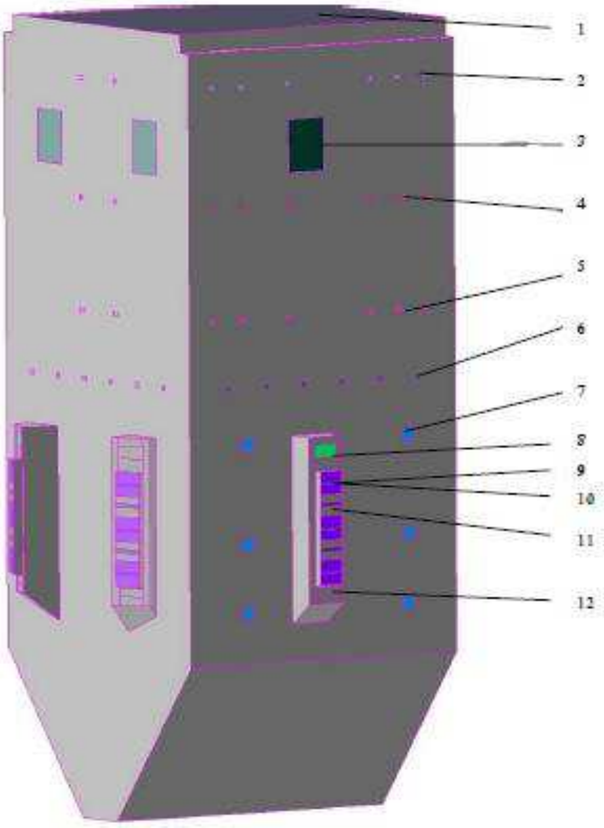

Fig.2 Overview of the focus
1. Section output; 2. Air superior; 3. Suction die ; 4. Air intermediate level; 5. Air

lower level; 6. Insufflation gas recirculation nozzles; 7. Startup burners ; 8. Fanta air education; 9. Primary air and fuel; 10. Air core ; 11. Central Air ; 12. Air inferior.

2. VARIANTS OF REDUCING NOX EMISSION

Boilers 3 and 6 from Rovinari CTE are of the same type and function with the same coal. However, from the point of view of NO_x emissions they differ as follows:

- boiler 3 has 567mg/Nm^3 at PAR 1 (preheater of right rotary air) and 589mg/Nm^3 at PAR 2 (preheater of right rotary air) with an average of 578 mg/Nm^3;
- boiler 6 has 523mg/Nm^3 at PAR 1 (right) and 491mg/Nm^3 at PAR 2 (left) with an average of 507 mg/Nm^3.

3. CONCLUSION OF MEASUREMENTS

The values of NO_x emissions at boiler no. 3 are higher (with 14%) than the values of NO_x emissions at boiler no. 6. This fact is due to the distribution of coal dust burners on a single level and, implicitly, to the lower flame concentration and in a restricted area in the furnace than the burners of boiler no. 6 placed on two levels.

At boiler no. 3, the flame concentration in a lower area of the furnace brought the following advantages:

- flame stability of the coal dust burners;
- increase of the stationary time of dust particles which burn inside the furnace;
- boiler’s functioning without a hydrocarbon fuel supply due to flame stability of dust coal burners.

The disadvantage of flame concentration inside the furnace is the increase of combustion gas temperature which leads to increase of NO_x emissions.

At boiler no. 6, the initial solution had the following disadvantages:

- due to the distribution of the 12 coal dust burners on two levels the flame was practically fragmented;
- the stationary time of coal dust particles inside the furnace was short due to the small distance to combustion gas entry in S3, and that’s why the combustion continues in convective way leading to sudden variations of steam temperature.
- flame was instable and needed a supply of hydrocarbons. This can also be observed from the table with functioning parameters of boilers on the date the measurements have been carried out.

Taking into account the theoretical notions of reducing NO_x emissions the following variants were established and the following values of NO_x were calculated:

Variant (A) = introduction of tertiary air (AS1) taken from the secondary air at coal dust burners inside the furnace in a region located over the suction bottoms of the combustion gases for mills, at the level of +41,800 m;

Variant (B) = introduction of tertiary air (AS2) taken from the secondary air at coal dust burners inside the furnace in a region located under the suction bottoms of the combustion gases for mills, at the level of +29,230 m;

Variant (C) — introduction of returned combustion gases (GAR) taken from the chimney inside the boiler in a region located over and under the burners (AS2), at a level of +26,000 m.

Variant (D) - solution with dust concentrator at coal burners.

In order to realize an equal distribution of tertiary air on the 16 apertures from the steam generator walls each main branch of warm air channel was equipped with a valve of electrical adjustment and a debit counter, and on each supply section of the apertures was provided with a hand valve. B, C, D variants need higher costs than A variant. Consequently variant A will be applied. In order to optimize air distribution in the furnace, a study has been carried out for 94 hours in the period

21 January 2013 at 13 o'clock – 24 January 2013 at 9 o'clock. The results are presented in table 1.

The content of NO_x varied within large limits between 304mg/Nm^3 and 480 mg/Nm^3 at a content of oxygen of combustion gases of 6% respectively 8%. No connection can be established between the content of oxygen and NO_x. For example on 21 January 2013 the content of O_2 is 6%, and the percentage of NO_x is 409 mg/Nm^3.

Air valves located at 31m quota were opened between (0 – 46)% and those from 41,8m quota were opened between (4 – 45)%. Even in the same conditions of functioning the results are different because there are many variable parameters: group power, heating power. Practically the heating power is variable from one hour to another and although coal from the same warehouse is used. The fuel consumption varies depending on the heating power. It varied during measurements between 147 t/h (P = 166 MW and Q_i = 2024 kcal/kg) and 312 t/h (P = 300 MW and Q_i = 1459 kcal/kg).

At large loads of the energetic group better adjustments can be performed and for this reason the content of NOx is within smaller limits. In order to highlight the effect of the introduction of fractionated air it was tried the functioning with closed air valves. It is observed that in the same conditions (electric power, heating power, and content of oxygen) the functioning with closed fractionated air valves leads to an increase of NO_x percentage with 25 - 40 mg/Nm^3.

As a general conclusion it must be shown that the introduction of combustion air in stages leads to a reduction of NO_x emission. Adjustment general rules cannot be established because there are many variables parameters. The operation will operate the air valves depending on the functioning parameters. The most reduced values of NO_x are obtained from group powers higher than 250 MW. The inferior valves have the lowest value when they are opened between 25 – 30 %, and the superior valves when are opened between 30 – 35%.

Table 1. Study during 94 hours in order to optimize the distribution of air to the furnace

Date / hour	Power [MW]	Calorific power [Kcal/kg]	Coal flow [t/h]	NOx [mg/Nm^3]	O$_2$ [%]		Air temp. after PAR ^{0}C		Gas temp. output outbreak ^{0}C		Clapet NOx inf.front		Clapet NOx inf.behind		Clapet NOx sup.1		Clapet NOx sup.2	
					Left	Right	1	2	Left	Right	Poz %	Flow [Nm^3/h]	Poz %	Flow [Nm^3/h]	Poz %	Flow [Nm^3/h]	Poz %	Flow [Nm^3/h]
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
21.01.2013 13	307	1792	266	307	3	3	271	270	795	819	46	10574	40	10447	40	16852	45	13432
14	310	1671	277	317	3	3	275	274	785	816	50	12176	42	14792	40	17431	50	14276
15	298	1659	266	333	3	3	274	273	776	797	50	11842	42	14262	39	17529	49	14051
16	294	1708	272	372	3	4	271	270	772	789	50	11311	42	14945	35	16107	40	12110
17	288	1724	250	377	4	4	271	270	757	764	50	11380	42	14609	35	17223	40	14250
18	260	1773	221	415	5	5	268	267	791	730	34	7203	34	9525	35	15771	35	11317
19	240	1773	208	409	6	6	267	266	731	719	34	6713	34	8669	35	13682	35	10654
20	249	1796	231	398	5	6	265	265	737	733	34	7226	34	9148	35	15064	35	11179
21	215	1819	183	453	6	6	260	260	702	707	34	6987	33	8705	35	14202	35	9815
22	168	1977	156	349	7	7	255	255	667	651	25	5365	24	6617	34	13369	35	9433
23	197	1843	181	400	6	6	258	258	700	690	25	5900	24	6400	34	14360	35	9900
22.01.2013 0	180	1812	147	410	7	6	260	261	690	670	25	5600	24	6000	34	13900	35	9200
1	180	1999	155	420	7	6	260	262	692	670	25	5700	24	5700	34	13300	35	8500
2	166	2024	147	480	8	7	258	259	670	645	25	5500	24	5300	34	12500	35	8600
3	170	1991	152	460	8	7	260	260	675	650	25	5600	25	6000	35	12600	35	9000
4	173	1926	160	477	7	7	260	260	780	650	25	5700	25	6300	35	12660	35	9100
5	180	1940	157	420	7	7	260	260	690	650	25	5740	25	7000	35	14300	35	10700
6	211	1913	184	430	4	5	260	261	720	715	25	5781	25	8100	35	15400	35	11700
7	215	1925	183	315	5	5	263	261	720	710	26	5876	25	7562	35	14732	36	11276
24.01.2013 0	168	1833	160	392	7	7	260	256	631	700	20	-	19	-	20	10226	20	-
1	177	1805	180	357	7	7	259	256	651	730	20	-	19	-	20	10878	20	-
2	188	1794	174	337	7	7	262	258	659	722	20	-	20	-	20	10014	20	-
3	181	1815	174	343	6	6	261	257	658	731	21	-	20	-	20	10805	20	-
4	193	1832	184	361	6	6	262	258	659	722	20	-	20	-	20	10379	20	-
5	197	1797	179	344	6	6	263	259	665	714	20	-	20	-	20	12175	20	-
6	196	1796	183	334	6	6	262	258	667	710	20	-	20	-	20	12536	20	-
7	284	1763	264	358	4	3	270	268	779	789	20	-	20	-	20	15800	20	4800
8	304	1725	264	350	3	3	275	273	786	797	20	-	20	-	30	17300	30	8900
9	302	1736	273	328	3	2	273	271	787	800	30	-	30	-	30	17000	30	8300

4. RESEARCH PERSPECTIVES

Considering that the approach described in here aiming to reduce polluting emissions from the thermoelectric power plants in Oltenia Basin did not succeeded, especially referring to the reduction of nitrogen oxide emissions, new research directions can be traced in the field:

- Development of a program for experimental data processing and establishing the linking relationships between input and output parameters by modernization and automation of all energetic groups, for a better control of the technological process.
- Use of new technologies for reduction of nitrogen oxide emissions adaptable to the already existent installations, which are also advantageous from an economic point of view.

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INCREASING ENERGY EFFICIENCY

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Abstract: In this paper were presented and analyzed methods to increase energy efficiency. Efficient energy use is widespread concern regarding the efficient use of material resources of any kind. Efficient energy has become an economic necessity, condition expressed concentrated by reducing the share of energy costs in total production costs. Were presented effects of recovery secondary energy resources. Among the most effective ways of increasing the use of energy consumed in industrial processes can be mentioned capitalization secondary energy resources results, in this case flue gas. Side effects Tice recovering energy resources are technical, energy, economic and environmental .

Key words: efficient energy, environment, pollute, economic,

1. INTRODUCTION

Focusing efforts to improve the energy performance of final consumers of energy in most developed countries has become justified and economically After it was found that higher fuel prices on the international market will remain high for a long time. Along with price increases began to be felt awareness of the need to preserve the environmental effects and the inevitable exhaustion of fossil fuel reserves, for which there is no currently found otherwise a convenient alternative to industrial scale.

Efficient use of energy is now an issue of general concern for the efficient use of material resources of any kind caused by the depleted nature of their awareness. Thus, energy efficiency has become an economic necessity, condition expressed concentrated by reducing the share of energy

A similar effect had lately and concern for reducing environmental pollution arising embodied in the laws and regulations in all developed countries , which requires those who pollute the environment still important to pay damages. Since the damage and paid fines for exceeding allowable levels of environmental pollution is Royal sc in costs of production, profitability companies that pollute the environment is thus affected.

Given that pollution is, in many cases, a consequence of natural or synthetic fuels , there is now a direct link between energy efficiency and environmental impact of a particular activity.

Experience has shown that the same advanced countries improve energy efficiency in the national economy can not be left solely to companies regardless of their size and importance, whether they are private or that they belong to the state. The means by which the state gives businesses an incentive towards increasing energy efficiency must, however, be compatible with the laws of competitive economy. The experience so far shows that change can not be achieved at once through a massive injection of capital.

Introducing efficient solutions made gradually, starting no or less expensive. The savings thus obtained were reinvested all the efficiency measures that have benefited most important. In turn, they have been reinvested in the same way, the evolution of this process less continuous concern for

Through a clever propaganda, government agencies in industrialized countries having the object of energy conservation and environmental protection have contributed to widespread effective solutions, bringing direct benefits to companies that have applied. They prospered and contributed ultimately with higher amounts in the form of income tax to the state budget. In this way, funds invested in these agencies work finally brought indirect benefits to the state budget, so the source from which they came, while also helping to maintain competitiveness and prosperity of the national economy.

Promoting and fostering creativity internal technical and exchanges of information and experience with other countries can contribute significantly to finding technical solutions compatible with current situation of the Romanian economy, to reduce the share of energy costs in total production costs and achieve the Thus a minimum level of competitiveness in relation to the EU. (R. Pătraşcu ş.a, 2004).

2. EFFECTS OF SECONDARY ENERGY RESOURCES RECOVERY

Among the most effective ways of increasing the use of energy consumed in industrial processes can be mentioned capitalization secondary energy resources results, in this case flue gas . The effects of secondary energy resources recovery are technical, energy, economic and environmental .

a. Effects technical

The design and integration of direct recovery facilities in the technological modernization schemes contribute to overall processes.

Thus the location of recovery (preheating of air, fuel , materials technology) in the process pirotehnologice of metallurgy, building materials , chemical, enabling the transition to new technologies , performing with a high degree of recovery , with high productivity to obtain the final product. The recovery processes , such as flue gas recirculation increases the life of the technological aggregates , decreasing thermal stresses to which are subject the components . Technical effects are interrelated and can be found in the economic.

b . Effects such as energy

The effects of nature practically quantifies energy through fuel savings achieved by recovery. The main energy indicators from which it will assess the energy efficiency of the recovery solution are :

- Saved energy equivalent fuel (fuel economy, absolute or relative value) - is defined as the difference between the fuel consumption before and after recovery ;
- The total extent of recovery - defined as the ratio between heat actually recovered due to thermodynamic constraints and technical and economic

existing and effective heat contained by res

c. Effects economic

Economically, the immediate effects are determined primarily by the energy savings achieved, depending on the direction in which he did recover or recovered energy to the manufacturer or to the recipient thereof. This reduces energy consumption analyzed in the outline (whatever it is), thus reducing the intake of fuel and classic.

Reflecting economic reducing energy consumption at the level of companies or industrial sites occurs by reducing costs related production, which ultimately reduces the cost price of technology products. The indirect effect as mentioned above, namely the reduction in primary energy appeal is reflected by reducing energy losses and actual consumption of energy extraction step and transport fuel.

d. ecological Effects

Of particular importance for the recovery of secondary energy resources, it is reflected effects on the environment. In industrial processes, the resulting flue gas, which due to their quality and quantity can not be discharged as such into the environment.

Most of them posed by the particular temperature, composition, pressure may be secondary thermal energy, fuel or pressure, being used as such and simultaneously neutralized in terms of harmfulness on the environment.

The recovery of the flue gases from industrial processes, as a secondary energy resources such as heat reduces sensible heat emission in the environment, thus reducing the greenhouse effect, which is under strong industrialization planet faces an imminent threat of destruction ecological balance.

There is a class of secondary energy resources in the form of flue gases whose recovery is supported primarily by environmental considerations and then to the energy and economic. That category also flue gases from industrial processes chemical, metallurgy, construction materials , which due to toxic substances contained by chemical interaction with air and especially water, can lead to the formation of toxic or corrosive on technological aggregates itself and everything there is a considerable range.

The regulations issued international law provides the main categories of air pollutants of water and soil, their harmful effects on the environment, limit permissible content and fees charged for exceeding them.

Therefore any fuel economy (including nuclear), recovery is achieved by a substantial reduction in primary energy use of the resources, thereby reducing harmful effects on the environment.

Din punct de vedere ecologic, efectul implementării soluţiei de recuperare propusă, poate fi cuantificat prin reducerea indicatorilor de impact, comparativ cu soluţia de referinţă, iar din punct de vedere economic efectele ecologice pot fi cuantificate prin ecotaxe.

3. CONCLUSIONS

The experience of advanced countries has shown that improving energy efficiency in the national economy can not be left solely to companies regardless of their size and importance , whether they are private or that they belong to the state. The means by which the state gives businesses an incentive towards increasing energy efficiency must, however, be compatible with the laws of competitive economy.

Promoting and fostering creativity internal technical and exchanges of information and experience with other countries can contribute significantly to finding technical solutions compatible with current situation of the Romanian economy, to reduce the share of energy costs in total production costs and achieve the thus a minimum level of competitiveness in relation to the EU.

Harnessing energy efficiency in technical and economic limits of gases from industrial processes, may constitute a method of preserving the environment.

Extraction of classic fuels, especially those with solid surface by scraping layers operation on the ground above, adversely affect the ecological balance.

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PRIMARY ENERGY RESOURCES

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Abstract: In this paper, the primary forms of energy existing in nature. A classification of the types of fuels and steps taken for their use. Accelerated technological progress and industrial development have resulted in a complication of primary energy conversion chain - direct energy use. They were shown the effects of mining on the environment, exploitation of coal energy , wind energy home as part of renewable energy , which is a renewable source of energy generated from wind power. Wind energy is considered one of the most sustainable options of future variants wind resources are huge.

Key words: Primary energy resources, mining, influences, Wind Energy, pollution

1. INTRODUCTION

Primary energy resources are forms of energy available in nature itself.

This includes fossil fuels, nuclear fuels and unprocessed kinetic energy of rivers, seas and oceans. Fossil fuels and nuclear conventional mineral primary resources available in the form of deposits of coal , oil, natural gas and uranium. Their use by people in a more organized activity involves preliminary stages: extraction, processing (purification), storage and transportation.

Their use involves at least an intermediate stage of transformation of primary energy (fuel) in direct energy use. Accelerated technological progress and industrial development have resulted in a complication of primary energy conversion chain - direct energy use. In principle, such a chain may comprise several stages:

– generation (primary energy conversion);

- Transformation (changing forms of energy or energy carrier parameters) ;

- Transmission and distribution (in the case of a centralized supply solutions);

- Final consumption.

Efforts in energy technology sectors have focused on the production, transport and distribution. They were considered both energy conservation and the widespread exploitation of renewable energy resources (wind, solar, biomass, tidal , etc.).

The economic importance of the group of developed countries caused the generalization of energy conservation measures, which have become an imperative condition for any profitable economic activity involving the global market. Experience gained enabled the development of a methodology capitalizing on advanced energy resources of any kind and based on the concepts of energy management and energy efficiency.

Improving the energy efficiency of processes and technologies can consume significant energy savings (R. Pătraşcu ş.a, 2004).

2.1. RECOVERY ENERGY COAL

Mining has an impact on the environment, which can often exceed that of other industries. This applies to all sub-branches all phases of mining and mining, from extraction and continuing with the preparation , metallurgical and thermal power sector . Inside the various branches of the mining industry, coal mining quarries have an important impact on the environment.

The range of these influences is very broad, encompassing both positive influences, such as those relating to economic development in mining areas and those related to social development and urban and negative influences related to changing environmental implications substantive ecosystems on agriculture and forestry, hydrography, communication routes, human settlements dismantled , the quality of life of residents and the fauna and flora of the operation perimeters and adjacent to them.

Harnessing Coal Energy made its presence by first positive effects of producing products with economic importance, employment and ensuring livelihoods for many people, increasing social conditions and civilization in those areas, creating infrastructure necessary for other industries.

At the same time , they also felt a lot of negative effects .

The impact of this industry , was also felt over the last three decades and will continue for a long time , until around 2050. Mining activity is characterized so through a number of sources of influence and change the environment :

- Cast mining, deals and geomorphological changes the structure of the land and make it impossible , using a long time (Fodor, 2006);
- Underground mining, ore deposits affect land covered by destroying the physical and hydrological balance of the rocks. The magnitude of the deformations depend on the nature and the extension fields, the depth of the reservoir and method of operation.

This produces large areas of land diving by depths ranging from a few centimeters to 15-18 m where thick layers ;

- Dumps occupy large areas of forest and agricultural and adjacent land influences the morphological changes, hydrogeological and chemical often ;
- Construction and mining installations, leading to changes in the operating environment land and are often sources of air pollution and water .

Environmental legal obligations were complied with , in particular related to external dumps location outside the settlements as the administrative office premises .

To reduce the area occupied by dumps external foreseen staggered opening of the pit to store tailings remaining gaps or suprahalde over existing dumps like playing outside their productive cycle .

Industrial pollution can be defined as the presence of toxic substances in air, water or soil , often due to shortcomings in production processes .

These substances may present a risk to human health and / or ecosystems.

Activities in the careers of pit lignite , the main source of air pollution with particulate matter and sediments.

Excavated rocks are friable for the most part , to the low mechanical strength , to which a low humidity , especially in hot weather , lead to the formation of dust .

Air quality is affected mainly by the process of the quarry , landfill and coal deposits , the increase in certain points of the mining area , the concentration of dust , gases, fumes resulting from cars and combustion

Another source of air pollution is the self-ignition of coal deposits or layers of the soil surface (Huidu, 1996). A potential source of toxic gases is the self-ignition of coal deposits or strata outcropping

Due to incomplete combustion carbon monoxide vented and in smaller amounts oxide and sulfur dioxide, light hydrocarbons , toxic substances but do not reach levels that

Career to prevent auto-ignition of coal strata outcropping coal descopertează not completely , leaving the sterile layer roofs of about 5-10 cm.

To avoid self-ignition of coal deposits following measures are taken:

- Regular water sprinkling coal (Jescu, 1984);
- Loosening of coal regular and continuous movement of stocks during deliveries.

Self-ignition of coal is triggered especially during summer, the high temperature at ground level. There career in the flue gas emissions of the vehicles, fumes from heating plants at the administrative headquarters of his career, from headquarters to headquarters Dispatch and rotors.

Air emissions from the quarry are two categories:

- Direct emissions from technological processes;
- Emissions from combustion processes from three sources:
  - Mobile sources (cars, transport) ;
  - Surface (excavators)
  - Stationary sources (power plants, coal deposits) .

In terms of pollution with particulate matter, given that sources of pollution are low rise, influences remain within range of the career , except higher amounts zone conveyor belts scrapping affecting residents, households and dependencies placed at a distance of 50 .... 70 m of conveyor belts.

Dust emissions from the tailings management area are a problem in dry conditions and wind. The most severe problems caused by dust from the dumps appear dry days of activities crushing / grinding, sediment transport and storage of tailings.

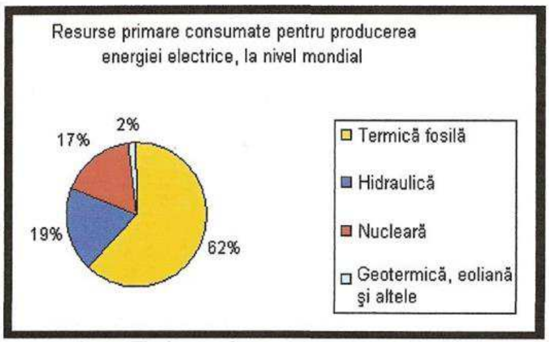
2.2. WIND ENERGY HOME

Wind Energy origin is from renewables , it is a source of renewable energy generated from wind power . Wind power is attractive both ecologically - produce no air emissions , no radioactive waste forms and from economically - as a primary energy source, wind costs nothing .

New requirements for sustainable development led countries of the world to put the issue of energy production methods and to increase the share of energy produced from renewables. The Kyoto Protocol commits signatories to reduce emissions of greenhouse gases. This agreement led to the adoption of national policies for the development of wind turbines and other sources that do not emit carbon dioxide .

Three factors have caused the solution to become more competitive wind turbines :

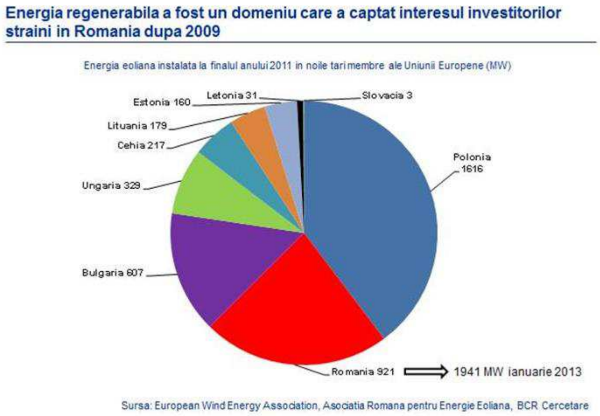
- new knowledge and the development of power electronics ;
- improving aerodynamic performance in wind turbine design ;
- National funding for the implantation of new wind farms.



(Sursa: Wind energy barometer-EuroObserv'ER 2004)

Currently, the worldwide share of renewables in electricity production is low. It can be said that different branches of renewable energy potential is under-used .

However, technological improvements have favored the installation of wind generators in a permanent pace increased in recent years with exponential growth , with a growth rate of 25 % in 2003



Wind pathway is quite developed in Europe, holding the leading position among renewables . This type of renewable energy to provide electricity needs of 10 million people.

In fact, 90 % of manufacturers of medium and large wind power in Europe lies . Cost and efficiency of a wind project must take into account both the price of wind as those of installation and maintenance, as well as that of the sale of energy . A wind is expensive. It must be made more economic progress in order to ensure the development of wind energy resources . It is estimated that the installation of a wind kW , costs about 1,000 euros. Technological advances and increasing wind production in recent years allow constant reduction in the estimated price of a kWh price depends on the price of installing wind as the amount of energy produced annually. This price varies according to location and decreases with the development

3. **CONCLUSIONS**

In terms of pollution with particulate matter, given that sources of pollution are low rise, influences remain within range of the career, except higher amounts zone conveyor belts scrapping affecting residents, households and dependencies placed at a distance of 50 .... 70 m of conveyor belts.

Dust emissions from the tailings management area are a problem in dry conditions and wind. The most severe problems caused by dust from the dumps appear dry days of activities crushing / grinding, sediment transport and storage of tailings.

Wind energy is considered one of the most sustainable options of future variants, wind resources are huge. It is estimated that the recoverable wind power worldwide is approximately 53 000 TWh (TerraWattoră) , which is 4 times the current global consumption of electricity.

In Europe, the potential is sufficient to ensure at least 20 % of electricity needs by 2020, especially if you take into account the new offshore potential .

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STUDY ON INFLUENCING FACTORS OF EFFICIENCY STEAM TURBINE 330 MW

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Abstract. This paper presents a case study on the determinants of efficiency of operation of 330 MW turbine energy group. For the calculation of operating efficiency measurements were performed to determine the steam flow, pressure and temperature steam and electric power at the generator terminals.

Keywords. Steam turbine, operating efficiency, flow, pressure, temperature, electrical power.

Chapter 1

Technical specifications

FIC type steam turbine 330 is a condensing turbine with one intermediate overheating. The turbine is like "acting".

The turbine is composed of four bodies on a line of trees and a single capacitor:

- body high pressure (CIP) with 10 steps and a step of adjusting pressure;

- medium pressure body (CMP), an adjustment stage and 12-stage pressure;

- two bodies low pressure (CJP-1, CJP-2) in double flow.

To preheat boiler feed water turbine is fixed tapping prevăzuă` 7. These feed Regenerative steam preheating system composed of 3 JP preheaters, a degasser and three preîncîlzitoare IP. The sockets are fixed to the four bodies arranged as follows:

- 7 socket - the ejections of IP body;
- 6 socket - MP after step 3 of the body;
- 5 socket - after stage 7 of the body MP;
- 4 socket - after stage 11 of body MP;
- 3 socket - to exhaust the body MP;
- 2 socket - after step 2 in each stream JP;
- Unit 1 - after step 4 in each stream JP.

Turbopump power outlet receives steam from the turbine no.3 large loads of 40% of the rated load and live load steam below 40% of rated load.

The live steam inlet CIP 4 is the quick-closing valves (VIR-IP), four inlet and four regulating valve (VR-IP) mounted on the high-pressure casing; exhaust steam from

CIP to intermediate superheater is via two pipelines.

Admission steam over [warm up the intermediary CMP is done by two quick-closing valves (VIR-MP), April 4 and April intake control valve (VR-MP) mounted directly on the housing medium pressure.

Making the operating tests

There have been a number of electrical loads to the following 5 tests: 328 MW.; 311 MW.; 271 MW.; 251 MW., 223 MW.

The tests were conducted under the following conditions ::

- normal operation thermomechanical scheme;

- turbopump supply operation;

- cascading condensate evacuation secondary PIP in degasser and the PJP in capacitor;

- degasser steam supply from the mains 4

- turbopump from the mains supply three steam and live steam pipe

- preheating regenerative system worked in complete diagram;

- it has worked with normal scheme by PIP.

Chapter 2

The measurement of operating parameters

2.1. Flow measurement

For measuring flow rate transducers were used Bailley type. Flow calculation was performed with the relationship:

$$D = C \cdot E \cdot \varepsilon \cdot \frac{\pi \cdot d^2}{4} \sqrt{2 \cdot \gamma \cdot \Delta p}$$

(kg/s)

D - mass flow

ε - expansion coefficient - coefficient of discharge

E - rate coefficient nearby

d - hole diameter primary element at work (m)

Δp - pressure difference created by the primary element (Pa)

γ - the specific gravity of the fluid at the pressure and the temperature upstream of the primary element (kg / m3)

Table 1- fluid flow measured

Nr. Crt.	Title	Device type
1	Live steam boiler output	Mouthpiece
2	Cold intermediate steam	Mouthpiece
3	Boiler feed water input	Mouthpiece
4	Water injection into the intermediate superheater	Diaphragmes
5	The total injection water	Diaphragmes
6	Condensate output base PJP-3	Diaphragmes
7	Condensed secondary TPA	Diaphragmes
8	Water added	Diaphragmes

2.2. Measuring pressure

They were measured on the steam pressure necessary for the heat balance and the necessary regenerative circuit was used to determine debitelor.Au pressure transducers and pressure gauges type Bailley condenser vacuum measurement adheres Bourdon.Pentru type using a mercury column.

2. 3. Temperature measurement

They used thermocouple Cr-Al and mercury thermometers. With existing equipment in the control room termiă` were measured parameters of live steam and superheated steam the intermediary.

- Temperature steam extracted from the turbine fixed outlets;

- Basic condensate temperatures of the water supply

- Temperature at the outlet of the condensate of the condenser core

- Cooling water temperature entering and leaving the turbine condenser.

2.4. Power measurement

The power produced from electric generator terminals was measured with precision transducer power electric` 0.2.

Chapter 3

The results of the measurements

Table 2 - The results of measurements

Nr crt	Title	Sample no.1	Sample no.2	Sample no.3	Sample no.4	Sample no.5
1.	Active power from the generator terminals (MW)	308,4	272,4	254,2	224	321,2
2	Live steam inlet pressure CIP (bar)	169,4	168,3	173,5	170,4	172
3	Live steam inlet temperature CIP (°C)	528	530,2	535	534	533
4	Steam pressure exhaust CIP (bar)	44,2	42	38,8	34,8	48,2
5	Temperature exhaust steam CIP (°C)	355,2	347,2	334,5	330,2	352
6	Steam pressure inlet CMP (bar)	41	37,9	36,4	33	40
7	Steam temperature admission CMP (°C)	536	534	533,7	532	534,4
8	Vacuum the condenser (bar)	0,06	0,06	0,06	0,06	0,06
9	Temperature tamping turbine (°C)	37,3	37,9	39,2	39,2	37,2
10	The cooling water inlet temperature to the condenser (°C)	22	23,3	23,2	23,1	22
11	Preheating temperature water supply (°C)	263,8	260,3	252	249,2	264,8
12	Specific heat consumption profit (kJ/kWh)	8341,6	8530,6	8647,2	8782,5	8312,4

Table 3 - Internal performance

Nr crt	Title	Sample no.1	Sample no.2	Sample no.3	Sample no.4	Sample no.5
1	Internal yield CIP (%)	82,4	78,6	79,2	75,6	72,1
2	Internal yield CMP (%)	85,2	85,2	84,4	83,9	83,9
3	Internal yield CJP (%)	78,4	75,3	73,4	72,1	68,7

Chapter 4

Conclusion

In all tests regenerative preheating to work with high-pressure water normală.Preîncălzirea capacity was made up at 264,8ºC in uniform steps.

- the values of input parameters (pressure, temperature) of live steam were close to the nominal;

- domestic yields are good values, load corresponding to the load;

- overall turbine operation was appropriate.

Recommendations

- throughout the operation with regenerative feed water preheating nominal parameters;

- normal operation scheme with achieving the rated values for various parameters;

- maintaining the flow of cooling water circulated at face value or as close to it

- avoiding the supply of TPA's and live steam (TPA using live steam in the power block lead to reduced power).

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Section

Control System, electronics, information technology and cyber security

SECURING ONLINE BANKING SERVICES USING IRIS RECOGNITION

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ABSTRACT: Online banking services are omnipresent in our lives. They started to be used after the internet was widely spread all over the world. Online banking services were really basic at the beginning, but nowadays the end-user can control or initiate most of the common operations that can be done in a physical building of a bank. That's why a very important task to be taken into account is represented by securing the access to this kind of applications. Main methods usually used are represented by a combination of what user knows (a username) and what user has (a digipass / token to generate an OTP – One Time Password). The intrinsic characteristic of the user (that can be represented by a biometric characteristic, like fingerprint, iris, etc.) can also be taken into the account for securing access and operations signing. This paper will present an approach on using iris recognition (together with a username and an OTP) that can be used for achieving the goal of security enhancement.

KEY WORDS: online banking, iris recognition, biometrics, end-user interface, bank officer interface.

1. INTRODUCTION

Online banking services were introduced in early 1980's but the offered services were really basic. After the internet has widely spread and especially after 2000's, these services were improved and excessive promoted to the end-users. The services offered became more and more advanced, so the security concern rose in intensity. At the beginning the main authentication methods were represented by a username and a static password, transmitted to the bank server using a basic internet modem connected on a telephone line. But at that moment, there were only a few users that were accessing this kind of services, mostly because of the conservative reasons (and this include the (still actual) fear of using a new service or because of the distrust in these methods) or because they didn't know anything related to these services provided by major banks.

After the internet was widely spread all over the world, the number of users that were involved in using this kind of services was in an increasing trend, year after year.

That's why securing authentication and signing methods raised a real interest for online banking providers. They tried to improve these methods in order to raise the confidence of the users in the services they offered.

Using biometrics for security enhancement is not a new idea, but it was not widely studied and we think that adding a new authentication method will increase the security of these services. We won't insist on iris recognition method because it is a well-known one, and can be studied in the paper [11] or in John Daugman's researches – [14].

In the following paragraph we will present the proposed system for user enrollment or for accessing the internet banking services using iris recognition together with traditional methods.

2. PROPOSED SYSTEM FOR USER ENROLLMENT

There exist some studies about using biometrics in online baking applications authentication process (like our papers [1]-[6]). The idea is still under a large debate and this thing can be really easy seen in the large number of actual articles about adding a biometric for security enhancement.

In the following picture it is presented the main flowchart used for developing our application. It is presented both the bank-side application and end-user interface.

On the left side it can be seen the steps in authentication/signing for end-user interface. The user has to authenticate using a username, an OTP (One Time Password – generated by a digipass device) and an iris image.

Also, the operations' signing has to be done using an OTP and an iris acquired from an iris camera (presented in paper [2]). This flowchart is widely presented in paper [6], with the comment that in that paper we are using fingerprints while in this one iris images are used.

The main differences between fingerprints and irises are represented by: (i) although irises are much more secure, it is harder to acquire their image (that's smaller) and this thing has to be done in near-infrared light; (ii) FTE/FTA rates (Failure to Enroll / Failure to Acquire) are greater for irises than for fingerprints but FAR/FRR rates are much lower (False Acceptance/Rejection Rate); (iii) fingerprint sensor is much cheaper than the one for iris.

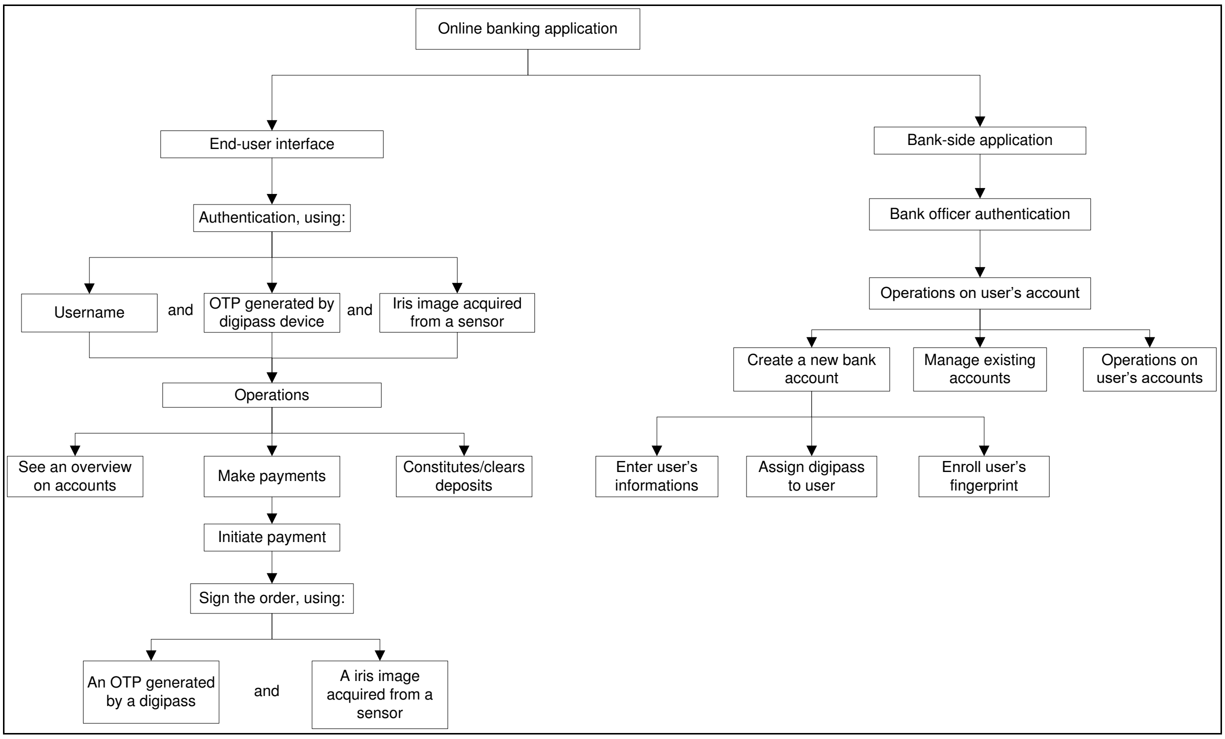


Figure 1. Main flowchart for online banking operations: end-user interface (left) and bank-side application (right) – adapted from previously published paper [6]

In our researches we used the Panasonic BM-ET100US iris recognition camera, presented in papers [2] and [3]. The camera comes with a iris recognition software, namely PrivateID 2.0 and SecureSuite 3.5. We used the provided DLL libraries in order to acquire the raw images from iris sensor and to process them for extracting the IrisCode. The functions from this ActiveX control are not documented anywhere and we had to extract them from the library using specific tools provided by Microsoft Visual Studio 2010 (like OLE/COM Object Viewer).

In the following table are presented the functions exported from Irid_GetImage.dll ActiveX control. These functions will be used for user enrollment, which will be presented further.

In the table 2 it is presented a real HTML example on using these ActiveX methods in order to acquire the raw image from the iris sensor.

Table 1. Irid_GetImage.dll functions exported from ITypeLib Viewer

```
// Generated .IDL file (by the OLE/COM Object Viewer)
//
// typelib filename: Irid_GetImage.dll

[
  uuid(1A805ED1-301B-11D5-AF4C-0050046B03B4),
  version(1.0),
  helpstring("IridianTech GetImage 1.0 Type Library"),
  custom(DE77BA64-517C-11D1-A2DA-0000F8773CE9, 83951780),
  custom(DE77BA63-517C-11D1-A2DA-0000F8773CE9, 1000668118)

]
library IRID_GETIMAGELib
{
    // TLib :     // TLib : OLE Automation : {00020430-0000-0000-C000-000000000046}
    importlib("stdole2.tlb");

    // Forward declare all types defined in this typelib
    interface IGetImage;

    [
      uuid(1A805EDE-301B-11D5-AF4C-0050046B03B4),
      helpstring("GetImage Class")
    ]
    coclass GetImage {
        [default] interface IGetImage;
    };

    [
      odl,
      uuid(1A805EDD-301B-11D5-AF4C-0050046B03B4),
      helpstring("IGetImage Interface"),
      dual,
      oleautomation
    ]
    interface IGetImage : IDispatch {
        [id(0x00000002), helpstring("method Selftest")]
        HRESULT Selftest();
        [id(0x00000003), helpstring("method Selftest2")]
        HRESULT Selftest2(long lPattern);
        [id(0x00000004), helpstring("method CaptureIrisNonce")]
        HRESULT CaptureIrisNonce(
                        [in] VARIANT* nonceBuffer,
                        [in] long hwndParent,
                        [in] short sShowVideoWindow,
                        [out, retval] VARIANT* imgBuff);
        [id(0x00000005), helpstring("method CaptureFaceImage")]
        HRESULT CaptureFaceImage(
                        [in] long hwndParent,
```

```
                        [in] short sShowVideoWindw,
                        [out, retval] VARIANT* imgFace);
        [id(0x00000006), propget, helpstring("property DisplayPopupMsgs")]
        HRESULT DisplayPopupMsgs([out, retval] long* pVal);
        [id(0x00000006), propput, helpstring("property DisplayPopupMsgs")]
        HRESULT DisplayPopupMsgs([in] long pVal);
        [id(0x00000007), helpstring("method CameraTest")]
        HRESULT CameraTest(
                        [in] short liveVideo,
                        [in] short theTimeout,
                        [in] short gatherImage,
                        [in] VARIANT* imageName,
                        [in] VARIANT* soundfile,
                        [out, retval] short* nReturnValue);
    };
                                         };
```

Table 2. HTML example on using ActiveX method “CameraTest” in DLL

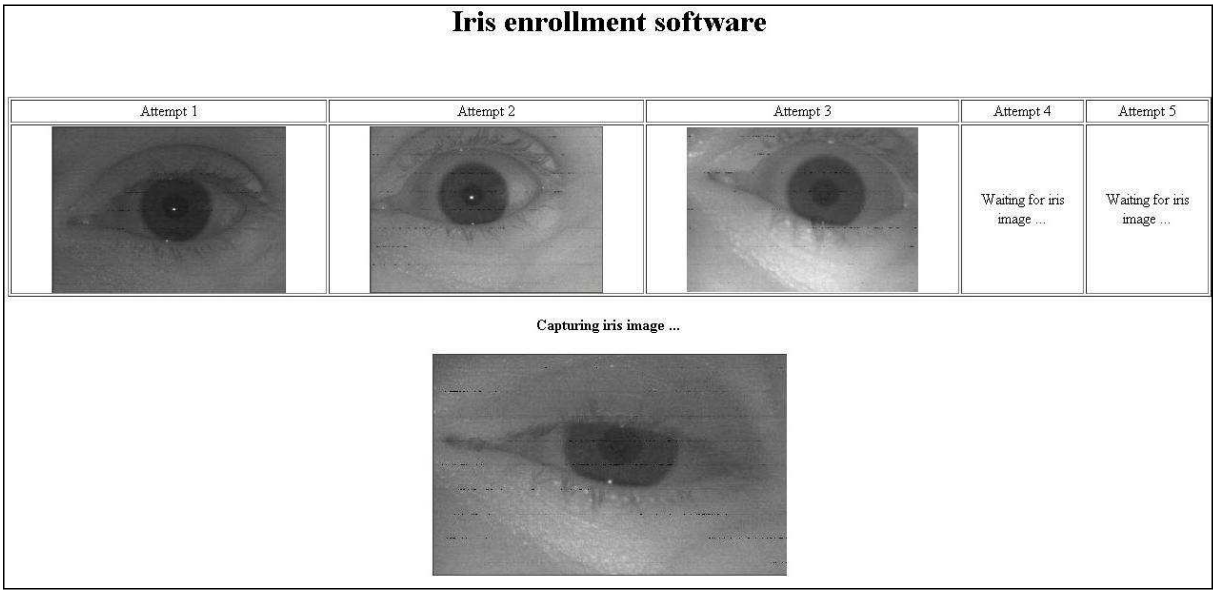
```
<html>
        <head>
                <title>Iridian Authenticam Help</title>
</head>
  <body>
  <OBJECT classid=clsid:1A805EDE-301B-11D5-AF4C-0050046B03B4
     data=data:application/x-
oleobject;base64,3l6AGhsw1RGvTABQBGsDtAADAADYEwAA0wMAAA==
     height=1 id=GetImage width=1 VIEWASTEXT></OBJECT>
        <script languge="JavaScript">
        <!--
        var nonceBuffer = new Array(16);
        var imgBuff1 =  GetImage.CameraTest(0, 5, 1, null,null);
   // -->
  </script>
  </body>
 </html>
```

We used the functions provided in this ActiveX control in order to create our own application for user enrollment. The irises are acquired from the camera, displayed on the browser web-page and - after the successful enrollment - stored in a database for further use. The main application for iris enrollment is present in the Figure 2.

In the figure 3 it is presented the result after five attempts to acquire the same iris image. If the Hamming distance (presented in John Duagman’s papers – [14]) between the generated IrisCodes is in the established limits, than the enrollment is successful, otherwise the process will start over. The user can click on any image already acquired and then that image will be acquired again.

After the enrollment is successful, the user can click on the link on the bottom of the page in order to go back to the main page (in case of enrollment) or to access the online banking application. As it can be seen, this page can be used especially for user enrollment, but it can be easily adapted to be used in online authentication (only 2 iris images will have to be taken – for example – when user authenticates to online banking services).

The main idea is that only iris images that will pass a quality test will be taken into the account, and this can be done from software parameters (thus, many images will be taken but only the one that can be used for personal recognition will be used; presented iris images are ready to be processed in order to obtain the IrisCode).

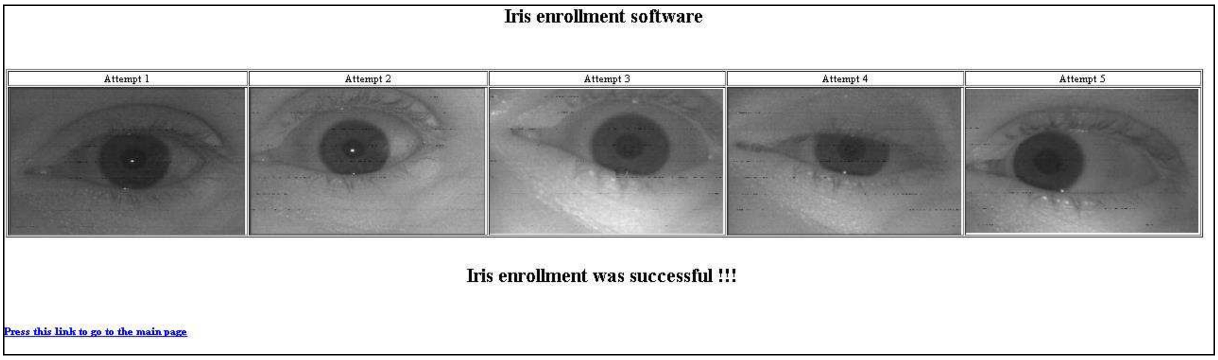


Waiting for iris image ...

Waiting for iris image ...

Capturing iris image ...

Figure 2. Iris enrollment software



Iris enrollment was successful !!!

Figure 3.The software after successful enrollment

5. CONCLUSIONS AND FUTURE DEVELOPMENT PROPOSALS

We proposed a iris-based authentication method, together with classic username (in order to do a verification (1:1 comparison) instead of a identification (that’s 1:N)) for raising the security in a online banking application. The main problem is that the iris camera costs around $100 and it should be provided by the bank. A usual webcam isn’t suitable to be used in this kind of applications because the iris image has to be taken in near-infrared light (especially for black eyes, that won’t be possible to be enrolled otherwise). This method is much stronger than the methods presented in papers [1]-[6], but it has its limitations, related to the fact that a small object (iris) has to be acquired from a significant distance. Reducing the cost of the sensor will lead to a greater acceptance from banks in using this method. Also, many other researches can be done in this field, especially when talking about recognition methods, for example.

ACKNOWLEDGMENT

This paper was supported by the project "Sustainable performance in doctoral and post-doctoral research - PERFORM - Contract no. POSDRU/159/1.5/S/138963", project co-funded from European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013.

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OVERVIEW ON A PERSONAL RECOGNITION SYSTEM THAT USES IRIS IMAGES AS MAIN BIOMETRIC CHARACTERISTIC

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ABSTRACT: Biometric characteristics are being used and studied for a long period of time. Irises, fingerprints, voice or face are common biometrics that can be taken into account for development a strong personal recognition system. Other biometrics, like gait, hand geometry, vein pattern, keystroke, signature or ear are not as used as the ones specified above, but their potential is recognized. In this paper we will focus on presenting an overview on a personal recognition system that uses iris images as main biometric characteristic, together with a personal improvement in image processing of the images acquired from an iris camera.

KEY WORDS: biometrics, iris recognition, pattern recognition, image processing.

1. INTRODUCTION

Biometrics has been used for a long period of time for forensic purposes. But nowadays these methods and characteristics are suitable for personal recognition in world-wide distributed systems. Some of the biometric characteristics are suitable for forensic purposes, especially fingerprints, because their property that they remain at the crime scene. But irises or voice, for example, won’t remain there and this kind of biometrics can be successfully used for personal recognition in access control applications.

Also, many biometrics can be combined in order to increase the confidence in specific systems, but the main problem is choosing these characteristics. For example, if we choose a strong biometric characteristic (like the iris) together with one that is much weaker (e.g. gait), then the result system will not have greater performances.

In the following paragraphs we will present the developments in studying iris recognition techniques, together with some improvements in image processing steps.

2. IRIS RECOGNITION

One of the first papers that focus on using iris images for personal recognition is represented by US patent no. 4641349 from Feb. 3, 1987, issued to Leonard Flom and Aran Safir [9]. They discovered that human iris possesses some characteristics that allow its usage for personal identification. They demonstrated, thru statistic methods, on a great sample of persons, that the iris is unique and specific to each person, even for identical twins.

The main idea is that the iris characteristics are randomly generated during gestation and they aren’t depending on genetic information (like face, for example – it's well known that's harder to distinguish between two identical twins).

After this first patent in iris recognition, the idea was further developed by prof. John Daugman from University of Cambridge [10]. His patent, no. 5.291.560, was issued in 1994 and it is in fact a mathematical representation of iris recognitions methods and steps to obtain an IrisCode from a iris image acquired from a iris camera that uses near-infrared light (presented in papers [2] and [3]). This method for acquiring iris image is better than the ones in natural light, because the level of details that can be achieved is greater, especially for dark brown or black eyes. It is also suitable for low light environments where natural light intensity is lower.

An example of the most common iris recognition cameras is presented in Table 1.

Table 1. Iris recognition cameras: Panasonic (a,b), LG (c) and Iridian Authenticam (d)

	
a)	b)
	
c)	d)

In our researches we used the first camera, namely Panasonic BM-ET100US. The price for this camera is about $100, so it is not quite suitable for securing access to a personal computer. But for research purposes it is a very versatile camera, which can be used both for iris and face recognition. This camera comes with PrivateID and SecureSuite software and can be used for personal recognition in environments where security concerns are at a very high level. The software provided with this camera can be used for acquiring raw images of the irises.

Further, these can be processed in order to obtain the IrisCode and to store it in a database.

After Daugman’s patent expired, a very interesting book appeared, namely a handbook on iris recognition – [8]

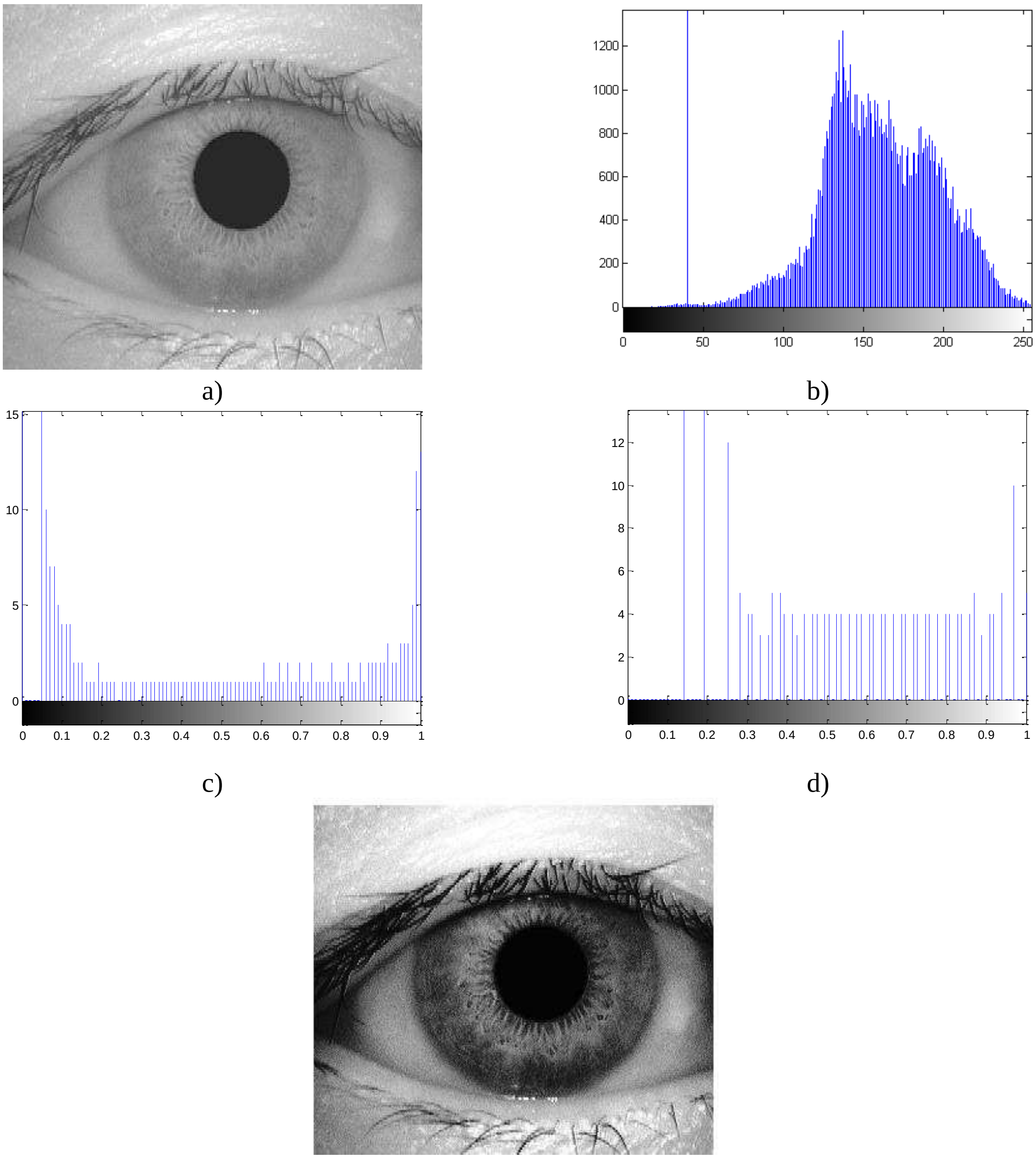
In the following paragraph it is presented a method for iris image enhancement.

3. IMAGE ENHANCEMENT SOFTWARE

During our researches, we studied a lot of methods for enhancing the acquired image quality. For example, paper [4] can be adapted to iris recognition with the same success rate.

Histogram equalization methods are widely used in image processing. In Figure 1 are presented the main steps in image enhancement proposed by authors.

The image is taken from public iris database CASIA and we can see that after histogram equalization of the main image, a much sharper image is obtained. The level of details is greater in the normalized image than in the initial image.



a) b)

c) d)

e)

Figure 1. a) Sample image – from database CASIA - CASIA 001 _1 _1.BMP; b) initial image histogram c) Normalized cumulative histogram; d) equalized histogram after cumulative summing; e)equalized iris image, after cumulative summing

4. CONCLUSIONS

Iris recognition methods have to be further developed because this biometric characteristic has a great potential in personal recognition. Most of the filters can be used in order to enhance the image acquired from the sensor (like the ones presented in [4]). Many other researches can be done in this field, that will always provide really interesting results.

ACKNOWLEDGMENT

This paper was supported by the project "Sustainable performance in doctoral and post-doctoral research - PERFORM - Contract no. POSDRU/159/1.5/S/138963", project co-funded from European Social Fund through Sectoral Operational Programme Human Resources Development 2007-2013.

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CLASSIFICATION ALGORITHMS OF FACIAL EXPRESSIONS BY USING THE FEEDFORWARD NEURAL NETWORKS

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ABSTRACT: This article aims to implement a facial expressions recognition system based on the feedforward neural networks. The neural network utilised is trained using a supervised method called backpropagation of cunjugate scaled gradient type (trainscg). It performs well in a short time, requiring reduced memory and can recognize different states of emotion. The topological structure of feedforward network comprises: the entry level, the hidden and output level. For a higher rate of recognition we will make changes to the neurons number from the hidden layer, as well as the number of hidden levels (from one layer pass to 2 layers). The output of the system allows the recognizing of emotional states (6 basic states and the neutral state), including one neuron for each emotional state.

KEYWORDS: facial expressions, neural networks, backpropagation, emotion

1. INTRODUCTION

The first theories about emotions have appeared as early as of the nineteenth century. In his book [1], Darwin argues that the emotions have appeared in order to help humans to develop. Neural networks (NN) were used in the computers domain for the first time in 1980 [2]. They were often called artificial neural networks (ANN) [3] to distinguish them from biological neural networks, after whose model they were built using the working model of the human mind. Today they represent an information processing system represented by a graph, as well as a series of algorithms that access that graph. Like the human mind, neural networks consist of multiple interconnected processing elements. Thus, a neural network is a graph with multiple nodes (processing elements) and arcs (interconnections) between them. The nodes of the graph are like individual neurons, while the arcs are the interconnections between them. Neural networks represent some of the most complex algorithms of classification and regression and are often considered true black boxes [4]. Although a neural network has a lot of data for training, consuming time, it can make predictions for new cases very quickly, even in real time. Moreover, a neural network can provide multiple outputs representing multiple simultaneous predictions. A key feature of neural networks is that they operate directly only on numbers. Thus, any date located in independent or dependent columns (outputs) which is not numeric must be converted into numbers (for example, values of "yes / no", "high / low" of a variable must be replaced with "0 / 1 ").

2. THEORETICAL BACKGROUND

The most common neural network architectures contain three levels: the input units level (sources), the hidden units level (internal) and the output units level (results). A neural network (NN) is a directed graph $F =< V, A >$, which has the set of nodes $V = \{1,2,...n\}$ and the set of arcs $A = \{< i, j >| 1 \le i, j \le n\}$, with the following restrictions [5]:

1. The set V is divided into the subsets V_I (input nodes), V_H (hidden nodes), and V_O (output nodes);
2. The set of arcs {1,2,…k} is divided in levels:
    a) The input nodes on the first level;
    b) The hidden nodes on the 2,...,k-1 levels;
    c) The output nodes on the k level.
3. Any arc $< i, j >$ must have the i node on the h-1 level and j node on the h level;
4. The arc $< i, j >$ is labeled – the numerical value w_{ij};
5. The i node is labeled – the function f_i.

An example of neural network is shown in figure 1, where it is observed that the input nodes level (I1, I2, I3) is connected to the hidden nodes level (H1, H2), the latter being connected to the output nodes level (O1).

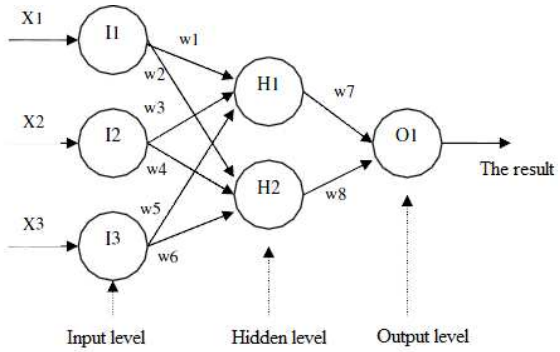

Figure 1. Neural network with 6 nodes

The arcs that connect the nodes (w1, ..., w8) determine the weight (level of importance) of that node.

Input nodes take over the input information and introduce it in the network. Enabling each unit of the hidden layer is determined by the activation of the input nodes and of the weights of links between input nodes and hidden nodes. The output of a i node from a neural network is the activation function of that node his associated, F(I).

The activation function of a node in a network is calculated as follows:

$$F(I) = x_1 \cdot w_1 + x_2 \cdot w_2 + ... + x_k \cdot w_k \quad \mathbf{(1)}$$

A neural network executes a linear transformation of inputs. The transfer function is nonlinear transformed of the activation function F(I) and noted with F'(I). In figure 2 we can see what is happening inside each node in the network.

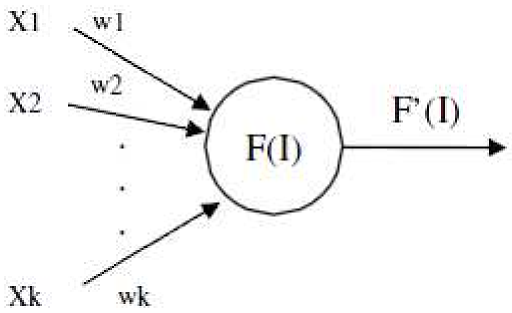

Figure 2. Node of the neural network

The behavior of the output units depends on the activation of the hidden units and of the weights of links between the hidden units and output units. The hidden layer makes the network recognize more patterns, in a way that the number of hidden nodes often increases with the number of inputs and with the complexity of the issue.

Using too many hidden nodes can lead to excessive matching (overfitting) and using a few nodes can lead to models with accuracy (precision) low. Finding a adequate number of hidden nodes is an important part of any data mining techniques that use neural networks [6].

Many products that use neural networks include search algorithms for finding the optimal number of hidden nodes (genetic algorithms). The weights of the input units and hidden units determine if a node is active, and thus by changing these weights, a hidden node can choose what it will be.

3. BACKPROPAGATION TRAINING ALGORITHM

The proposed algorithm consists of the following steps:

1. Determination of the architecture:
   a) How many input neurons and output neurons; what encoding we have at the output;
   b) How many hidden neurons we have and how many layers.
2. It initializes all weights to small random values, typical [-1,1];
3. Repeat until the termination criterion is satisfied:
   a) The presentation of a training example and spread it through the network (forward);
   b) It calculates the current output;
   c) It adjusts the weights starting from the output layer and going to the input. (backward):

$$w_{pq}(t+1) = w_{pq}(t) = \Delta w_{pq} \qquad \textbf{(2)}$$

, where Δw_{pq} is the weight from node p to q in time t.

$$\Delta w_{pq} = \eta \cdot \delta_q \cdot o_p \qquad \textbf{(3)}$$

, representing the changing of the weight.

$$\delta_i = (d_i - o_i) \cdot o_i \cdot (1 - o_i) \qquad \textbf{(4)}$$

, the calculation of the error at the output layer level.

$$\delta_j = o_j (1 - o_j) \cdot \sum_i w_{ji} \cdot \delta_i \qquad \textbf{(5)}$$

, the calculation of the error at the hidden layer level.

4. EXPERIMENTAL RESULTS

We used in the experiment a PC system with Intel Core i3-2100 processor and 4GB memory. The structure of the feedforward network is shown in figure 3 and is composed as follows:the input level, consists of three input vectors, intermediate level (hidden), it contains five neurons and the output level, it contains seven neurons, one for each emotional state.

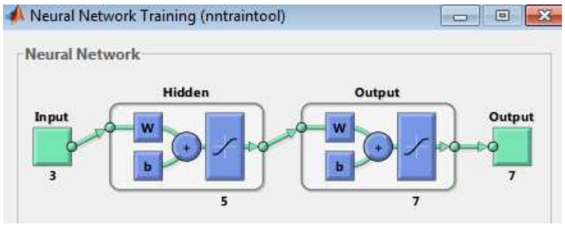

Figure 3. The structure of the feedforward network

The used neural network is built using the backpropagation algorithm of the function cunjugate scaled gradient type (trainscg).

The three input vectors, each have fourty-one different values being appointed feature vectors of the form 3x41, resulting in 123 elements) being associated with 123 neurons.

The output vector is of the form 7x1, resulting seven elements corresponding to the seven classes: happiness, sadness, fear, anger, surprise, disgust and neutral.

In Figure 4 the graph of the mean squared error is showen. From that we can conclude that the system has a small error, that is near to zero.

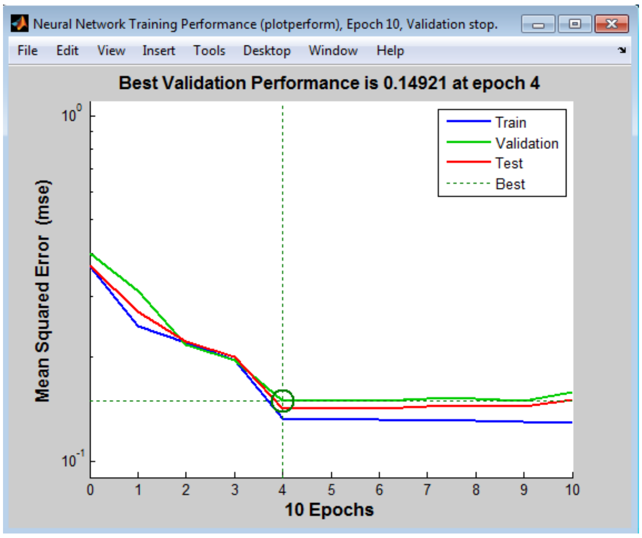

Figure 4. The graph of the Mean Squared Error

In figure 5 the confusion matrix for the following processes is shown: training, validation, testing, and all mixed together. For the training process, it is observed from the first array that the network has very good results for the emotions: sadness, fear, anger and neutral. Worse results are for the emotions: happiness, surprise and disgust, the worst being for hapiness class that has a percentage of 6.9% confused with the second class (sadness). For the validation and testing processes there aren't confusions and for the mixed process, the confusion is kept whole for the 3 classes listed, but now the biggest confusion is for the surprise class (7.3%), where this class is confused with the fear class.

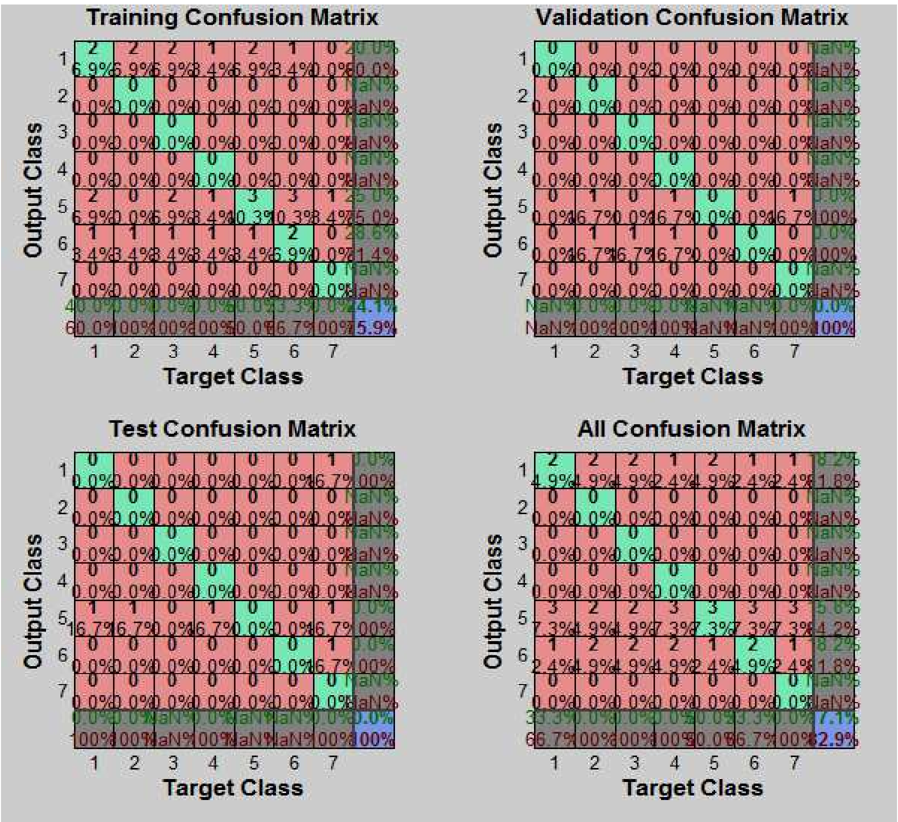

Figure 5. The confusion matrices

In figure 6 the receiver operating characteristic is showen. From the mixed characteristic, it is observed that six classes have true positive rates only the neutral class has a majority of false positive rate.

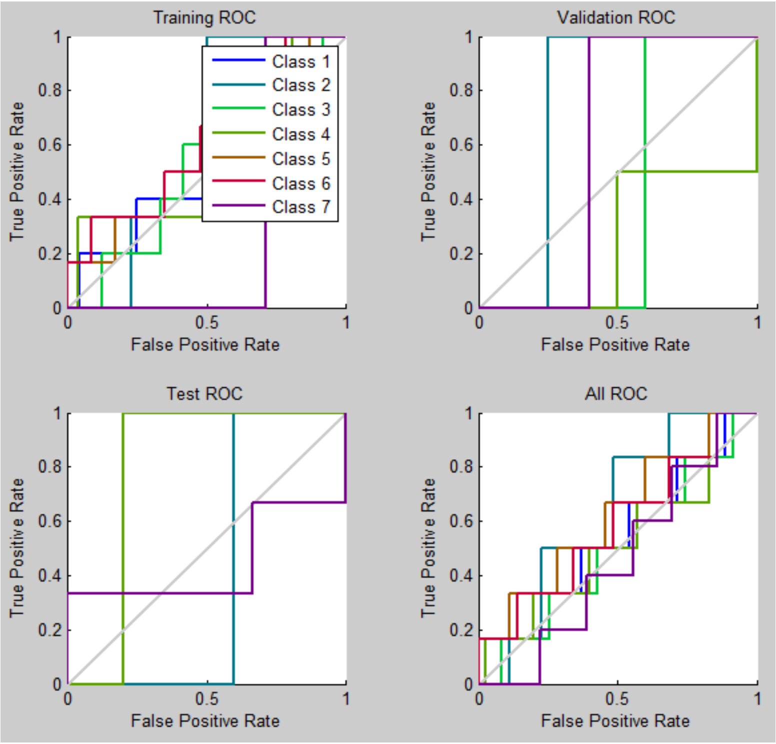

Figure 6. The ROC Characteristic

In figure 7 the histogram of the error is shown. For most instances, the error is almost zero, only in a few instances it is higher, resulting that the system is good in the classification of emotions.

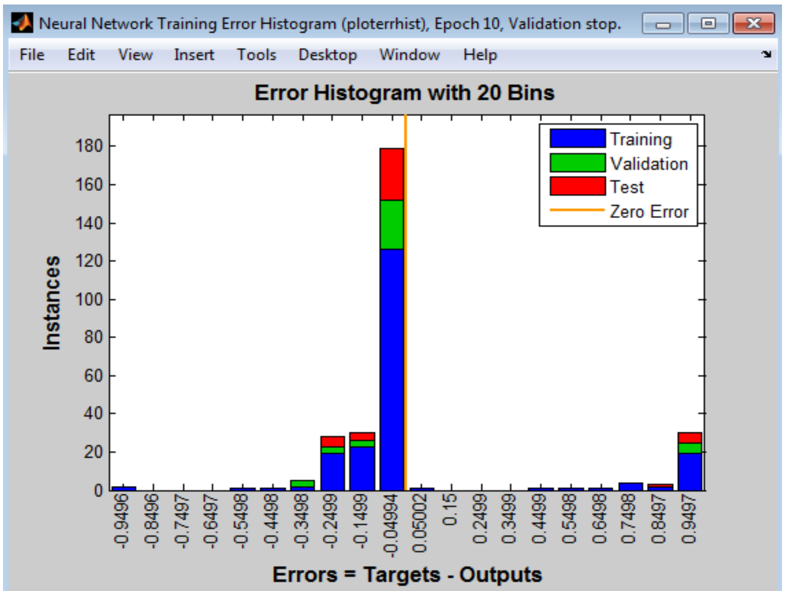

Figure 7. Error Histogram

5. CONCLUSIONS

This paper presents a human emotions recognition system based on neural networks feedforward trained with a backpropagation algorithm of the cunjugate scaled gradient type (trainscg).

The network structure consists of three levels: input level with 123 neurons, the hidden layer with 5 neurons and the output layer with 7 neurons.

For the input level, the network uses data for three vectors corresponding to facial features that change quickly for each state, namely: eyebrow, eyelid and mouth, and for the output level we have the moods: happiness, sadness, fear, anger, surprise, disgust and neutral.

The system can recognize without problems four emotions classes without confunding them with other classes (sadness , fear, anger and neutral), and for classes: happiness, surprise and disgust there was some confusion, but it was acceptable.

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ARTIFICIAL VISION ALGORITHMS BASED ON FRACTALS FOR THE IMAGES DESCRIPTION

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ABSTRACT: A fractal dimension (FD) is an important feature, which characterizes roughness and self-similarity of complex objects in nature images. In practice, the FD is determined by a box-counting (BC) that is one of the commonly used estimation algorithms. In this paper we propose two algorithms: a box-counting algorithm for the evaluation of fractal dimension and an algorithm for the evaluation of local fractal dimension. The implementation of the algorithms is validated by the accuracy estimates in respect to the FD theory. Experimental results show that the BC method proposed provides more precise estimates compared with the classical BC method in terms of precision, accuracy, and the order of data taken over. The higher accuracy of FD estimations leads to more powerful features in the application of general and fine applications.

KEYWORDS: fractal dimension, image feature, fractals features, box-counting method.

1. INTRODUCTION

In nature, there are complex shapes which cannot be evaluated neither through classical geometry nor through topology. These shapes change their geometric properties according to the representation scale. Fractal geometry is an extension of classical geometry [1]. It can be used in order to shape and evaluate more precisely complex physical shapes, which have irregular edges, like leaves, shores, galaxies. In their paper O.M. Bruno and others use the fractal dimension (FD) to identify objects in nature through the box-counting (BC) and the multiscale Minkowski methods to estimate the fractal dimension (FD) [2]. In medical applications, R.D. King and colab. [3] used the BC method to estimate the FD of the cortical ribbons in order to determine the patients with different degrees of cerebral atrophy. The most used method of the fractal dimension estimation in objects from nature is the box counting method defined by Russell and others in 1980 and used by scientists later [4], [5]. Several papers [6], [7], [8], [9] try to extend the capacity of a BC method in order to be applied to a grey scale picture.

2. THEORETICAL BACKGROUND

2.1 Fractals. Fractal Dimension

In image processing we will consider fractals being subsets of the R^2 plan formed from irregular objects with indefinite details at any representation scale. The Euclidian dimension is the dimension of the minimal Euclidian space in which the analyzed object can be submerged (broadly through Euclidian dimension we understand the minimal number of coordinates used to define a random point of the object). In order to characterize the fractal objects the notion of fractal dimension was introduced. The fractal dimension is very important in the quantitative evaluation of the fractal objects because it allows the evaluation of the irregularity degree of a contour, edge line or surface. A fractal is a shape whose fractal dimension is strictly greater than its topological dimension, not being an integer. For objects having the self-similar property, the fractal dimension is defined as follows: Let N be the number of copies produced by the scaling with the factor $r(r<1)$. Between N and r, the following relationship is determined:

$$\mathrm{N}\mathrm{r}^{\mathrm{D_f}} = 1 \qquad \textbf{(1)}$$

Through the logarithm of the relationship above, the fractal dimension is obtained for self-similar objects:

$$\mathrm{D_f} = -\frac{\ln \mathrm{N}}{\ln \mathrm{r}} \qquad \textbf{(2)}$$

For natural objects another definition of fractal dimension will be adopted. Either, in this way, A a compact set of plan and $N(A,r)$ the smallest number of discs of radius r needed to cover the set A. If the next limit (3) exists, then this limit is called fractal dimension of A:

$$D_f(A) = \lim_{r\to 0} \frac{\ln(N(A,r))}{\ln(1/r)} \qquad \textbf{(3)}$$

Because the direct calculation of fractal dimension is practically impossible to be done, there are now many ways to evaluate the fractal dimension, of which the most common is the box-counting algorithm. Therefore, the first way to evaluate the fractal dimension is to cover the A set with domains limited by the sides of the squares obtained by successive division at 2 of the side of an initial square, considered on the directions of the coordinate axes containing this set. In this case we can consider as definition, the following limits:

$$D_F(A) = \lim_{n\to\infty} \frac{\ln(N(A,n))}{\ln(2^n)} \qquad \textbf{(4)}$$

, where n is the order number of division ($L/2^n$ being the side of the coverage square, and L the side of the initially square) and $\mathrm{N}(\mathrm{A},\mathrm{n})$ is the number of squares corresponding to this divisions that have non-empty intersection with the set A.

3. THE PROPOSED METHOD

3.1. Algorithms for the evaluation fractal dimension

In practice, due to the limited resolution of the digital representation of images, the calculation of the fractal dimension by applying directly the definition is impossible. For the calculation the fractal dimension we can used, the box-counting algorithm, starting from the definition (4) and the restrictions of resolution. This algorithm applicable to the binarized images, consists of the following steps:

1. it reads the original binary image;
2. it extracts the contour using e.g., the filter based on logic functions with five points neighborhoods;
3. it initializes k=2, r=1/k și N(r)=0;
4. it calculates the size of the box counting as follows:
    a) it divides the image into 4 squares equivalent and mark which contains points of the outline;
    b) it counts the marked squares;
    c) each marked square is divided in turn into 4 equivalent squares and the ones which contain points of the outline are marked;
    d) make k = 2k and the process continues from the point b), as long as it allows the image resolution;
    e) the values obtained k = 1 / r, and N(r) are logarithmic and

    represented graphically in a curve having coordinates $(x, y) = (\ln(1/r), \ln(N(r)))$;
  - f) the approximate slope of the log-log curve or the slope of the line joining the most points of the curve is calculated. The value of the slope represents the size of the box-counting $D_{bc} \approx D_f$.

Sometimes, the choice of the binarization threshold may influence the evaluation of the object’s fractal dimension. In order to attenuate this influence the following algorithm can be used, also based the box-counting dimension, but which uses all the shades of gray (or color) of interest in the selected area. The box-counting algorithm for the greyscale images consists of the following steps:

1. the grayscale initial image is read or if it is colored it is transformed from RGB in the intensity I (or gray level) using the formula: $I = 0{,}299R + 0{,}587G + 0{,}114B$;
2. the area of analysis is selected;
3. select and stores the grayscale of interest in the area of analysis. For each tone of gray selected the following operations are selected:
   - a) the image is binarized using a threshold equal with the gray tone selected so that the object is white and the background is black;
   - b) the contour is extracted using the binary filter with 5 points neighborhoods;
   - c) the box-counting dimension for extracted outline is estimated and stored;
4. the space of the size box-counting (the dimension of the box-counting to the value of gray level considered as binarization threshold for the extraction of the contour) is represented graphically.

The fractal dimension of the object in grayscale, will be considered the value of the constant part (or an average value if is quasi-constant) from the spectrum obtained at point 4. If such a portion does not exist, then the object analyzed is not fractal.

3.2. The local fractal dimension

The fractal dimension defined above and calculation algorithms presented refer to a global characterization of the analyzed object. In order to characterize the local complexity of shapes the local fractal dimension concepts and the local-connected fractal dimension have been introduced. Thus, in order to evaluate the shapes which do not allow the calculation of a global fractal dimensions, each point of the shape is associated with a maximum neighborhood and a defined local fractal dimension and calculated by a method similar to the box-counting method. The algorithm for the calculation of the local fractal dimension is as follows:

1. either a current point of the shape (the shape contour);
2. a neighborhood of increasing size $(2h + 1) \times (2h + 1)$is considered, centered on P, $h = 1, \ldots, h = h_{max} + 1$;
3. for each h, there are counted shape points from inside the neighborhood N(h);
4. Trace the curve $(\ln h,\ \ln(N(h)))$ and the local fractal dimension is calculated as being the slope of the logarithmic characteristics, using one of the methods mentioned (the smallest squares, maximum frequency).

Sometimes the local fractal dimension leads to erroneous results (e.g. case of separate lines - instead of 1, give a value greater than 1.2 - or separate points - instead of 0 obtain a value greater than 1). To correct these errors the local-connected fractal dimension is considered. Unlike the calculation of the local fractal dimension, the calculation of the local-connected fractal dimension considers only shape points from inside the neighborhood, connected with P. The algorithm for the calculation of the local-connected fractal dimension is as follows:

1. take a current point of shape (the shape contour).
2. the neighborhood of increasing size $(2h+1)\times(2h+1)$ it is considered, centered on P, $h=1,\ldots,h=h_{max}+1$;
3. for each h, shape points from inside the neighborhood N(h) are counted which are connected to the central point P;
4. trace the curve $(\ln h,\ \ln(N(h)))$ and the local-connected fractal dimension is calculated as being the slope of the logarithmic characteristics, using one of the methods mentioned.

4. EXPERIMENTAL RESULTS

We have conducted the experiment in Matlab R2012b, which is installed on a PC system with Intel Core i3-2100 processor and 4GB memory. The proposed algorithm it used to compare the experimental and theoretical results in terms the Serpienski triangle. Figure 1 shows the result for the Serpienski triangle using the proposed algorithm.

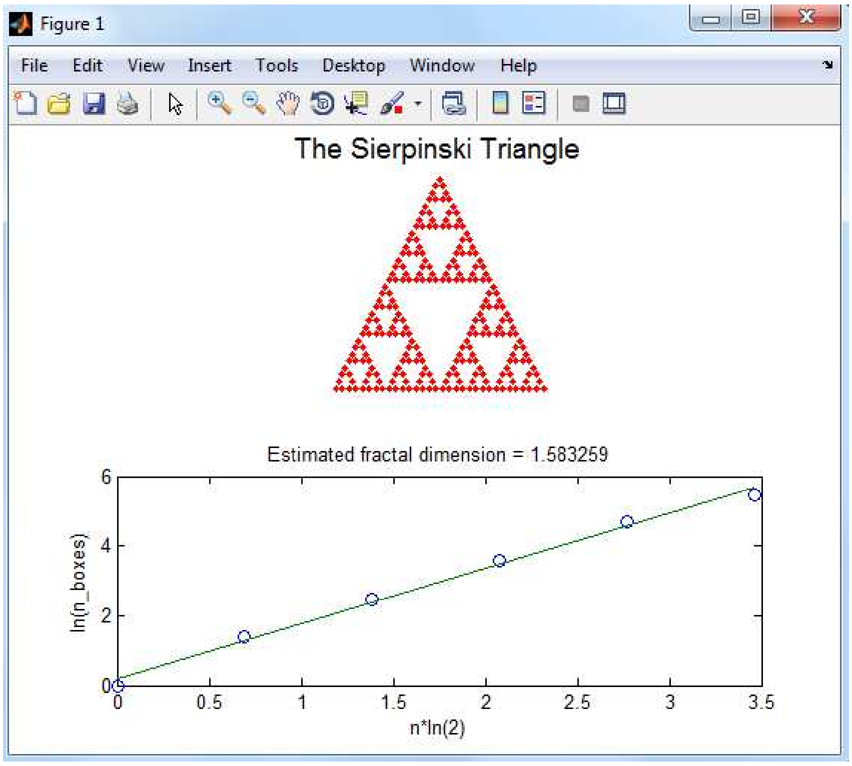

Figure 1. The dimension estimate of the Sierpinski triangle by the proposed algorithm

The estimated fractal dimension of the Sierpinski triangle with the proposed algorithm is less (1.5832) compared to the theoretical dimension (1.5850), resulting that the proposed algorithm is good. Table 1 shows the execution times in the program to calculate the dimension and tracing. From table 1 we can deduce that an execution consumes the most time for potting the graph (subplot function), then less time for calculating the fractal dimension (function boxcount), a small time to draw the triangle (Serpienski function) and other small functions consuming very little time.

Table 1. The execution time for the functions of the program

Function	**Total time**	**% Time**
serpinski	0.022 (s)	16.5%
boxcount	0.045 (s)	33.8%
subplot	0.064 (s)	48.1%
Self time (built-ins, overhead, etc.)	0.002 (s)	1.5%
Totals	0.133 (s)	100%

5. CONCLUSIONS

In this paper, two algorithms are presented: one type for box-counting fractal dimension and an evaluation algorithm for evaluating local fractal dimension.

With the first algorithm an experiment is performed, the results are better than those theoretical realized with the box-counting classic method.

To characterize the local complexity of a shape notions of local fractal dimension and local-connected fractal dimension were introduced, proposing an algorithm for the calculating of the local fractal dimension.

The errors which appear during the calculation of the local fractal dimension can be corrected with the local-connected fractal dimension because it takes into account only of the shape points within the neighborhood.

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A CRITICAL INSIGHT ON THE NEW INFORMATION STORAGE, PROCESSING AND TRANSMISSION ENVIRONMENT

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Abstract: *Today's cybercriminal industry has* evolved to a point where criminal activities have become as structured, organized, and skilled as security vendors, turning them into money-scheming machines causing global yearly financial losses ranging in the billions of dollars. Expanding IT infrastructures and operating system fragmentation has paved the way for cybercriminals to find and exploit new and unknown vulnerability that affect all transitioning parties.

Keywords: Cloud computing, server, security, provider limited, costs, flexibility, independence, lost dates, spy.

1. Cloud computing

The necessity to temporarily share the resources of a computer in order to implement a business model in which certain applications could be used in common, led to the 'cloud computing' concept in 1961 by professor McCarthy. We remember the 1990s when architectures like client-server and peer-to-peer were used in institutions (universities, ministries, etc.). To extrapolate, at this time, we can consider the "internet" as one of most accessed cloud spaces. At the same time we have to admit the clear delimitation between notions such as virtual machine, data center and cloud computing, the latter using API (application programming interface).

The concept has evolved rapidly from offering increased computing powers, adapted to oprational demands - equal to having a system with unlimited practical capacities, to specialized cloud type services – equal to installing a certain software with dedicated functions on the respective information system (an example is the archiving and sharing documents among users, regardless of their geographical location or used device).

Although the cloud applications developers effort is to eliminate blocking understanding and assimilation of way of exploiting cloud services for the final user, in fact the cloud concept remains, structurally and functionally a very complex one due to the implementation patters, to the real used infrastructure and the destination of offered services.

Classification based on addressability or user category, leads to identifying four types of cloud: private cloud, community cloud, public cloud and hybrid cloud.

Private cloud describes an infrastructure created to be used by a single entity, hardware resources being allocated according to the respective organization. Administration can be handled by an external specialised company, which will exclusively reserve and allocate the necessary resources for the client, directly from the organization premises ('on-premises' / 'off-premises') or a combined management system. In most cases, the "thin" clients who are integrated with a private cloud are in fact computers that are not equipped with hard disks, have with no external access (DVD,USB, etc), reduced power consumption and maintenance, and a high security level, since no data is stored on the user device.[1]

In this context it is to be mentioned that the technological accessibility barrier for creating Cloud-type services has lowered the last years, making it accessible for everyone to have minimal server installation knowledge, create own cloud services (either for other persons or companies or for personal use), as the operation systems and the information programmes necessary for such services are publicly available, for free, under Open Source licence and benefit from community support and detailed installation and user manuals.

One of the eloquent examples is the OwnCloud software kit. Much like other similar solutions it can be easily created – freeof charge - it uses open source technologies for certain operation systems (for other systems there are monthly fees and there are various limitations), it is relatively easy to install on a server. It offers users Cloud type services and files synchronising among more devices (Computer, Laptop, Tablet, Telephone, etc), such as sharing it with other users publicly or on the same system, similar to the services offered by known commercial service, such as DropBox, allowing organizations and the private persons, who don't want to use a public service for internal documents, to create their own cloud DropBox type. OwnCloud offers enough robustness, allowing exploitation of saved applications and files to be accessed from any point, as the data can be synchronized and delivered to tertiaries. The consumption of resources are reduced and only one web host is necessary to support PHP5 and MySQL (or SQLite), a vesion of OwnCloud Server 5 application and URL for remote access. The authors claim that OwnCloud is compatible with absolutely any type of server, and the providers of „online hosting service" even offer support and installation guides.

Accessibility of the programme as well as its continuous development by the community that promptly remedies security issues, offers support and permanently improves the programme. It also makes it suitable to hardware resources allocated to different users - from the domestic one to the internal implementation - in companies that have their own servers, limitations reffering to used hardware, connectivity, and technical support staff. It is a less conventional but very popular version, suitable for a small number of concurrent users and for some companies/groups whose activity requires access to distant resources. According to current requirements and necessities of exploiters, a domestic private cloud can be framed differently, its development having as target the end product. In the near future, all these can lead to creating „cloud in cloud" with less predictable effects at this moment.

Public cloud is an infrastructure owned by a specialized supplier aloowing independent users access the same server resources of the physical server[2]. But some applications cannot be ported to the cloud, as they retake the "thick" clients, with the risk of not having the possibility to rebuild the work environment in case some events related to the total compromising of the "machine" occur. This is becuase most data is stored on the respective device.

The community cloud – is an infrastructure that is developed to be exploited by consumers who have common preoccupations or interests.

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[1] Mihai Preda – IISC – Reţele de calculatoare şi internet – cloud computing – Universitatea Politehnică Bucureşti

[2] https://www.katescomment.com/what-is-cloud-computing/

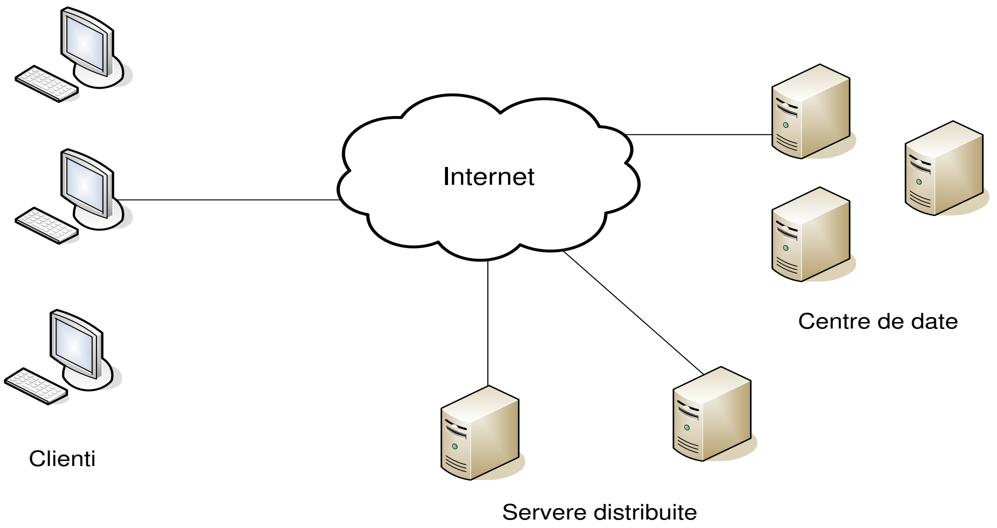

Fig. 1 Cloud computing structure

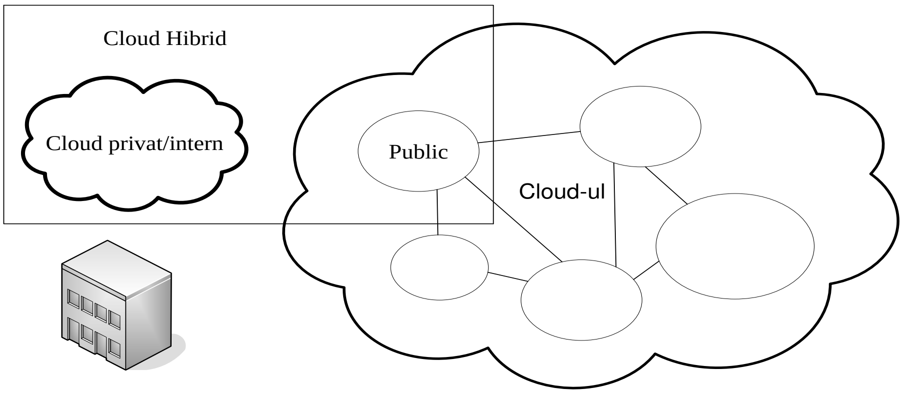

Fig.2 Types of cloud

The Hybrid cloud is an infrastructure created with a mixture of more distinct cloud structures that remain separate entities, but are tied together by the same technology - proprietary or standardized - allowing data portability and on-request[3] applications. According to requirements, the resources are allocated dynamically by means of specialized applications.

Another classification criterion is that of cloud “model service” or service “level of specialization”, from simple virtual servers to platforms or software applications according to users requirements and on the maintenance level the user company wants to assume. All this becase there are more cloud computing solutions available on the market that can be grouped into three main categories: IaaS (Infrastructure as a Service), SaaS (Software as a Service), PaaS (Platform as a Service).

At the virtual infrastructure level in the field of information storage and its distance exploitation, the actual tendencies are to provide the final users with dedicated virtual information systems and resources adequately reserved, presenting increased subdivision and security as compared to the old web host systems. This is far better than the well-known Shared Hosting type hosting service in which different entities have the internet pages stored and delivered to visitors on the same physical server, an advantage being the hosting reduced cost due to the great number of consumers covering the expenses the provider being the only one charged with security and maintenance of the physical server. If we were to make a comparative analysis of the storage/exploitation solutions in light of new trends, we can consider as acknowledged the Share Hosting notion, the hosting service on a server where the resources are shared with other website owners, resulting in only one operation system that has all services necessary for a website to function with more users, each user having strict access to the files that compose the site[4]. Of the new tendencies, what differentiate and defines VPS (Virtual Private Server) as next the web hosting level is the complete access to the respective virtual server which can be personalized and secured specifically to the clients' needs, benefiting also of a dedicated IP[5]. The physical/hardware services are shared among virtual servers of clients, but this happens only at physical level, the logical behaviour acting much better and clearing many of the associated security problems. There is only the possibility that one of the virtual machines consume more resources, this aspect having an impact on the other machines that share the same physical resources.

One solution based on a VDS (Virtual Dedicated Server) is more expensive than VPS, and it is composed from a farm of virtual machines which have been allocated resources guaranteed for only a certain user, eliminating excessive use problem, and dedicated servers are generally used by the bigger sites that want to monitor absolutely everything related to stored data.

All suggested solutions also have disadvantages that are not to be neglected:

- resources are unstable: if one of the sites hosted on the server consumes a lot of

resources, all sites will run heavily;

- security is exposed: if a vulnerability of a site is exploited, there’s a risk that more

sites may be affected;

- limitations required by the provider: if a certain type of email server or a certain

PHP version is wanted there is the possibility of not having the provier's agreement;

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[3] http://www.cert-ro.eu/files/doc/775_20131030091057011764400_X.pdf

[4] http://www.worldit.info/articole/de-ce-ar-trebui-renuntat-la-shared-hosting-ce-solutii-de-hosting-ieftine-al-unui-site-exista/

[5] Number used exclusively by information technology equipment (printers, routers, modems, computers, etc.) that allows them to identify and communicate with each other across a network of systems.

- spam propagation: if one of the sites on the shared hosting server produces spam (as an activity) or hosts a pornography site, the IP of the server will be considered by different international solutions as a malicious one, with the risk that this site won't rank well in search engines;
- limited speed: the transfer rate depends strictly on the bandwidth and connection speed.

In exchange, cloud hosting providers have very big data centers and have the ability to allocate "unlimited" resources, upon request, most of times in real time. Although there is a chance that data is shared in more locations, resources behave as if existing in the same place (as if there were a single dedicated server). We can remember a few general advantages of cloud computing that are valid, regardless classification:

- decrease of costs : classically, technological evolution involves replacement of resources in order to ensure operational efficiency, but the cloud eliminates the necessity to invest in servers or software that demands high capital;
- scalability and speed: cloud type services are usually fiable in order to ensure necessary resources related to the increase or decrease of requirements during the activity programme;
- disaster recovery: because storage in cloud is a distance back-up solution, data will be safe and the recovery process is instantaneous;
- flexibility: services delivery is done upon cooperation agreements, the user can give up some requirements, receiving a high level of operational flexibility;
- independence: applications provided via Cloud can be accessed from any computer-like device, smartphone, iPad, etc., that can become a possible adept of cloud computing technology;
- virtual machines can be cloned, reinstalled and administrated online.

The above presented scenario can surely be placed in a totally different position, favoring a dedicated physical server, anti-cloud arguments drawing attention on some possible effects:

- congestion of data transfer: as computation are distributed in cloud and applications become more intense in term of data, the need to move larger volumes of data arrises;
- network traffic costs: certain cost patterns for some organizations limit access to offered facilities;
- loss of data: for cloud consumers, the loss /affection of data to the provider may become a very important issue, even leading to incapacity of rebuilding the previously affected structure[6];
- juridical aspects related to the jurisdiction applicable to a geographical area where data are effectively stored.

Specialists conclusions hint at prioritizing the necessities of each user. The choice depends very much on the level palced on each decision element. There is no distinct winner between the classical formula and the new tendency. There are many cases when sustained hybridization of heterogeneous security solutions is the only possible option.

Conclusions

Specifically in the technical area, any evolution besides presenting various advantages, also comes with various drawbacks. Innovation in computer science is so dynamic that even financial institutions have difficulties in adapting,

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[6] http://www.cert-ro.eu/files/doc/775_20131030091057011764400_X.pdf

consuming effort in anticipating and regulating new sets of rules that enforce stability. Also, prevention methods assume the use of high-priced and specialized software that require specialized technical knowledge.

Beyond disadvantages, cloud technology is a projection of the future that cannot be ignored, but only experimented with and continuously perfected...

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GLOBALISATION - IMPACT ON THE FINANCIAL DOMAIN

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Petrică - Mihail Marcoci

Abstract: Financial and banking institutions that have adhered to the new internet and technology era in the hopes of delivering better customer experience and service availability have embraced technology with both hands. However, this has caused a wide range of problems due to the ever-increasing complexity of systems used to deliver these services.

Keywords: Globalization, cloud accounting, single euro payment area.

1. Arguments and general considerations

A particular domain, extremely sensitive regarding data protection, is the financial one, including, of course, the bank domain. Taking into consideration the level of globalization and the dynamic business environment, many organizations externalize certain services. Cloud hybrid pattern is implemented taking advantage of the benefits brought by the private cloud , as well as by the public one but, due to the special character of the data, implementing some security mechanisms are necessary to be implemented that will have as purpose isolating information from the unauthorised access. Do the material advantages generated by the implementation of new technologies justify taking the risk of reputation and of possible financial losses that cannot be foreseen? It's exactly this lack of predictability that usually imposes to the financial system a careful behaviour in implementing the new technologies. Are security and management policies of the providers aligned to those of the beneficiaries? In the last decade, the financial institutions face more and more advanced persistent threats (APTs). There were also cases when, employees of cloud services providers did not respect the internal operating protocols allowing access of unauthorized persons to confidential data. The question is then what are the losses, in case of an intentional threat from the inside or of the decision to alienate the data base of a client in exchange of some material benefits.

The companies that, at this moment have the data base a little digitalised are more reserved while, the companies with a wide experience and a history in the field of digitalised data base processing are more open. On the other hand, according to a study published in March 2015[1], the companies with less than 500 employees and the companies with more than 5000 employees have a rate of acceptance and adoption of new information storage and processing environment strategies much bigger than the companies with a number of employees between 500 and 5000. The fears expressed by the financial institutions subject related to the cloud phenomenon could be classified according to their importance:

- implementation of security measures adapted to the new necessities (66%);

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[1] Cloud Security Alliance – How cloud is being used in the financial sector: Survey Report, March 2015

- auditing, permission for incidents 75%

- data basis encrypting (46%);
- data encryption and "tokenisation" (46%);
- effect of criminal terms generated by possible incidents (42%);
- loss of clients data in cloud (20%).

The extremely important elements in the good running of the financial institutions are confidentiality, integrity, availability and most of times non-repudiation of processed information. For understanding the possible impact on the financial domain in general, it is necessary to detail a little the two previous actions.

Regarding the confidentiality, as we will see in the next chapter, (Juridical implications and answer to incidents) data can be stored in many copies, in more jurisdictions with different types of legislation, this very fact making more complicated the cooperation protocol between the financial institution and provider. The legislation and the regulations regarding the confidentiality and data protection, such those from EU and US Safe Harbor Programme but especially USA Patriot Act, require a knowledge of data storage in any moment. What is allowed in one country may be a possible crime in other country[2].

Elements of conformity must be obeyed equally by the client financial institution and by the services provider. The management of access and associated policies must be identical. There cannot be exceptions if building a common security system is wanted. Respecting the transparency principles , the cloud provider must prove the internal control capacity, control of implemented confidentiality measures and of communication channels that need to be periodically tested during operations. Accessing a client data must be done without compromising other client's data, respecting all laws, regulations and standards, the result of executed auditing actions by the juridical authorities need to certify implementation of all conformity measures. But legislative unevenness even in side EU generates more controversies and decreases trust in a cooperation in this field. The measure to take must be implemented globally in trying to prevent, as much as possible, the crimes, especially given the fact that the decentralized nature of online environment allowed money laundry become a quite common practice among individuals that perform illegal activities an example like that being the transaction by virtual coins (e.g bitcoin[3]).

Even if we previously presented some disadvantages of cloud computing , the subject referring to security requires a more careful and more detailed analysis given that the cloud technology automatically involve development of new attack ways over the information and the number of links of the "trust chain" necessary to ensuring confidentiality and data security increases given that the physical infrastructure can be owned and operated by more providers.

A report from 2013 highlighted a few vulnerabilities[4]:

- data compromising: the leak of information is one of the continuous threats to the financial institutions and the implementation of classical protection methods (e.g. encryption/decryption) do not have the same expected effect, the impact can produce security breaches on another level of the system- creation of a security copy in another space increases the exposure and on the other hand, the loss of decryption key can make impossible to recover the files/applications (including the auditing ones);
- hacking the accounts and the services: fraud , exploit of software vulnerabilities,phishing, vishing, as well as other attack methods expose the access

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[2] http://www.cert-ro.eu/files/doc/775_20131030091057011764400_X.pdf

[3] Bitcoin - https://en.wikipedia.org/wiki/Bitcoin

[4] http://www.cert-ro.eu/files/doc/775_20131030091057011764400_X.pdf

credentials , a very mediated case in 2010 hinting to a security vulnerability (Cross-Site Scripting - XSS);

- blocking services (DoS, DDos): attacks at applications level through a lot of volumes of small size, aims at slowing the processes and the services offered so that they bloc or interrupt (if possible) the service exploitation by the users offered by the cloud provider;
- problems with the distributed technologies: in case of a cloud architecture, compromising a component of a technology common to more clients,can affect the whole system and implicitly all the clients.

A new tendency of the criminality “industry” has become the use of cloud for controlling entire botnet networks[5] by means of C&C (Command and Control) server type which can be found in the cloud. The reason for which the hackers “plant” these servers in cloud type infrastructures is to slow down the network traffic analysis done between the infected terminal an online services and for making difficult the distinction between legal and illegal traffic. In order to extend the control to the terminals for a longer period of time, most malwares incorporate a series of DGA[6] (domain generation algorithm) up to 50,000 domains a day and automatic search of C&C servers,to continue getting and sending instructions, even if the legal bodies have stopped communication with the identified servers.

We remember just a few “attackers” typology which overlap in terms of action at the same time on the same areal and/or the same target:

- White Hat Hackers –experts in security, specialized in penetrating networks and showing the eventual vulnerabilities in order to improve the security of a company or institution;
- Black Hat Hackers – use their knowledge for penetrating on personal purpose networks and security systems and to create malwares/viruses;
- Script Kiddies – with reduced skills and knowledge as compared to Black Hat Hackers,use tools developed by the later ones in order to penetrate websites /systems and to build own reputation;
- Attacks/attackers sponsored by nations- develop upon agreement and the support of a nation theoretically having unlimited resources, the targets might be military, financial, governmental, industrial,civil, etc;
- Spies/industrial espionage – the companies can call for some hackers help for penetrating the security systems of some competitors in order to seep out confidential data (patents, plans, internal documents);
- Terrorists/cyber terrorism- in general attacks which have critical infrastructure as targets;
- Taking into account the details above, we can understand much better the fears and the objections of the financial companies regarding the implementation of the new technologies in the context of companies' necessity to protect clients recordings against any threat and unauthorised access. Being convinced that there are more aspects that can be discussed related to the present subject, we can present part of the problems that can provoke very important reputation and financial losses at general level as well as at particular level – institution[7]:
- monetization by the cloud providers of confidential data ;
- lack of very solid regulations globally adopted , in extreme situations, can lead to collective clients processes;

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[5] botnet – o rețea de calculatoare ale căror sisteme de securiate au fost compromise și sunt controlate de o terţă parte - fiecare terminal compromis poartă denumirea de „bot”, https://en.wikipedia.org/wiki/Botnet

[6] Domain Generation Algorythm, https://en.wikipedia.org/wiki/Domain_generation_algorithm

[7] http://www.cert-ro.eu/files/doc/775_20131030091057011764400_X.pdf

- reduction of services and cloud applications availability if these were “suffocated”

or interrupted may cause main disturbances in the well functioning and may block functional processes with major implications;

- access interface are not common to all providers: replacement of the provider,

migration or other operations involving strategy changes dependent on the provider's technology may generate non-sustainable costs and placement as captive consumer, even if the resources do not positively meet the necessity criteria.

The procedures and the business processes must adjust the security policies and the work fluxes. Limits and responsibilities must be defined so that the internal structure of the financial institution should not be affected . Any externalized service to tertiary must obey the same security rules. The public or financial institutions must respect the norms regarding the segregation of the network infrastructure depending on the access to the data, the implementation of a DMZ[8] (demilitarized network), as well as of some DLP (data loss prevention) systems [9]. Few of the good practices measures in the security field should be implemented by absolutely all financial companies:

- plan-do-check-act (PDCA)[10]: preparation of a response plan in case of a security

breach, integration of these procedures in a list of actions , checking the compliance with the procedures ad their correction if they don't produce the expected effect;

- monitoring the network traffic: in monitoring, recording and correlating the

network traffic , generally SIEM[11] type tools are used (Security Information and Event Management) in order to identify possible security breaches;

- policies of data erasure: since there are methods to recover the data on physical

environments even if they had been erased, it is necessary that the discarded storage equipments be completely destroyed in order to avoid possible data leaks;

- collecting logs: for facilitating the investigation process after the identification of a

possible breach.

2. Globalisation

2.1.Cloud accounting - a new challenge for accounting

In 2013, a representative from Romania as vice-president was elected in Bruxelles during the Assembly of European Accountant Federation. Globalisation is required by the technological process and by the applications which are in a continuous development. Acquisition of more efficient softwares and implicitly more expensive, involve acquiring IT support which allow applications to run in optimal conditions. More personalities support the measures regarding aspects that should be regulated in detail and that refer to transitory dispositions and the period of time dedicated to this change, proportional application of the standards. An accountancy software in cloud environment would allow access and data updating from any point and at any moment.. In a study realised by the Consult Blue Company at CIO Council request CIO Council (Association of Information and Communications Directors in Romania) - „Cloud Adoption 2012”, is presented in a very interesting aspect: 55% of the big companies in Romania use, in different forms, technologies of cloud computing category. The study regarding migration of the financial and accountant process is supported also by KPMG, according to the analysis done in 2012.

The monthly accountancy flux for data processing of a company implies a few

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[8] DMZ, https://en.wikipedia.org/wiki/DMZ_(computing)

[9] DLP, https://en.wikipedia.org/wiki/Data_loss_prevention_software

[10] PDCA, https://en.wikipedia.org/wiki/PDCA

[11] SIEM, https://en.wikipedia.org/wiki/Security_information_and_event_management

stages starting from collecting and storing justifying documents from clients to elaboration of checking balances, data centralization and transposition in fiscal declarations. A cloud accounting platform would allow to some operations and accountant processing be exclusively clients tasks to a stage where the flux of information operations would overlap those done by the traditional accountancy programs[12]. Documents can be uploaded online by eliminating client picking times. In addition, the platform can provide functions that otherwise would be purchased from the vendor under a contract of "accommodation" with legislative changes. SaaS (Software as a Service) provides the answer to all expectations. If strong financial service companies own data coming from other departments are updated and automatically entered in the analysis, the result can be delivered in real time for policy makers to identify market needs and provide the necessary resources. SaaS (Software as a Service) provides the answer to all expectations. If strong financial service companies own data coming from other departments and are updated automatically entered in the analysis, the result can be delivered in real time for policy makers to identify market needs and provide the necessary resources.

Some advantages of cloud computing in accounting relate to:

- automation of data collection and processing;
- lowering IT costs and procurement services;
- real time access to information;
- back-up services that lower the risk of loss / damage information;
- improving collaboration and financial communications, including social interaction between accounting / accounting department and customer / other departments;
- preventing errors in the conduct of business, increase data accuracy and eliminate duplicate information;
- improve service control and authorization;
- improvement of auditing in general, regardless of company size.

The main concern remains the confidentiality and security of access.

Although implementation of the new system will also have side effects related interruption of business, the protection linked to new forms of risk and will require investments related training to the employees, the skeleton and the actual construction of supporting the business will require progress in the allocation and personnel changes.

2.2.Single Euro Payments Area - project overview SEPA in Romania

By establishing the SEPA project is In terms of breaking down barriers, even if it will enhance the integration of the banks, as in fact all other financial institutions, are these to be affected by growing competition. However the vision of the future payments in euro European Payments Council (European Payments Council - EPC) that counts 69 members, banks and banking associations from 31 countries and over 300 specialists representing credit institutions in all sectors of the European market. To develop new services to consumers, common practices should be supported by efficient infrastructure for payments processing and a harmonized legal framework which must comply with SEPA standards, for the PSD (Payment Services Directive - PSD) Regulation no. 2560/2001 on cross-border payments in euro, Regulation no. 1781/2006 on information about the payer accompanying transfers of funds, Regulation no. 924/2009 on cross-border payments in euro, the FATF recommendations on terrorist financing - recommendation VII for wire transfers (2004) and others.

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[12] Bogdan Ştefan Ionescu, Cristina Prichici, Laura Tudoran - Cloud Accounting - A Technology that may Change the Accounting Profession in Romania, audit Financiar, Anul XII, nr. 110 – 2/2014

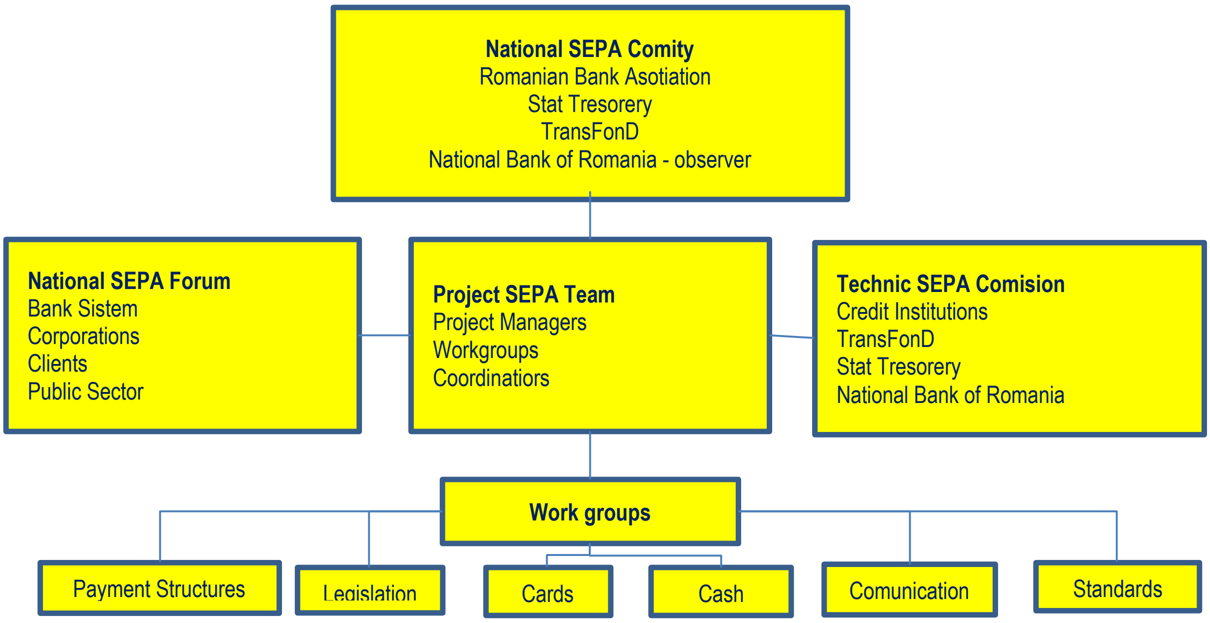

Fig. 1 SEPA Project Organisation[13]

The SEPA project in Romania stipulates that the first phase cooperation and dialogue between the National Bank of Romania, TransFonD, the Romanian Banking Association and the State Treasury, targeting, before switching to the single European currency, the adoption of SEPA standards for domestic and ensuring compliance with respect to the handbooks of rules listed above.

Payment Services Directive - Directive 2007/64 / EC establishes the requirements for transparency and disclosure, rights and obligations of users and providers of payment services, unitary prudential requirements and the regime for authorization and supervision, and the set of rules, applicable Equally non-bank banking and payment services, extremely important issues, as we shall see in the next chapter (the legal and incident response). European Parliament and Council approved in 2012 Regulation (EU) no. 260/2012 as amended by Regulation (EU) no. 248/2014 establishing technical and business requirements for credit transfer transactions and direct debit transactions in euro, which is mandatory for all EU member states in adopting national legislation non requiring adoption in national legislation.

Where the European Union aims to create SECA[14], SEPA encourages the gradual replacement of transactions and cash services through electronic: initiating payments via internet, to bring mobile payments, e-invoicing e-invoicing, credit, direct debit mandates electronically, e-reconciliation-reconciliation, etc.

The SEPA project is just one of the projects which support globalization and, in turn, needs the support of all the bodies involved. Accessibility, addressability and full transparency in terms of services and prices are clear evaluation criteria. The technical requirements are not simple. Technical interoperability is another requirement is a prerequisite for competition.

3. Conclusion

To create an integrated market for electronic payments systems in euros, it is essential that the processing of credit transfers and direct debits is not hindered by business rules or technical obstacles such as compulsory adherence to more than one system for settling cross-border payments[15]. The services provided by PSP (payment service providers, according to

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[13] www.infosepa.ro

[14] Single Euro Cash Area

[15] Regulamentul (UE) nr. 260/2012

Regulation (EU) no. 260/2012), public administrations and national central banks, as well as other heavy users of regular payments based on technical infrastructures that include, among others, accessibility cloud. The advantages of the new technology outweigh the potential risks and oblige operators to adopt safety measures. It is a clear example of a technology conjunction globalization leading to the measures that are intended to be implemented to ensure financial globalization.

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The work has been funded by the Sectoral Operational Programme Human Resources Development 2007-2013 of the Ministry of European Funds through the Financial Agreement POSDRU 187/1.5/S/155420

THE SIMULATOR-SYSTEM FOR THE RENEWABLE ENERGY POWER SUPPLY SYSTEMS

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Abstract: The interest in renewable energy is increasingly high in recent years. In addition to developing the manufacturing technologies of the elements that generate electricity from renewable sources, special attention should be paid to elements that allow to use the renewable energy supply systems for the common power supply system. This paper presents a simulator-system that has built two systems for converting solar energy into usable power in classical power supply network.

Keywords: power supply system, energy, solar panel, ON-GRID, OFF-GRID

1. The renewable energy power supply systems

The ON-GRID systems are those systems for generating electricity, regardless of renewables / fuel used and where it is located (from a company or an individual) which can be connected to the public electricity network. Photovoltaic (PV) ON-GRID systems represent one of the most effective sources of converting the solar energy into electrical energy. The solar energy is a reliable source of savings and, in some cases, an income generator. Photovoltaic panels convert sunlight into electricity by photoelectric effect. Photovoltaic panels produce continuous current. This is converted into AC current by the inverter ON GRID thus fueling consumers connected. The ON GRID PV systems allows you to power your home or small business with renewable energy during those periods (daily and seasonal), when the sun shine. Any excess electricity it produces is then reintroduced into the public power supply network. When renewables are not available, the public power supply network provides energy that you need, eliminating expenditures for storage devices like batteries of electricity.

In addition, the energy suppliers (eg. electric utility) enables a bidirectional meter and thus the excess electricity generated by photovoltaic systems is fed into the network. If you use more electricity than the PV system generated during a given month, you pay only energy provider for the difference between what you use and what you have produced.

Advantages:

- Total clean and long term running (minimum 25 years):
- Possibility of further expansion of production capacity

- Power supply to consumers
- Reduced maintenance and operating costs
- Participate in drastically reducing electricity bills.[3]

The OFF-GRID systems are often referred to as autonomous electrical systems, or "island systems", which many beneficiaries want to install them to benefit from green energy.[4]

2. The simulator-system description

The system - simulator is shown in Figure 1. This system allows the laboratory conditions of a proposed photovoltaic system with components, simulating realistic motion tracking process of the sun, and the power of consumers using two types of power supply, ON-GRID and OFF-GRID.

Fig.1. The simulator-system

The simulator - system components

The solar module (Figure 2) is formed by a polycrystalline solar panel and a reflector with halogen such as solar simulator, whose brightness can be adjusted. By adjusting the inclination of the solar module can simulate different angles of the roof to allow study of the effect on the functioning tilt module. Halogen reflector is mounted on a swivel that allows it to simulate the progression of the sun during a full day.

This solar module with solar altitude emulator makes it possible to analyze various scenarios of solar irradiation. The software tools can be set depending on the angle of latitude, date and time of day. Equipment characteristics are: 10 W polycrystalline solar module with Open - circuit voltage: 26V short- circuit and Current: 650mA , adjustable tilt mode , adjustable solar altitude , solar angle adjustable , halogen lamp 500W.[1]

Fig.2. The solar module

The solar panel simulator module (Figure 3) comprises three independent solar modules, as follows: three separate models of solar simulation modules, each solar module shows irradiation adjustable, open-circuit voltage: approx. 23V, short-circuit current: up to 2A , integrated display for voltage and current, operating voltage: 100-240VAC, 50 /60Hz , individual modules can be connected in series or in parallel.

In order to "store" the energy produced and consumed in order to provide permanent power supply network either in ON- GRID system or in OFF-GRID system, the system is equipped with a battery and a charge controller.[1]

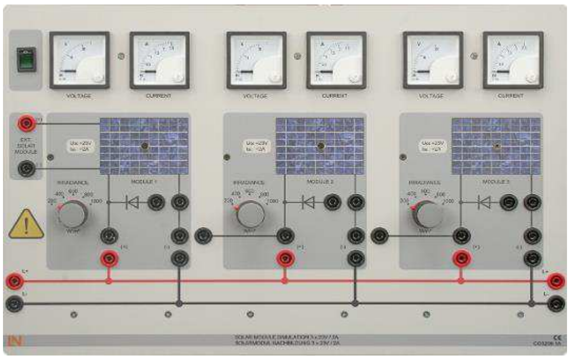


Fig. 3 The solar panel simulator module

The battery module (fig.4.a) has provided panel indicator, voltage and current, and terminals. Battery used lead- acid battery is maintenance free (12V / 7Ah).

The solar charge controller (fig.4.b) is used to charge the lead- acid batteries using solar power. It controls which transfers power battery protection and battery sets limits (to download and overload) . The module also contains the indicator panel controller, voltage and current, and alerts LEDs.

a) b)

Fig.4. The solar battery and the charge controller

The OFF-GRID inverter (Figure 5) contains an inverter to stand -alone mode analysis of the PV system. It ensures operation independent of mains power consumer public and the entire solar energy stored in the batteries is used only for local consumers. It works only with solar panels and solar cells, and the excess energy produced is not used. OFF-GRID inverter module provides a sinusoidal output voltage, reverse polarity protection and the battery.

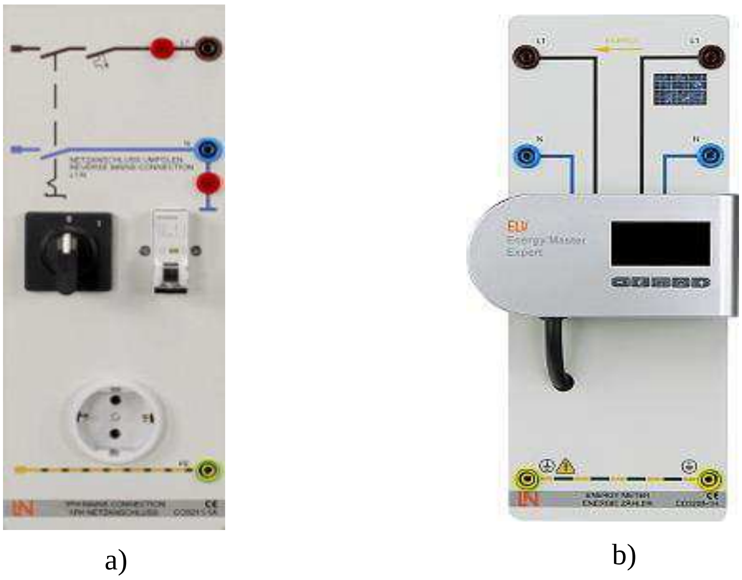
Fig.5. The OFF-GRID invertor

The grid connection inverter or the ON-GRID inverter (Figure 6) contains an inverter for PV system analysis in parallel with the electric grid. This module ensures continuous supply local consumers with the opportunity, when no energy is produced by solar panels, to use energy from the public power network. The module also synchronizes with public power network by analyzing network parameters (frequency, voltage), with the possibility that excess energy produced to be distributed through public power supply.

Fig.6. The ON-GRID inverter

For monitoring and metering the power energy distributed in the public network there it is used a **energy meter** (fig.7.b) that incorporates a energy meter unidirectional, energy flow direction is from the network simulator. It is a digital energy meter, with display parameter: voltage, active power, energy cost, energy consumption.

By means of the circuit breaker of Figure 7.a. made the connection between the inverter OFF-GRID public power network.



a) b)

Fig.7. The circuit-break and the energy meter

The panel of the simulator-system contains, besides the present systems and consumers of various powers, which is feed to 12V and 230V (Figure 8).[2]

The simulator-system enables software monitoring of parameters via analog – digital multimeter (Figure 9) . This display enables display of the measured parameters (voltage, current, active power, apparent power, reactive power, cos φ) and sending them to the software via USB or RS232.[2]

Fig.8. The consumers

Fig.9. The Analog-Digital Multimeter

Experiment – ON-GRID supply of the local consumption

Figure 10 shows an experiment that connects solar module simulator on the ON-GRID power system and aims to follow the system operation mode.[2]

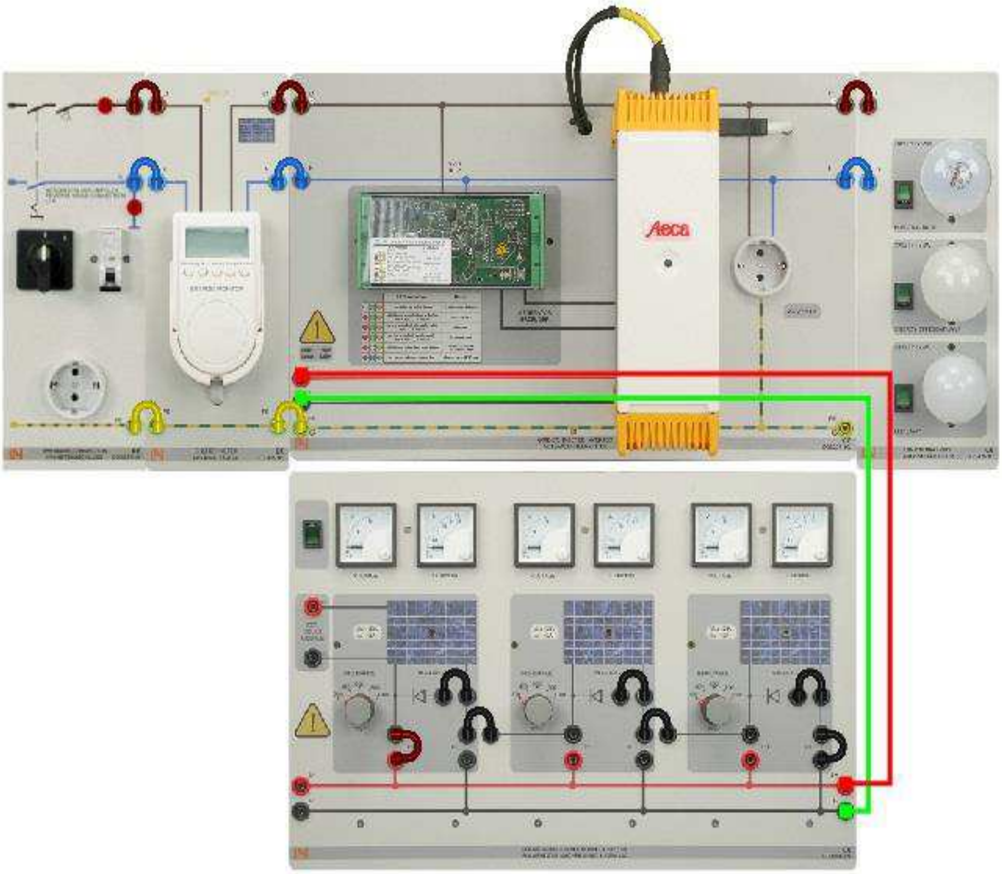


Fig. 10. The experiment connections

Set an irradiance of 1000 W/m^2 for the solar module simulations. Move the single-phase mains connection's main switch to the "1" setting; wait until the inverter displays the energy parameter and both its green LEDs come on. Note that when consumers connect the power supply network decreases and increases consumer power.

Conclusions

The ON-GRID systems presents a superior advantage of the off-grid type, as provides the ability to continuously supply electricity to local consumers either using energy from the solar panels or the public network. Also, these systems offer the possibility that the energy produced by the solar panels to be transferred and consumed by the public power network.

The OFF-GRID systems successfully apply where there is no public power supply. These systems use electricity energy by solar panels in parallel with a set of solar panels. Unused energy is stored in batteries, which can be used later.

The simulator-system proposed approach allows multiple power schemes and studying power modes on ON-GRID and OFF-GRID, making operating characteristics and aiming the operation features.

The simulator-system is currently used in the usual way with renewable energy from photovoltaic panels or received from a photovoltaic simulator, but can be used with any other renewable energy source such as wind power. Principles that are used in the conversion of renewable energy - electricity used not take into account the primary energy source but only a few of its parameters.

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SOFTWARE APPLICATIONS USED FOR AUDITORY-VERBAL REHABILITATION

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Abstract: Children normally developed in terms of auditory, learn verbal language naturally and spontaneously. But there are children who have difficulty in proper development of language from various causes such as deafness (transmission, sensorineural, mixed). Proper development of the verbal language of children is conditioned on listening and speaking. For these situations, children must use different devices and hearing aids and must follow a program of auditory-verbal rehabilitation. Auditory-verbal rehabilitation involves generally to perform under the guidance of a specialized speech therapist, a complex of auditory training exercises and speech therapy. In this paper we present some examples of software that can be used in auditory-verbal rehabilitation program, highlighting the stage where they can use and benefits in stimulating the auditory-verbal children with hearing disabilities. Since, at present, very much children use the computer and smart mobile devices, the paper presents applications for both PC and tablet or smart-phone.

Keywords: rehabilitation, cochlear implant, software, auditory training

1. General aspects

Hearing impaired determine, by depriving hearing, direct consequences of language, thought and on the overall development of mental somatosensory.

The recovery process of children with cochlear implant consists of: early education, early prosthetic, family guidance and motivation.

Although cochlear implant enables the child to perceive auditory signals through the electrical stimulation of auditory cells in the cochlea does not mean that he can automatically speak, to integrate spontaneously among hearing people. In this case for children with cochlear implants, which no longer learn to speak spontaneously, early auditory-verbal recover is an essential requirement for a socio-psycho-emotional and effective professional integration by learning the language with the help of specialists and family by creating an proper communication environment for auditory-verbal stimulation.

Duration of the learning process of language and hearing abilities is conditioned on the child's age (the age at which it was implanted), the level of the mental development and family involvement.

Preparing child for auditory-verbal rehabilitation includes:

- developing motricity of the fonoarticulator apparatus;
- daily oral training / repetitive as games;
- developing, setting and language automation.

Forming of abilities to use his vocal tract is a necessary task made through various exercises:

- intuition exercises felt the vibration through the chest, larynx and cheeks while speaking;

- breathing exercises - examples blowing balloons.

Preparing the child for auditory-verbal rehabilitation:

1. Forming of abilities to use his vocal tract: intuition exercises, breathing, facial gymnastics, lingual.
2. auditory training - will be reacting to noise, noise detection and discrimination of sound source produced by various noise sources.
3. developing, setting and language automation

Auditory training involves the following steps:

a. the child's reaction to noise: blinking eyes, turn their heads, flinching
b. detecting non-verbal sounds: appliances, toys sound engine and horn machine, telephone, doorbell
c. discrimination against non-verbal sounds: drum - flute, Telephone - mixer, ringtone - vacuum cleaner;
d. distinguish AIUSŞ phonemes plus consonants M, B, P plus adjustments based on other consonants and vowels
e. discrimination vocalizations (UUU - train, OOO - wonder specific vocalizations animals, vehicles etc.)
f. acquire and differentiation of monosyllabic words (water, egg, one, two, bear, train, horse) bisyllabic (mother, father, ball, front, house) trisyllabic (elephant, banana, car).

2. Software applications

Auditory training is generally performed by auditory stimulation directly using various noise sources. However, since children use a lot the computer and smart mobile devices, there are a number of software applications that can be used for additional stimulation.

One of the variants available for PC, is provided by Neurelec, on the http://rehabilitation.oticonmedical.com/ (fig.1).

Fig.1. Main page

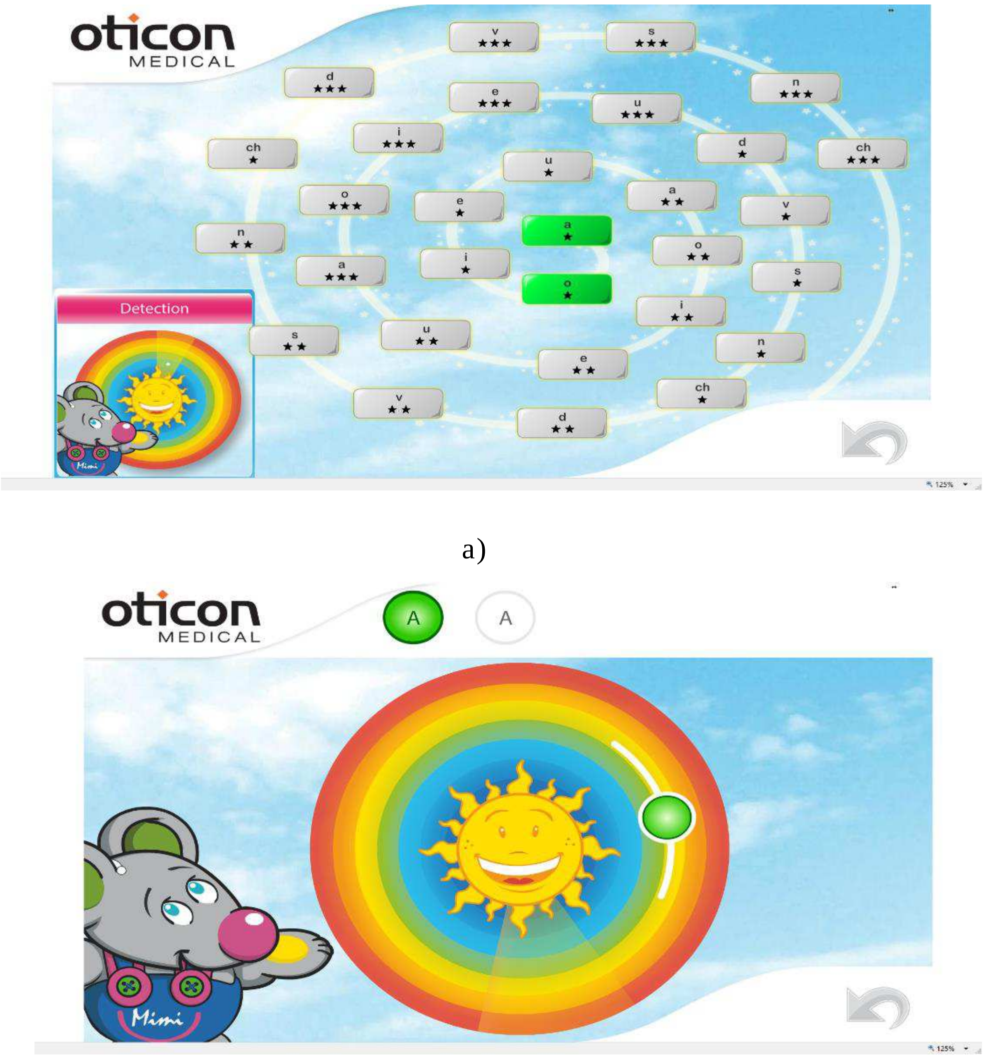
The website provide sets of application for auditory training both children and adults. The main disadvantage, for Romanian children, is that the website does not have a Romanian interface (French, English, German, Spanish, Brazilian).

The children section has 3 types of applications (fig.2):

- Detection
- Discrimination
- Identification

Detection – allow to choose a sound (fig.3.a) and double click when the sound is generated. When the detection was correct the area is colored by green, else the area is colored in red. (fig. 3.b).

Fig.2. Selection page

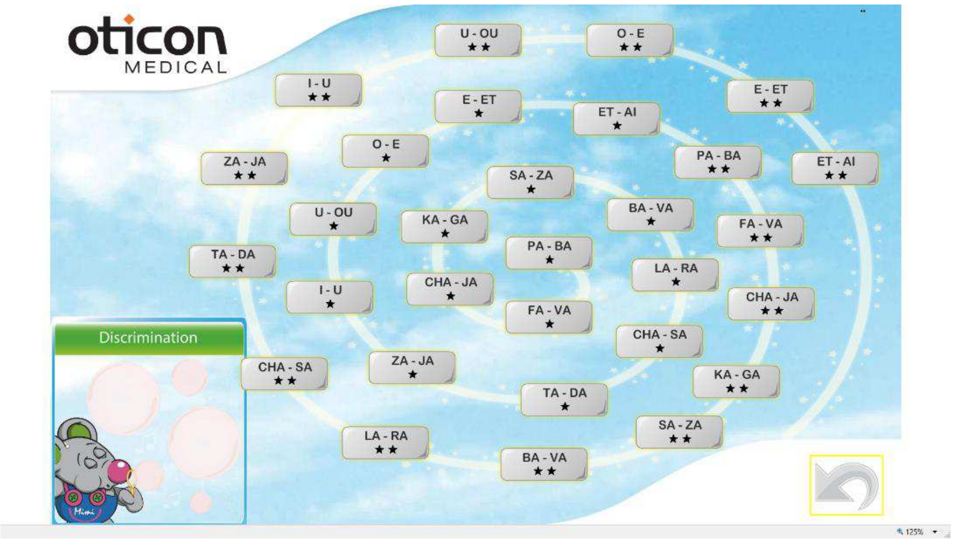


a)

b)

Fig.3. Detection

Discrimination – allow to choose some groups of very close sounds (fig.4.a) and double click when the followed sound is generated. When the detection is correct the balloon is broken and the emitted (fig.4.b).



a)

b)

Fig.4. Discrimination

Identification – allow to choose some groups of images and sounds from real life (fig.5.a) and double click when the followed sound is generated. When the detection is correct the image is marked with a green circle (fig.5.b)

a)

b)

Fig.5. Identification

A provider of applications for Android systems, with Romanian-language version, which can be used successfully in the verbal auditory rehabilitation is KIDSOPIA (kidsopia.ro) (Fig.6). It features more than 18 interactive applications and activities for kids (Trenul alfabet, Onomatopoeia: Vocea Animalelor, Puzzle cu Rățușca etc). All these applications have a rich information database and it contains the explanation about the theme of the game.

Culori cu Fleoșc

Pentru că știm că învățarea culorilor este un lucru greu și în mod normal un copil poate să le recunoască și deosebească abia în jurul vârstei de 3 ani Kidsopia a creat inca o aplicație educativă care să îmbine distracția cu educația.

Haplea: Fructe și Legume

Iată cea mai distractivă colecție de fructe delicioase și legume sănătoase! O aplicație educativă de la Kidsopia care îi va ajuta pe cei mici să memoreze și să recunoască cele mai cunoscute fructe și legume.

123 Numere și Oi

Cei mici vor învăța numerele de la 1 la 99, cum se citesc și cum se scriu precum și ordinea lor într-un joc distractiv chiar și pentru cei mofluzi!

Bobble: Jocul Cuvintelor

British Council și Kidsopia vă prezintă un minunat joc educativ de compus cuvinte pentru copii de la 8 la 14 ani. Evident că și cei mari sunt invitați să se distreze!

Fig.6. Kidsopia.ro

Looking at the steps for auditory training, can give some examples of applications that can be used:

a. discrimination against non-verbal sounds: http://rehabilitation.oticonmedical.com/ section **Identification**

b. distinguish AIUSŞ phonemes plus consonants M, B, P plus adjustments based on other consonants and vowels - ex. KIDSOPIA BUBBLE WORDS, ABC Trenul *alfabet, Învăţăm animalele,* ex. http://rehabilitation.oticonmedical.com/ section **Detection**

c. discrimination vocalizations (UUU - train, OOO - wonder specific vocalizations animals, vehicles etc.): KIDSOPIA VOCEA ANIMALELOR, ANIMALS LEARNING, MUPPET BABIES, http://rehabilitation.oticonmedical.com/ - section **Identification**

d. acquire and differentiation of monosyllabic words (water, egg, one, two, bear, train, horse) bisyllabic (mother, father, ball, front, house) trisyllabic (elephant, banana, car): KIDsopia CERC, Triunghi Patrat, Curtea animalelor, Potrivirea generalor, Anotimpurile, Bucatarul, Bobocii *şi cifrele*

Conclusions

The auditory-verbal rehabilitation of deaf children, wearing various medical devices that help them hear, can do very well with a sustained effort in permanent auditory stimulation.

The process of rehabilitation has very good results if it is done under the guidance of one speech therapist specialized in the type of deafness and the type of device worn by the child.

As for children, the best way to stimulate the auditory and verbal are games, the dedicated software applications came to diversify the range of games and provide a different form, "exercises" for children undergoing a auditory-verbal rehabilitation program.

The use of the software do not replace the speech activity and game elements from the real world.

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DETERMINING THE CHARACTERISTICS OF STRENGTH AND ENERGY

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Abstract In the study conducted on the cutting system-low-load rotor through the defining parameters of the excavation, the parameters of cutting, excavation capacity and capacity of force and energy can synthesize the following:-for analysis of cutting system-low rotor loading in order to improve performance in service is necessary to be defined respectively measured a number of categories of parameters , of which the most important are: cutting parameters; cinematici parameters; geometric characteristics of rocks and characteristics extraction technology.For the determination of these parameters are presented in a synthetic way and ordered the technical data and the ones definable by direct calculation, so as to be easily useable by professionals, interested in conducting analyses of this nature. It presents a graphical material suitable for the proper understanding of the elements considered in this study; -cutting parameters determination of rocks by using low-rotor assumes knowledge of technology and the ripping process. The technology used is based on extracting the steps above vehicular level excavator in slices, with wood chips. For this case are studied and determined both graphically and through relationships of computing elements that define the cutting process. There are analyzed the elements of influence of process and of these interdependencies, being introduced new concepts and a methodology of analysis.The problem of determining the capacity of the excavation, if the low-rotor is analyzed under various aspects, are defined and established relationships for the calculation of the theoretical excavation capacity, technique, and ability to return, per day, per month and per year.

Key words**: transport, optimizations, mechanics**

1.Introduction

In the case of rotor low-force characteristics relate to:

-the forces acting on a bucket:

- force of cutting (cutting) F_x acting after the tangent to the trajectory of the Cup;
- the force of penetration (press) F_y acting normal to the trajectory after Cup;
- lateral force F_z acting after the binormala Cup.

- What forces act on the rotor:

- the resultant cutting force F_{xR};
- the resultant force of penetration F_{yR};
- the resultant lateral force F_{zR}.

Energy characteristics may refer to:

- The power required for the excavation P_{ex};
- Power required for lifting material P_r;
- Power required to rotate (pivot) the upper deck of the excavator along with arrow and rotor running P_p.

The parameters of force and energy depend on time and deployed chip parameters. In practice it works with average values. Medium cutting force F_{xm} shall be determined by the relationship:-in vertical plane main (θ = 0):

$$F_{xm} = k_{uz} \cdot K_e \cdot S_t, \quad \text{N} \qquad (1)$$

- in a plan which, at angle θ ≠ 0 against the main dropdown plan:

$$F_{xm}(\theta) = k_{uz} \cdot K_e \cdot S_t(\theta), \quad \text{N} \qquad (2)$$

where k_{uz} represents the coefficient of tooth wear and account edge shear bucket (k_{uz} = 1 new tooth, k_{uz} = 1,2 ... 1,5 worn tooth normal, $k_{uz} \geq 2$ for teeth, the exaggerated experimental spent for any situation). If you take into account the shown in the previous section, it follows that

$$S_t = S_t(\theta), \qquad (3)$$

If $\theta \leq \theta_L$.

Thus it follows that the mean value of labor F_{xm} is constant for $\theta \leq \theta_L$ and decreases if $\theta > \theta_L$, reaching out $F_{xm} = 0$ for $\theta = 90^o$.

The resultant cutting force acting on the rotor as absolute value is determined by the relationship:

$$F_{xR} = \sum_{i=1}^{n_{ca}} F_{xm} = n_{ca} \cdot F_{xm} = n_{ca} \cdot k_{uz} \cdot K_e \cdot S_{tm}, \quad \text{N} \qquad (4)$$

or:

$$F_{xR} = k_{uz} \cdot K_e \sum_{i=1}^{n_{ca}} S_{ti}, \quad \text{N} \qquad (5)$$

Average penetration force F_{ym} shall be determined as follows:

$$F_{ym} = k_y \cdot k_{uz} \cdot K_e \cdot S_{tm}, \quad \text{N} \qquad (6)$$

where k_y represents the ratio of the force of penetration F_y and cutting force F_x, What must be determined experimentally.

The resultant force acting on acumen rotor as absolute value can be determined from relationships (1.54 and 1.56), i.e.:

$$F_{yR} = k_y \sum_{i=1}^{n_{ca}} F_{xm} = k_y \cdot k_{uz} \cdot K_e \cdot S_{tm} \cdot n_{ca} = k_y \cdot k_{uz} \cdot K_e \sum_{i=1}^{n_{ca}} S_{ti}, \quad \text{N} \qquad (7)$$

Average lateral force can thus determine Fzm:

$$F_{zm} = k_z \cdot k_{uz} \cdot K_e \cdot S_{tm}, \ \text{N} \qquad (8)$$

where k_z represents the ratio of lateral force Fz and cutting force Fx, what must be determined experimentally, or:

$$F_{zm} = F_{ym} \frac{h_{mi}}{h_{mi} + b}, \quad \text{N} \qquad (9)$$

where:

$$h_{mi} = h_m \cdot \cos\theta, \quad \text{m} \qquad (10)$$

The resultant lateral force F_{zR} will be:

$$F_{zR} = k_z \cdot F_{xR} = F_{yR} \frac{h_m}{h_m + b}, \ \text{N} \qquad (11)$$

The power required for the excavation shall be determined by the relationship:

$$P_{ex} = 10^{-3} F_{xR} \cdot v_t, \quad \text{kW} \qquad (12)$$

or: $$P_{ex} = \frac{1}{360} \cdot k_{uz} \cdot K_e \cdot Q_m, \ \text{kW} \qquad (13)$$

where K_e shall be determined in N/cm^2, and Q_m shall be determined in m^3/h.

The power required for the rotor pivot can be calculated as follows:

$$P_p = 10^{-3} \cdot F_{zR} \cdot v_p \text{ ,kW} \qquad (14)$$

where the swivel speed v_p Depending on the angle of swivel θ, If $\theta \leq \theta_L$ otherwise ($\theta > \theta_L$) decreases and the $\theta = 90^o$ becomes zero.

Power required for lifting material is determined on the basis of parameters established and represented in Figure 1.2. The weight of the material from a split what is characterized as the Centre of gravity shall be determined by the relationship:

$$G_a = \rho \cdot g \cdot V_a, \quad \text{kN} \qquad (15)$$

where: ρ represents the density of solid material in t/m^3;

g – gravitational acceleration, m/s^2.

Lifting height H_r the material will be:

$$H_r = D - \frac{H}{2} - \frac{2}{3} h_c, \quad \text{m} \qquad (16)$$

where:h_c represents the height of the Cup;

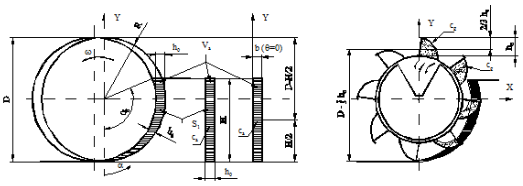


Figure 1 Determination of the power required for lifting material

The work of lifting is:

$$L_r = G_a \cdot H_r, \quad \text{kJ} \qquad (17)$$

Power lifting result accordingly:

$$P_r = \frac{L_r}{\Delta T} = L_r \cdot z, \quad \text{kW} \qquad (18)$$

So it follows the relationship of computation:

$$P_r = \frac{1}{3600 \cdot \eta_r}\left(D - \frac{H}{2} - \frac{2}{3} h_c\right)\rho \cdot g \cdot Q_T, \quad \text{kW} \qquad (19)$$

where η represents the yield process of loading-unloading of the material (according to literature $\eta_r = 0{,}6 \ldots 0{,}7$).

Taking into account the relationships (12) or (13) and relationship (19) power required to drive the rotor will have:

$$P = \frac{P_{ex} + P_r}{\eta_t} \text{ ,kW} \qquad (20)$$

where η_t represents the efficiency of the transmission motor-wheel bucket.

Thus, it follows:

$$P = \frac{1}{3600 \eta_t} Q_T \left[10 \cdot k_{uz} \cdot K_e + \frac{1}{\eta_r}\left(d - \frac{H}{2} - \frac{2}{3} h_c\right)\rho \cdot g\right], \quad \text{kW} \qquad (21)$$

Engine actuators shall have power $P_N \geq P$.

In the study conducted on the cutting system-low-load rotor through the defining parameters of the excavation, the parameters of cutting, excavation capacity and capacity of force and energy can synthesize the following:-for analysis of cutting system-low rotor loading in order to improve performance in service is necessary to be defined respectively measured a number of categories of parameters , of which the most important are: cutting parameters; cinematici parameters; geometric characteristics of rocks and characteristics extraction technology;

-for the determination of these parameters are presented in a synthetic way and ordered the technical data and the ones definable by direct calculation, so as to be easily useable by professionals, interested in conducting analyses of this nature. It presents a graphical material suitable for the proper understanding of the elements considered in this study; -cutting parameters determination of rocks by using low-rotor assumes knowledge of technology and the ripping process. The technology used is based on extracting the steps above vehicular level excavator in slices, with wood chips. For this case are studied and determined both graphically and through relationships of computing elements that define the cutting process. There are analyzed the elements of influence of process and of these interdependencies, being introduced new concepts and a methodology of analysis;

-the problem of determining the capacity of the excavation, if the low-rotor is analyzed under various aspects, are defined and established relationships for the calculation of the theoretical excavation capacity, technique, and ability to return, per day, per month and per year. This approach allows an efficient and complete analysis of the capacity of the excavation, degajându and ways to improve this parameter in concrete terms;

-detailed analysis of the characteristics of strength and energy that characterize the excavation process highlights the fact that in order to improve system performance by cutting the necessary load to be known are the characteristics that define this process in terms of the interaction with cast iron-rock. Without them, the experimental determination any attempt of modernization of cutting cannot be based on a scientific approach fundamentally, only one empirical in nature and with a high degree of relativity.

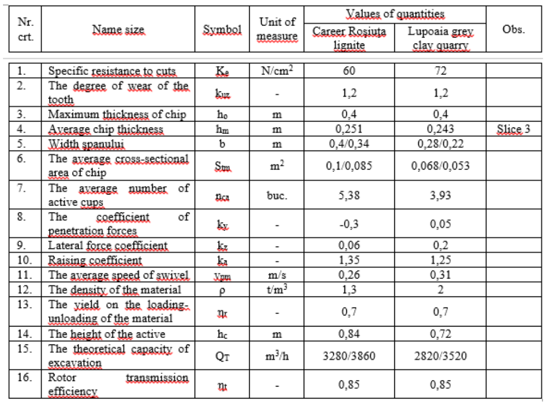
2. Case study for backhoes and Roşiuţa from Lupoaia careers

On the basis of specified were determined and we analyzed the characteristics of strength and energy for a concrete case of excavator var EsRc under the conditions Roşiuţa 1400 career what excavates the lignite excavator SRs 1300 Lupoaia in conditions career what grey blackish clay excavates. In this regard, in table 1.2, size characterizing the working conditions, dislocated and material demolition respectively, which will be used directly for calculating the parameters of force and energy. In table 1.3 are the calculated values of the forces on the cups, the resulting forces respectively, the power required for the excavation, for pivot, for lifting material from cups and total power required for the drive wheel with the cups. In all cases were obtained by two values which derives from the fact that they both can have two excavators cutting speeds, i.e. two revs who influence and other parameters.

It may be noted that under the conditions chosen powers necessary for the operation of the rotor, in both cases, exceed the nominal amount of engine power actuator, and that in some cases demolition is not able to work and at rated power and the maximum capacity of the excavation.

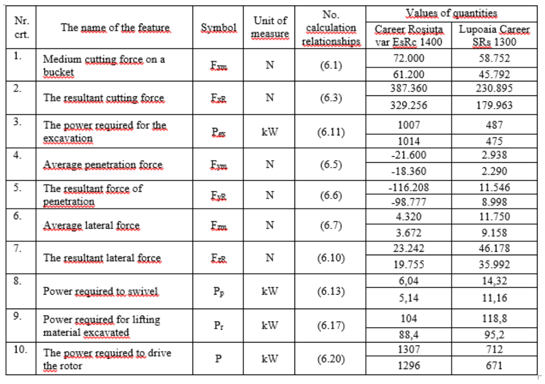
Sizes to calculate the parameters of force and energy

Table 1.2



Nr. crt.	Name size	Symbol	Unit of measure	Values of quantities		Obs.
				Career Roşiuţa lignite	Lupoaia grey clay quarry	
1.	Specific resistance to cuts	K_e	N/cm^2	60	72	
2.	The degree of wear of the tooth	k_{uz}	-	1,2	1,2	
3.	Maximum thickness of chip	h_o	m	0,4	0,4	
4.	Average chip thickness	h_m	m	0,251	0,243	Slice 3
5.	Width spanului	b	m	0,4/0,34	0,28/0,22	
6.	The average cross-sectional area of chip	S_m	m^2	0,1/0,085	0,068/0,053	
7.	The average number of active cups	n_{ca}	buc.	5,38	3,93	
8.	The coefficient of penetration forces	k_y	-	-0,3	0,05	
9.	Lateral force coefficient	k_z	-	0,06	0,2	
10.	Raising coefficient	k_a	-	1,35	1,25	
11.	The average speed of swivel	v_{pm}	m/s	0,26	0,31	
12.	The density of the material	ρ	t/m^3	1,3	2	
13.	The yield on the loading-unloading of the material	η_r	-	0,7	0,7	
14.	The height of the active	h_c	m	0,84	0,72	
15.	The theoretical capacity of excavation	Q_T	m^3/h	3280/3860	2820/3520	
16.	Rotor transmission efficiency	η_t	-	0,85	0,85	

The parameters of force and energy you studied by low Table 1.3



Nr. crt.	The name of the feature	Symbol	Unit of measure	No. calculation relationships	Values of quantities	
					Career Roşiuţa var EsRc 1400	Lupoaia Career SRs 1300
1.	Medium cutting force on a bucket	F_{xm}	N	(6.1)	72.000 61.200	58.752 45.792
2.	The resultant cutting force	F_{xR}	N	(6.3)	387.360 329.256	230.895 179.963
3.	The power required for the excavation	P_{ex}	kW	(6.11)	1007 1014	487 475
4.	Average penetration force	F_{ym}	N	(6.5)	-21.600 -18.360	2.938 2.290
5.	The resultant force of penetration	F_{yR}	N	(6.6)	-116.208 -98.777	11.546 8.998
6.	Average lateral force	F_{zm}	N	(6.7)	4.320 3.672	11.750 9.158
7.	The resultant lateral force	F_{zR}	N	(6.10)	23.242 19.755	46.178 35.992
8.	Power required to swivel	P_p	kW	(6.13)	6,04 5,14	14,32 11,16
9.	Power required for lifting material excavated	P_r	kW	(6.17)	104 88,4	118,8 95,2
10.	The power required to drive the rotor	P	kW	(6.20)	1307 1296	712 671

To elucidate this situation further will make a concrete analysis of the problem. From the point of view of the analysis, the relationship (1.71) some sizes are constants, and other variables in relation to cutting capacity, specific resistance to cutting of rocks. Thus, for concrete dates and conditions for an excavator is unable to write the function:

$$P = (k_1 K_e + k_2)\, Q, \qquad \text{kW} \qquad (22)$$

where:

$$k_1 = \frac{k_{uz}}{3{,}6 \cdot 10^2 k_a \eta_t}, \qquad (23)$$

$$k_2 = \frac{\rho g \left(D - \frac{H}{2} - \frac{2}{3} h_c \right)}{3{,}6 \cdot 10^3 k_a \eta_t}, \qquad \text{kWh/ m}^3$$

(24)

If we take into account the physical interpretation of the relationship (22), then product $k_1 K_e$ represents the specific energy consumption, and cut k_2 the specific energy consumption for lifting-loading rotor afânate rock. Specifying the cutting capacity Q in relation (22) yields:

$$Q = \frac{P}{k_1 K_e + k_2}, \qquad \text{m}^3\text{/h} \qquad (25)$$

In the relationship (22) for excavator and data shall be deemed P, k_1 and k_2 constants, and K_e the independent variable.

Taking into account the fact that the installed power for the operation of the rotor is limited, under normal operation is $P \leq P_N$, and in extremis $P \leq \lambda\, P_N$, where P_N represents the rated engine power actuator, and λ coefficient of overloading of the motor.

For demolition $E_s R_c$ 1400·30/7·630, nominal operating mode, applying the relation (25) yields:

$$Q_T = \frac{630}{2{,}9 \cdot 10^{-3} K_e + 0{,}0222}, \qquad \text{m}^3\text{/h}$$

(26)

Representing graph function (26) curve is obtained by cutting capacity variation depending on the specific resistance to cuts, as shown in Figure 1.10. Similarly, representing the graph function (22) forQ = Q_N = 3860 m^3/h (3,08 cutting speed m/s) I get a right represented also in Figure 1.10, which has the expression:

$$P = 11{,}21\, Ke + 85{,}67, \qquad \text{kW} \qquad (27)$$

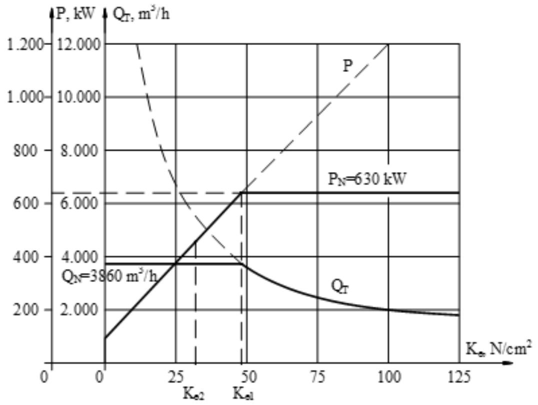


Figure 2. Reliance power and capacity according to the excavation specific resistance to cuts for your Digger var EsRc 1400 · · 30/7 630

For your Digger SRs 1300 (26/3.5 (500 yields:

$$Q_T = \frac{500}{3{,}44 \cdot 10^{-3} K_e + 0{,}0278}, \qquad \text{m}^3/\text{h} \tag{28}$$

and for Q = Q_N = 3520 m^3/h (2,64 cutting speed m/s) I get a right, given the equation:

$$P = 12{,}11\, K_e + 97{,}86, \qquad \text{kW} \tag{29}$$

Atât curba Q = f(K_e), and right P = f(K_e) are represented in Figure 3 .

As shown in Figure 2 and 3 so the power P, and theoretical capacity of excavation Q_T have a linear variation, hyperbolic, respectively, but if it continues the resistance specified in cutting exceeds a certain value K_{e1} then the flow rate Q_T decreases as you increase the K_e, strength remaining constant around the nominal value P_N.

On the other hand, if the specific resistance to cuts K_e subtract nominal flowrate, it keeps Q_N, but the power absorbed by the motor actuator wheel bucket decreases linearly. Whereas the drive motor takes place asynchronously, based on characteristic curves of its operation under the 70% of the P_N It is disadvantageous in terms of lowering the efficiency and power factor, it is advisable that demolition should not be used on values of specific cutting resistance in less than K_{e2}.

The power relationship, both limits for specific cutting

resistance: $$K_{e1} = \frac{1}{k_1}\left(\frac{P_N}{Q_N} - k_2\right), \qquad \text{N/cm}^2 \tag{30}$$

and $$K_{e2} = \frac{1}{k_1}\left(\frac{\delta\, P_N}{Q_N} - k_2\right), \quad \text{N/cm}^2 \tag{31}$$

where: δ represents the coefficient of subîncărcare.

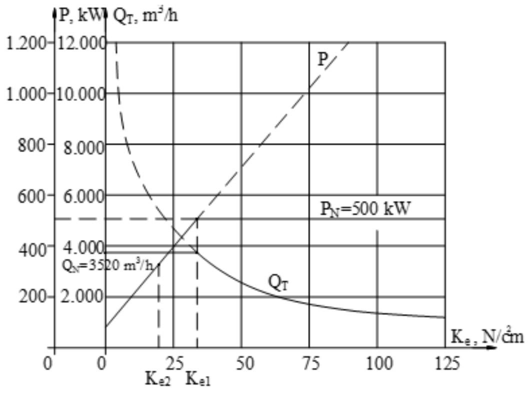


Figure 3. Reliance power and capacity according to the excavation specific resistance to cuts for 1,300 demolition SRs · · 500 3.5/26

Upper limit K_{e1} It is restrictive, whereas over the demolition works under the nominal capacity, in an extremely vibrant. Lower limit

K_{e2} It is advisable, respecting her operation excavator at its rated capacity, but in a disadvantageous for the operation of the propulsion engine. Applying relations (1.80) and (1.81) for demolition E_sR_c 1400·30/7·630 and lignite of Roşiuţa follows two limits namely $K_{e1} \cong 48,62$ N/cm^2; $K_{e2} \cong 31,74$ N/cm^2 , as shown in Figure 2, and and for your Digger SRs 1300 (26/3.5 (500 and grey clay of the Lupoaia the two limits are: $K_{e1} = 33,21$ N/cm^2 and $K_{e2} = 20,12$ N/cm^2, as shown in Figure 3.

Momentary capacity of excavation can be limited by power drive, volume and treble line transport capacity, if the latter is lower than the other two. Of course, the ability of the excavation can be limited and the power of the swivel actuator mechanism to the upper deck. The power required for the swivel shall be determined by the relationship

$$P_p = 10^{-3} \cdot F_{zR} \cdot v_p, \qquad \text{kW} \qquad (32)$$

to which is added the power needed for excavator "orizontalizarea", where appropriate.

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NEW ISSUES IN THE FIELD OF ELASTOHIDRODINAMICE WITH REFERENCE TO LUBRICATING THE MACHINERY FROM LIGNITE

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Abstract: In the study conducted on the cutting system-low-load rotor through the defining parameters of the excavation, the parameters of cutting, excavation capacity and capacity of force and energy can synthesize the following:-for analysis of cutting system-low rotor loading in order to improve performance in service is necessary to be defined respectively measured a number of categories of parameters , of which the most important are: cutting parameters; cinematici parameters; geometric characteristics of rocks and characteristics extraction technology;

-for the determination of these parameters are presented in a synthetic way and ordered the technical data and the ones definable by direct calculation, so as to be easily useable by professionals, interested in conducting analyses of this nature. It presents a graphical material suitable for the proper understanding of the elements considered in this study; -cutting parameters determination of rocks by using low-rotor assumes knowledge of technology and the ripping process. The technology used is based on extracting the steps above vehicular level excavator in slices, with wood chips. For this case are studied and determined both graphically and through relationships of computing elements that define the cutting process. There are analyzed the elements of influence of process and of these interdependencies, being introduced new concepts and a methodology of analysis;

-the problem of determining the capacity of the excavation, if the low-rotor is analyzed under various aspects, are defined and established relationships for the calculation of the theoretical excavation capacity, technique, and ability to return, per day, per month and per year.

Key words: transport, optimizations, mechanics

1. Elastohidrodinamic lubrication arrangements

One of the problems that currently attracts the attention of researchers in the field of tribologiei and the construction of the machine scheme of lubrication elastohidrodinamic (EHL). The importance given to this regime of rubbing lubrication is due to both its numerous practical applications (bearings with rolling bearings, gears, some with sliding, etc.) as well as theoretical and experimental problems of complexity that must be resolved One of the problems that currently attracts the attention of researchers in the field of tribologiei and the construction of the machine scheme of lubrication elastohidrodinamic (EHL). The importance given to this regime of rubbing lubrication is due to both its numerous practical applications (bearings with rolling bearings, gears, some with sliding, etc.) as well as theoretical and experimental problems of complexity that must be resolved.

2. Lubrication elastohidrodinamics

Even in the presence of large tasks, operation of machine parts with linear contact or transistor (bearings with ball bearing, gears, etc.) takes place in good conditions of friction and antiuzare vs. mixed regime and somewhat similar to those in hydrodynamic regime due to maintain in the contact zone of thin lubricant films. This complex phenomenon is named lubrificaţie elastohidrodinamică (EHL). It may also occur in the case of sliding bearings (FSU/steel lining of plastic) requested in hard starting and stopping phases. The two effects which arise and which have not been taken into account by the classical theory of hydrodynamic lubrication are: deformations of the area of the contact surfaces; changing the lubricant viscosity under high pressures.

- The increase of viscosity due to pressure and surface flattening elastic deformation contributes to retention of lubricant in the contact zone, leading to the formation of page considerably thicker than those obtained by treating classical hydrodynamic. The anointing was very elastohidrodinamice phenomenon, as a result of the reaction of many Newtonian lubricants, has been the subject of concern a large number of researchers. His research and his collaborators Dowson, together with those of Grubin, constituted the theoretical foundation of this however system of lubrication. Solving the problem involves determining the distribution of lubrication elastohidrodinamice pressure in the contact area and the shape of the lubricant film and the minimum thickness of this film. For solving these problems required were taken into account a number of assumptions: the existence of perfectly smooth surfaces in the contact zone; Newtonian behavior of lubricant; thermal effects of neglect (a variation of viscosity with temperature and expansion of those two bodies and oil); neglecting losses at the ends, given that the width of the contact area is very small compared to the length of the cylinder; the following conditions for pressure boundary:

- at the entrance: p = 0
- the exit: **p = δp/δx = 0**

The equations to be solved are:

The equations to be solved are:

$$\begin{cases} \dfrac{dp}{dx} = -6 \cdot \eta \cdot u \cdot \dfrac{h - \hbar}{h^3}; \\ \eta = \eta(p); \\ h = h(x), \end{cases} \qquad (1.1)$$

a) : p represents pressure lubricant film, the x-coordinate; the x-coordinate where the level; h-thickness of the film, the x-coordinate; ħ-the average thickness of the film of lubricant; dynamic viscosity (oil-; u-relative speed. On this issue there have been a number of interesting observations, from which stated: in the contact zone follows pressure so great that viscosity is orders of magnitude higher than its value at atmospheric pressure; Thus, in order to have plausible values for dp/dx, the h should be very low (close to zero). In other words, film thickness must be constant on almost all over the zone of high pressure. Full form of his equation Reynolds shows that high levels of pressure gradient, at relatively low pressures, so for low viscosity can be achieved only by reducing the thickness of the film; It follows a drop in local film thickness of lubricant out of the bearing area. at moderate speeds large loads, and film thickness will be low even in comparison with local deformations of elastic. As a result, except for marginal regions of the area, the distribution of pressure will be close to that hertziană (for dry contact). On the other hand, if the load is reduced or has high speed film thickness will be high compared with local deformations and the distribution of pressure will be different from the name hertziană, being closer to that which obtains in the case of rigid bodies.

3. Lubricating mechanism

3.1. Elastohidrodinamic lubrication mechanism

When a relatively large sized load acting on a non-compliant, both surfaces elastic deformation suffers that alter the point or line contact in a contact area, the area of comparable size film of lubricant. When the surfaces are moving, the liquid is drawn into the input area of the contact surfaces. The lubricant must go among the flattened areas where the phenomenon of cavitation. For most cases the presence of the lubricant film does not affect the size or shape of the planar surfaces of contact pressure distribution, Radio and remains unchanged. Since lubricant crosses completely the interstice there is a pressure rise. Most fluids, except water, pronounced rise of viscosity with increasing pressure. If there are contacts at very high pressure, viscosity may increase by more than a hundred times, causing the fluid to behave almost like a solid. The advent of elastic deformations and increasing viscosity with the pressure leading to a considerable increase in loading capacity of the contact.

3.2. Elastohidrodinamică theory

When calculating power and loaded to the contacts which the viscosity increases and the elastic deformations are important, the rigid cylinder previously presented theory leads to determining the amount of lubricant film thickness is quite imprecise. In reality, the appearance of surfaces lead to distribution of loading flattened over a larger area, while increasing oil viscosity increases its lubrication properties. The analysis of this situation it is necessary to take into account simultaneously the following relationships:- equation Reynolds

$$\frac{\partial}{\partial x}\left(\frac{\rho h^3}{\eta}\frac{\partial p}{\partial x}\right)+\frac{\partial}{\partial y}\left(\frac{\rho h^3}{\eta}\frac{\partial p}{\partial y}\right)=12u\frac{\partial(\rho h)}{\partial x}; \qquad (3.1)$$

- ecuaţia deformaţiei elastic

$$\nu=\frac{1}{E'}\int_{x_1}^{x_2} p(s)\lg(x-s)ds \qquad (3.2)$$

- equation variation of viscosity with temperature

3.3. Results obtained in the study of contacts required strong

3.3.1. The shape and distribution of lubricant film pressure

The results obtained permit the presentation of the form previously deformed cylinder and pressure distribution data for specific conditions. Typical in this regard presents itself to the shape of the cylinder and pressure variation for the case of a rolling speeds relatively low cylinder. Whereas the first time form of lubricant film, you can see the area of cereals intended for the concurrent entry virtually a parallel profile. At the exit there is a bottleneck that can reduce by 25% the lubricant film thickness.

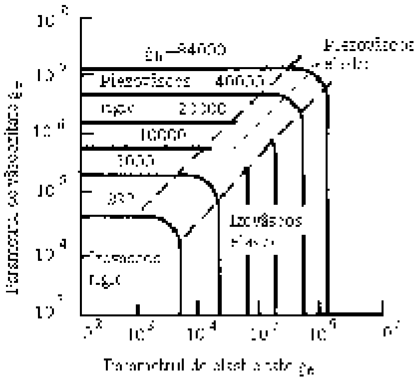

Fig .3.3

Pressure curve is very similar to that of Radio for pressure dry contact. Input

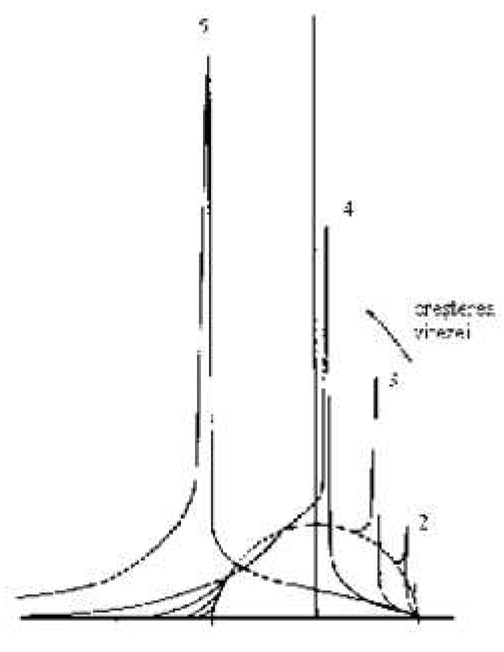

Fig. 3.4 Influenţa vitezei asupra distribuţiei presiunii în lichid

pressure increase, and nearly out of the interstice there is a jump in pressure and conditions of appearance of the phenomenon of cavitation. The jump in pressure is difficult to obtain because it is experimental, very narrow, but theoretically it is possible to see that it exists. If you use an exact relationship between viscosity and pressure then it is not necessary the calculation that is pressure. Total existing area under pressure can be

identical to that of Radio contact in the form of half-ellipse. Length of the parallel section is approximately 2 (8RW/BE ') 1/2, and the maximum pressure (WE '/2) 1/2. If the speed increases, the pressure distribution deviates more than the Hertziană pressure, as can be seen in Figure 3.4. For an elliptic surface results are very similar. In Figure 2.2 is a chart of permissible interference of surface shape for anointing. In the central part there is a parallel section, and leap does not extend more than 180 °.

3.3.2. The lubricant film thickness

Formulas for the calculation of the lubricant film thickness are the result of a combination of expression, algae-brice with a series of experimental results. Such a formula only applies to a specific case for which it was created and there may be other extrapolată for different situations. Therefore needs to be defined, the "calculation of the lubricant film thickness and use the formula for calculating the closest each regime. These arrangements are set out below.

(1) rigid Regime- very viscous. In this case the pressure does not increase largely due to viscosity change or strains. (2) rigid Regime- more viscous . Elastic element deformation is negligible, but there is a large increase in viscosity with pressure. (3) elastic-izovâscos Scheme. Elastic element deformation is considerable, but it neglects the variation of viscosity. (4) total Scheme EHL. Taking into account the deformation and viscosity variation. To determine the most appropriate arrangements necessary to make references to the graphs in figures 3, ..., 2.4. On the horizontal axis of the graphs is represented by elastic strains, ge criterion, criterion and on the vertical axis of a significant increase in viscosity, gv. To assess these criteria, it is necessary to analyze the representations adimensionale listed below.

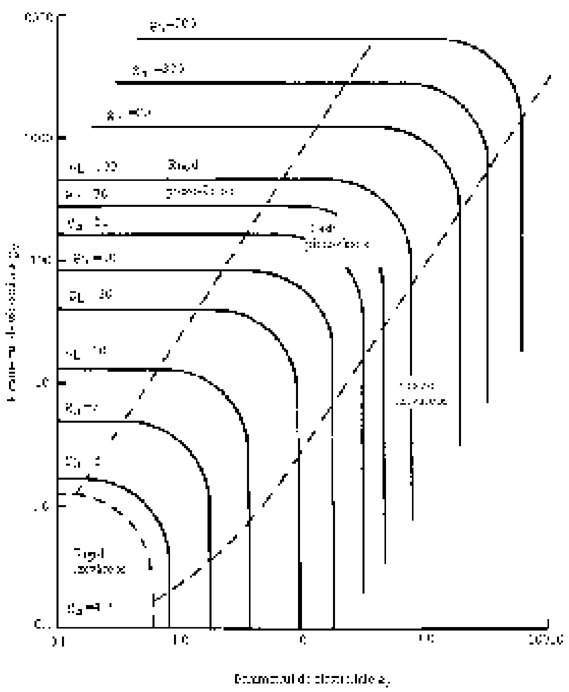

Fig. 3.5 thickness calculation Scheme of the movie for k = 3

3.3.3. Adimensionale representations

- Results of the analyses carried out on the computer are given conveniently in the form of adimensionale. This has the advantage of their representation, independent of the system of measuring units used. The most common possibilities are grouped into four representations of the film thickness: dimensionless $\hat{H} = h_0/R$ sau $\hat{H} = h_0/R_x$ for elliptical contacts;

- - dimensionless parameter of the load $\hat{W} = W/(E'RB)$ for angular or straight-contacts $\hat{W} = W/(E'R_x^2)$ for elliptical contacts;
- dimensionless parameter speed $\hat{U} = \eta_0 u/(E'R)$ for rectangular or contacts $\hat{U} = \eta_0 u/(E'R_x)$ for elliptical contacts;
- parameter material $\hat{G} = \alpha E'$, where α represents a coefficient dependent on viscosity and pressure. For contact in the form of ellipse is in need of elliptical parameter:

$$k = \frac{a}{b}, \tag{3.4}$$

where a is the semimajor axis of the ellipse's y direction contact perpendicular to the direction of motion, and b is the semimajor axis direction x. This parameter can be obtained with sufficient precision in the relationship

$$k = \left(\frac{R_y}{R_x} \right)^{0,64} \tag{3.5}$$

(a) (a) the contact Surface of the rectangular Solutions can be used for each of the regimes: rigid-elastic izovâscos piezovâscos, and EHL. All of these results can be expressed using the above representations of adimensionale. It can be seen that they are required only three representations, which are sufficient for a mild presentation of the solution. By choosing reasonable representations you can see the effects of an increase in viscosity and strains elastic. If

$$g_h = \frac{\hat{W}}{\hat{U}} \hat{H}, \tag{3.6}$$

$$g_v = \frac{\sqrt{\hat{W}^3 \hat{G}}}{\sqrt{\hat{U}}}, \tag{3.7}$$

$$g_e = \frac{\hat{W}}{\sqrt{\hat{U}}}, \tag{3.8}$$

then the lubricant film thickness can be expressed through the relationship

$$g_h = Z g_v^m g_e^n \tag{3.9}$$

for all schemes, being identified by Figure 2.2. Constant values for Z and exponents m and n for each are indicated in table 3.1. In table 3.1, it is observed that the smallest value for the corresponding exponent n EHL regime. This indicates the effect of the elasticity module, the term ' containing E ge. This suggests that the lubricant film thickness is relatively insensitive to changing the value of the elasticity module. It was also demonstrated that it is relatively insensitive and to changing load. This is confirmed by the practice, because an increase or a decrease in loading of the module of elasticity that result in actual contact surface growth (increasing the Earth's flattening of the cylinder).

Table 3.1 constant Values for Z and exponents m and n

The regime	Z	M	n
(1)	2,450	0	0
(2)	1,050	2/3	0
(3)	2,450	0	0,80
(4)	1,654	0,52	0,06

Constants, Z, m, n, and f (k) are different for each, those identified and are presented in table 3.2. Table 3.2 measurand Values Z, m, n and the expression of the function ƒ (k) for the four regimes of computing

The regime	Z	m	n	f(k)
(1)	128	0	0	$\gamma\left[0{,}131 tg^{-1}\left(\frac{\gamma}{2}\right)+1{,}683\right]^2$
(2)	1,66	2/3	0	$1-e^{-0,68k}$
(3)	8,70	0	0,67	$1-0{,}85e^{-0,31k}$
(4)	3,42	0,49	0,17	$1-e^{-0,68k}$

In table 3.2, γ= Ry/Rx,

Values shown above are valid for minimum thickness of the film of h0, lubricant which exists in the area where the jump occurs. Film thickness, hc, in parallel with section portion is given by the ratio h0/hc = 0.72 ... accounts. The error introduced by the assumption of 3/4 value of this ratio is negligible for most cases.

(b) the contact Surface of the elliptical in this instance sizes calculation can be expressed in roughly the same way. The general equation of the thickness of the film is

$$g_h = Z g_v^m g_e^n f(k), \tag{3.10}$$

$$g_h = \left(\frac{\hat{W}}{\hat{U}}\right)^2 \hat{H}, \quad , \tag{3.11}$$

$$g_v = \frac{\hat{W}^3 \hat{G}}{\hat{U}^2} \tag{3.12}$$

$$g_e = \frac{\hat{W}^{\frac{8}{3}}}{\hat{U}^2}, \tag{3.13}$$

Cu ajutorul relaţiei (3.10) se determină grosimea minimă a filmului, adică în zona de apariţie a saltului de presiune. Raportul dintre această grosime şi aceea din secţiunea paralelă variază în limite mai largi decât în cazul anterior.

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RANDOMLY GENERATED r-DISCRETE SUBGROUPOIDS OF X×Z×X

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ABSTRACT: The purpose of this paper is to introduce an Alexandroff topology on an arbitrary subgroupoid G of the trivial groupoid X×**Z**×X (where **Z** is the group of integers) and to establish necessary and sufficient conditions for G to be r-discrete (this means $G^{(0)}$ is an open subset of G). We also provide a Maple procedure for random generation of r-discrete subgroupoids of X×**Z**×X (where X is a finite set).

KEY WORDS: r-discrete groupoid; Alexandroff topology; orbit; discrete fibres; pseudorandom number generator.

1.NOTATION AND TERMINOLOGY

We use the same notation and terminology concerning the groupoids as in Section 2 [7]. Let us consider that X is a set and **Z** is the group of integers. Then under the operations

$$(x, n, y)(y, m, z) = (x, n+m, y)$$

$$(x, n, y)^{-1} = (y, -n, x)$$

X×**Z**×X becomes a groupoid. According [9] any subgroupoid $G \subset X\times\mathbf{Z}\times X$ can be completely characterized by X and two functions f: X→X and k:X→**Z** satisfying the following conditions:

1. $f(f(u))=f(u)$ for all $u\in X$.
2. $k(f(u)) \geq 0$ for all $u\in X$.
3. If $k(f(u)) \neq 0$, then
   $k(u)\in\{0,1,\ldots, k(f(u))-1\}$.

If the functions f and k are given, then G can be represented as $G=\bigcup_{(u,v)\in R} G_v^u$ with

$$G_v^u=\{(u,k_{u,v}+tk_{u,u},v):\ t\in\mathbf{Z}\},\ (u,v)\in R$$

where:

1. The relation R is defined by $(u,v)\in R$ if and only if $f(u)=f(v)$.
2. $k_{u,u} := k(f(u))$ for all $u\in X$.
3. If $k(f(u))\neq 0$, then for all v with the property that $(u,v)\in R$,
   $k_{u,v}:=(k(u)+k(f(u)-k(v)) \bmod k(f(u))$.
4. If $k(f(u))=0$, for all for all v with the property that $(u,v)\in R$,
   $k_{u,v}:=k(u) - k(v)$.

We shall endow G with an Alexandroff topology. Let us recall a few facts about Alexandroff topologies.

A topological space Y is an Alexandroff topological space [1] if the topology is closed under arbitrary intersections of open sets. In an Alexandroff topological space, the intersection of all open neighborhoods of a point x is again an open neighborhood of x, which is, of course, the smallest such. The intersection of all open neighborhoods of a point x is called the minimal neighborhood of x. A set is open if and only if it contains the minimal neighborhood of each of its points. Thus the topology of an Alexandroff topological space is completely determined by a knowledge of the minimal neighborhoods.

If an Alexandroff topological space Y is T_1 (i.e. has closed points) then it is discrete. (Indeed, every subset $A\subset Y$ is the intersection of the family$\{C\{x\}\}_{x\notin A}$, where $C\{x\}=Y\setminus\{x\}$ is open for all $x\in Y$. Hence A is open). A topological space Y is a T_0-space if for every $(x, y)\in Y\times Y$, $x\neq y$, there is an open set of Y which contains exactly one element of the $\{x, y\}$.

A preorder on a set Y is a reflexive and transitive relation. A preorder is a partial order if it is antisymmetric. Alexandroff topologies can be characterized in terms of preorders. More precisely, if Y is endowed with an Alexandroff topology, then we can define a preorder on Y in the following way:

$$x \le y \text{ if and only if } y \in U_x,$$

where U_x is minimal neighborhood of x. Conversely, if ≤ is a preorder on Y, then family $\{U_x\}_{x\in Y}$, where

$$U_x = \{y \in Y: x \le y\},$$

is a basis for a topology on Y. The Alexandroff topological space Y is T_0 if and only if the corresponding preorder is in fact a partial order.

Any topological finite space is an Alexandroff space. (See [2] for more details concerning Alexandroff spaces)

2. ALEXANDROFF TOPOLOGIES ON SUBGROUPOIDS OF X×Z×X

Proposition 2.1. Let G be a subgroupoid of $X\times\mathbf{Z}\times X$ characterized by the functions $f:X\to X$ and $k:X\to\mathbf{Z}$ (as in the beginning of Section 1). For every $(x,n,y)\in X\times\mathbf{Z}\times X$, let us define a set $U_{(x,n,y)}$ in the following way

$$U_{(x,n,y)} := \{(u, n, v)\in G: k(f(u)) \mid k(f(x)) \text{ and } k(f(u)) \mid (k(x)+k(v)-k(y)-k(u)\}.$$

(where $a|b \Leftrightarrow$ there is $m\in\mathbf{Z}$ such that $b=a\cdot m$)

Then the sets $U_{(x,n,y)}$ form a basis for an Alexandroff topology on G. With respect to this topology, G is a topological groupoid.

Proof. Let $(u, n, v)\in U_{(x,n,y)} \cap U_{(s,n,t)}$. Then it is easy to check that

$$U_{(u,n,v)} \subset U_{(x,n,y)} \cap U_{(s,n,t)}.$$

In order to see that G is an Alexandroff space, we remark that the relation defined below is a preorder:

$(x,n,y)\le (u, m, v)$ if and only if

1. $m=n$
2. $k(f(u)) \mid k(f(x))$
3. $k(f(u)) \mid (k(x)+k(v)-k(y)-k(u)$.

Let us check that G is a topological groupoid. If $(x,n,y), (y,m,z)\in G$, then

$$U_{(x,n,y)}U_{(y,m,z)} \subset U_{(x,n+m,z)}$$

and

$$U_{(x,n,y)}^{-1} = U_{(y,-n,x)}.$$

Remark 2.2. In [5] we started with a topological groupoid (G, τ_G), we introduced a topology $\tau_R(\tau_G)$ on the principal groupoid R associated with G and a new topology $\tau_{G\vee R}$ on G (called the modified topology on G with respect to R). If X is endowed with the indiscrete topology $\tau_X=\{\emptyset, X\}$, **Z** is endowed with the discrete topology, $X\times\mathbf{Z}\times X$ with the product topology, and $G\subset X\times\mathbf{Z}\times X$ with the subspace topology, then the topology described in Proposition 2.1 is the modified topology on G with respect to its principal groupoid (the proof is similar to the proofs of Proposition 2.4 and 2.5 [8]). With respect to the modified topology a basis for the topology on X viewed as a unit space of G is $\{U_x\}_{x\in X}$, where

$$U_x := \{u\in X: k(f(u)) \mid k(f(x))\}.$$

Proposition 2.3. Let G be a subgroupoid of $X\times\mathbf{Z}\times X$ characterized by the functions $f:X\to X$ and $k:X\to\mathbf{Z}$ (as in the beginning of Section 1) endowed with the topology introduced in Proposition 2.1. Then G is a T_0 space if and only if $k(f(u))\ne k(f(v))$ for all $(u,v)\in X\times X$ such that $u\ne v$.

Proof. Let us assume that G is a T_0 space. Let $(u,v)\in X\times X$ such that $u\ne v$. Then if there is an open set V of G which contains exactly one element of the $\{(u,k(f(u)),u), (v,k(f(u)),v)\}$, then V should include exactly one of $U_{(u,k(f(u)),u)}$ or $U_{(v,k(f(v)),v)}$. Since $k(f(u))=k(f(v))$ implies $U_{(u,k(f(u)),u)} = U_{(v,k(f(v)),v)}$, it follows $k(f(u))\ne k(f(v))$.

Conversely, let us assume that $k(f(u))\ne k(f(v))$ for all $(u,v)\in X\times X$ such that $u\ne v$. Let $(u, n, v), (x,m,y)\in G$. If $m\ne n$, then $U_{(x,m,y)} \cap U_{(u,n,v)} = \emptyset$. If $m=n$, $(x,m,y)\in U_{(u,n,v)}$ and $(u, n, v)\in U_{(x,m,y)}$, then $k(f(u))=k(f(v))=k(f(x))=k(f(y))$. Thus

$$x=y=u=v,$$

and consequently, $(u, n, v)=(x,m,y)$. Therefore G is a T_0 space.

Remark 2.4. G endowed with the topology introduced in Proposition 2.1 is a T_0 space if and only if G is a group bundle having non-isomorphic isotropy groups. Thus in general G is not T_0.

However if the fibres of the groupoid are locally compact (in particular, if the fibres are discrete), then we can endow the groupoid with a pre-Haar system and construct a convolution algebra as in [6] (using additional hypotheses). Also there is the possibility to extend the notion of groupoid morphisms treated in [3] and [4].

Proposition 2.5. Let G be a subgroupoid of X×**Z**×X characterized by the functions f:X→X and k:X→**Z** (as in the beginning of Section 1) endowed with the topology introduced in Proposition 2.1. Then $G^{(0)}$ is an open subset of G if and only if k(u)≠k(v) for all for all equivalent units u,v such that u≠v.

Proof. Let us assume that $G^{(0)}$ is open. Let v∈[u], u≠v. We have $(u,0,u)\in G^{(0)}$ and $U_{(u,0,u)} \subset G^{(0)}$. Hence $(u, 0, v)\notin U_{(u,0,u)}$. Thus either (u, 0, v)∉ G or

$$(u, 0, v)\in G\setminus U_{(u,0,u)}.$$

In both cases it follows k(u)≠k(v).

Conversely, let us assume that k(u)≠k(v) for all v∈[u] such that u≠v. Let $(u,0,u)\in G^{(0)}$ and let us prove that $U_{(u, 0,u)}\subset G^{(0)}$. Indeed, if $(w,m,v)\in U_{(u, n,,u)}$ then m = 0 and k(f(w))|(k(u)+k(v)-k(u)-k(w) i.e. k(f(w))|k(v)-k(w). It follows k(w)-k(v)=0. Therefore w=v.

Corollary 2.6. Let G be a subgroupoid of X×**Z**×X characterized by the functions f:X→X and k:X→**Z** (as in the beginning of Section 1) endowed with the topology introduced in Proposition 2.1. Then G has discrete r-fibres if and only if k(u)≠k(v) for all equivalent units u,v such that u≠v.

3. r-DISCRETE SUBGROUPOIDS OF X×Z×X GENERATED USING MERSENNE TWISTER ALGORITHM

As in [10] we use the RandomTools package (in the Maple environment). The RandomTools[MersenneTwister] subpackage contains functions for creating pseudo-random number generators using the Mersenne Twister algorithm.

Using the characterization of the r-discrete groupoids G⊂ X×**Z**×X given in Proposition 2.5, the below procedure random_groupoid_discrete_fibres generates an r-discrete groupoid:

$$G=\{(u,k(u)-k(v)+tk(f(u)),v): f(u)=f(v), t\in \mathbf{Z}\},$$

where X is a finite set and **Z** is the group of integers. The data of G are stored in gd. The parameter n is the cardinality of X, kmax is the maximum of the set

$$\{k(f(u)), u\in X\}$$

and nmax is maximum of the set

$$\{|k(u)|, u\in X, k(f(u))=0\}.$$

Thus the procedure defined below and the procedures defined in [10] have the same parameters, but unlike the procedures in [10], which generate arbitrary subgroupoids of X×**Z**×X,

random_groupoid_discrete_fibres

always generates r-discrete groupoids with respect to the topology introduced in Proposition 2.1.

```
> with(RandomTools[MersenneTwister]):
>random_groupoid_discrete_fibres:=proc(n, kmax, nmax)
  local gd,i,j,s,norbits,sn,co,represent,orbit,mk, orbitgk, no,
  init;
  gd:=[array(1..n),array(1..n), array(1..n)];
  represent:=array(1..n); orbit:=array(1..n); mk:=array(1..n);
  orbitgk:=array(1..n);
  for i from 1 to n do gd[1][i]:=i end do;
  s:=NewGenerator(range = 1 .. n);
  norbits:=s(); co:=1; represent[1]:=1; orbit[1]:=1; gd[2][1]:=1;
  for i from 1 to n do mk[i]:={} end do;
  s:=NewGenerator(range = 0 .. kmax); gd[3][1]:=s(); init:=0;
  i:=2;
  while i<=n do
   s:=NewGenerator(range = 1 .. n-init); sn:=s();
   if sn<=norbits then
    co:=co+1; represent[co]:=i; orbit[i]:=co; gd[2][i]:=i;
    s:=NewGenerator(range = 0 .. kmax); gd[3][i]:=s();
    if gd[3][i]=0 then mk[co]:={seq(j,j=0..2*nmax)} minus {nmax}
    else mk[co]:={seq(j,j=1..gd[3][i]-1)}
    end if;
    init:=0; i:=i+1;
   else
    no:=0;
    for j from 1 to norbits do
      if nops(mk[j])>0 then no:=no+1; orbitgk[no]:=j end if
    end do;
    if no=0 then
     norbits:=norbits+1; init:=n-norbits;
    else
     init:=0; s:=NewGenerator(range = 1 .. no);
     gd[2][i]:=represent[orbitgk[s()]];
     represent[i]:=gd[2][i];orbit[i]:=orbit[gd[2][i]];
     no:=0;
     for j in mk[orbit[gd[2][i]]] do
        no:=no+1;   orbitgk[no]:=j
     end do;
     s:=NewGenerator(range = 1 .. no); j:=s();
     mk[orbit[i]]:=mk[orbit[i]] minus {orbitgk[j]};
     if gd[3][gd[2][i]]=0 then
       gd[3][i]:=-nmax+orbitgk[j];
     else
       gd[3][i]:=orbitgk[j]
     end if;
     i:=i+1
    end if
   end if
  end do;
  RETURN(gd)
end proc;
```

```
> gd:=random_groupoid_discrete_fibres(10,8,3);
```

$$gd := \left[\left[\begin{array}{cccccccccc} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{array}\right], \left[\begin{array}{cccccccccc} 1 & 2 & 2 & 4 & 2 & 6 & 7 & 2 & 9 & 10 \end{array}\right], \left[\begin{array}{cccccccccc} 8 & 0 & 3 & 8 & -1 & 0 & 0 & 1 & 4 & 0 \end{array}\right]\right]$$

In the previous example, the groupoid encoded by gd is

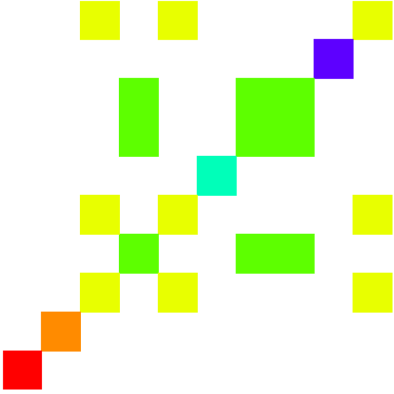
$$G=\{(u,k(u)-k(v)+tk(f(u)),v): f(u)=f(v), t\in \mathbf{Z}\}$$

where $f : X\rightarrow X$, $f(1)= 1$, $f(2)=2$, $f(3)= 2$, $f(4)=4$, $f(5)= 2$, $f(6)=6$, $f(7)= 7$, $f(8)=2$, $f(9)= 9$, $f(10)=10$ and $k:X\rightarrow \mathbf{Z}$, $k(1)=8$, $k(2)=0$, $k (3)=3$, $k(4)=8$, $k(5)=-1$, $k(6)=0$, $k(7)=0$, $k(8)=1$, $k(9)=4$, $k(10)=0$. For instance,

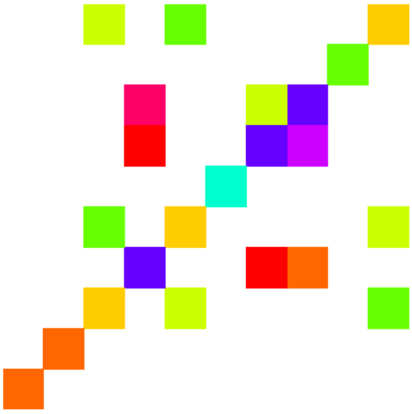
$$G_8^2=\{\gamma: r(\gamma)=2 \text{ and } d(\gamma)=8\}=$$
$$=\{(2,k(2)-k(8) +k(f(2))t,8): t\in \mathbf{Z}\}$$
$$=\{(2,k(2)-k(8)+k(2)t,8): t\in \mathbf{Z}\}$$
$$=\{(2, -1,8)\}.$$

The procedure orbits(gd) [9] displays the graph of the equivalence relation (principal groupoid R) associated with the groupoid G encoded by gd (each orbit of the groupoid has a unique associated color). Let us see its result for the preceding groupoid.

```
>orbits(gd)
```



The procedure visualization(gd) defined in [11] represents each (r,d)-fibre $G_{x_i}^{x_j}$ as the rectangle with top left corner (i-1,j) and bottom right corner (i,j-1) filled with a color uniquely determined by $k(x_i)-k(x_j)$ and $k(f(x_i))$. Let us see its result for the preceding groupoid. The fact that the topology induced on fibres is discrete can be visualized in the following way: the color of each rectangle on each row (and each column) is different from the color of the rectangle located on the intersection of the row (respectively, column) with the diagonal representing the unit space.



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DEFUZZIFICATION OF TIFNs

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ABSTRACT : In the present paper we complete the above fuzzy assessment approach by presenting a defuzzification method of TIFNS based on the Center of Gravity (COG) technique, which enables the required comparison.

KEY WORDS : Intuitionistic Fuzzy Numbers (IFNs), Center of Gravity (COG) defuzzification technique, Triangular (TIFNs) IFNs.

1. INTRODUCTION

The intuitionistic fuzzy number is a very important concept of the intuitionistic fuzzy modeling and optimization, which may be used to quantify an ill-known quantity in some real management situations [5, 6]. In this section, we will firstly introduce the concept of an intuitionistic fuzzy number. We will discuss special forms of intuitionistic fuzzy numbers such as triangular intuitionistic fuzzy numbers [4,7,11]. The intuitionistic fuzzy numbers (IFNs) on a universe X was introduced by K. Atanassov in 1983 as a generalization of FNs. Therefore, the concept of the triangular intuitionistic fuzzy number is a generalization of that of the triangular fuzzy number.

The additional parameters $p_a \in [0,1]$ and $q_a \in [0,1]$ are introduced to reflect the confidence level and nonconfidence level of the triangular intuitionistic fuzzy number $a = \left\langle \left(\underline{a}, a, \overline{a}\right); p_a, q_a \right\rangle$, respectively. Thus, the triangular intuitionistic fuzzy number may express more uncertainty information than the triangular fuzzy number.

2. DEFINITIONS

The definitions are consistent with [4]. Let $p_a \in [0,1]$ and $q_a \in [0,1]$ be any real numbers, which satisfy the condition: $0 \le p_a + q_a \le 1$. An intuitionistic fuzzy number a is a special intuitionistic fuzzy set on the set of real numbers R, whose membership function $\mu_a : R \to [0, p_a]$ and nonmembership function $\nu_a : R \to [q_a, 1]$ satisfy the four conditions (1)–(4) as follows:

(1) There exist at least two real numbers x and y such that $\mu_a(x) = p_a$, $\nu_a(x) = q_a$

(2) μ_a Is quasi concave and upper semicontinuous on R,

(3) ν_a Is quasi convex and lower semicontinuous on R and

(4) The support of a (i.e., $a_{\langle 0,1\rangle} = \left\{ x \middle| \mu_a(x) \ge 0, \nu_a(x) \le 1, x \in R \right\}$) is compact.

From the above definition of the intuitionistic fuzzy number, we can easily construct a general intuitionistic fuzzy number

$$a = \left\langle \left(\underline{a_1}, a_{1l}, a_{1r}, \overline{a_1}\right), p_a; \left(\underline{a_2}, a_{2l}, a_{2r}, \overline{a_2}\right), q_a \right\rangle,$$

whose membership and nonmembership functions are given asfollows:

$$\mu_a(x)=\begin{cases}0, & x<\underline{a}_1\\ f_{\mu l}(x), & \underline{a}_1\le x<a_{1l}\\ p_a, & a_{1l}\le x\le a_{1r}\\ f_{\mu r}(x), & a_{1r}<x\le\overline{a}_1\\ 0, & x>\overline{a}_1\end{cases}$$

$$\nu_a(x)=\begin{cases}1, & x<\underline{a}_2\\ f_{\nu l}(x), & \underline{a}_2\le x<a_{2l}\\ q_a, & a_{2l}\le x\le a_{2r}\\ f_{\nu r}(x), & a_{2r}<x\le\overline{a}_2\\ 1, & x>\overline{a}_2\end{cases}$$

respectively, where the functions

$f_{\mu l}:\left[\underline{a}_1,a_{1l}\right]\to\left[0,p_a\right]$

$f_{\mu r}:\left[a_{1r},\overline{a}_1\right]\to\left[0,p_a\right]$

$f_{\nu r}:\left[a_{2r},\overline{a}_2\right]\to\left[q_a,1\right]$

$f_{\nu l}:\left[\underline{a}_2,a_{2l}\right]\to\left[q_a,1\right]$

$f_{\mu l}$, $f_{\nu r}$ are continuous and nondecreasing, $f_{\mu r}$, $f_{\nu l}$ are continuous and nonincreasing, and satisfy the conditions: $f_{\mu l}\left(\underline{a}_1\right)=0$, $f_{\mu l}\left(a_{1l}\right)=p_a$, $f_{\nu r}\left(a_{2r}\right)=q_a$, $f_{\nu r}\left(\overline{a}_2\right)=1$, $f_{\mu r}\left(a_{1r}\right)=p_a$, $f_{\mu r}\left(\overline{a}_1\right)=0$, $f_{\nu l}\left(\underline{a}_2\right)=1$, $f_{\nu l}\left(a_{2l}\right)=q_a$

$\left[a_{1l},a_{1r}\right]$, $\underline{a}_1$, $\overline{a}_1$ are called the mean interval and the lower and upper limits of the general intuitionistic fuzzy number a for the membership function, respectively.

$\left[a_{2l},a_{2r}\right]$, $\underline{a}_2$, $\overline{a}_2$ are called the mean interval and the lower and upper limits of the general intuitionistic fuzzy number a for the nonmembership function, respectively. p_a and q_a are called the maximum membership degree and minimum nonmembership degree, respectively.

For some specific values of the parameters $\underline{a}_1, a_{1l}, a_{1r}, \overline{a}_1, \underline{a}_2, a_{2l}, a_{2r}, \overline{a}_2$ we can further construct some particular forms of intuitionistic fuzzy numbers such as triangular intuitionistic fuzzy numbers.

A triangular intuitionistic fuzzy number $a=\left\langle\left(\underline{a},a,\overline{a}\right);\,p_a,q_a\right\rangle$ is a special intuitionistic fuzzy set on the real number set R, whose membership and nonmembership functions are defined as follows:

$$\mu_a(x)=\begin{cases}0, & x<\underline{a}\\ \left(x-\underline{a}\right)p_a/\left(a-\underline{a}\right), & \underline{a}\le x<a\\ p_a, & x=a\\ \left(\overline{a}-x\right)p_a/\left(\overline{a}-a\right), & a<x\le\overline{a}\\ 0, & x>\overline{a}\end{cases}$$

$$\nu_a(x)=\begin{cases}1, & x<\underline{a}_2\\ \left(a-x+q_a\left(x-a\right)\right)/\left(a-\underline{a}\right), & \underline{a}\le x<a\\ q_a, & x=a\\ \left(x-a+q_a\left(\overline{a}-x\right)\right)/\left(\overline{a}-a\right), & a<x\le\overline{a}\\ 1, & x>\overline{a}\end{cases}$$

We call degrees of indeterminacy of an element x in the triangular intuitionistic fuzzy number a. It is the degree of indeterminacy membership of the element x to a.

$$\pi_a\left(x\right)=1-\mu_a\left(x\right)-\nu_a\left(x\right)$$

It is a hesitancy degree of x to a [1-4]. It is obvious that

$$0\le\pi_A\left(x\right)\le 1,\ \forall x\in X$$

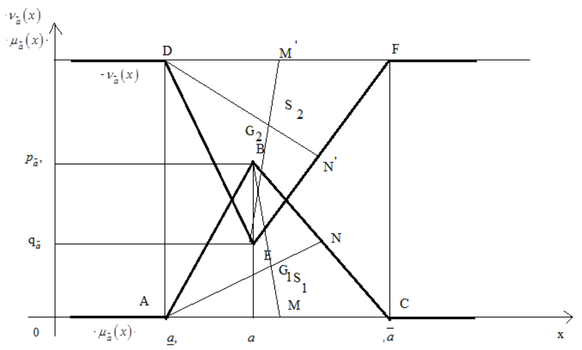

Figure 1[4] A triangular intuitionistic fuzzy number $a = \left\langle \left(\underline{a}, a, \overline{a}\right); p_a, q_a \right\rangle$

Let $a = \left\langle \left(\underline{a}, a, \overline{a}\right); p_a, q_a \right\rangle$ and $\tilde{b} = \left\langle \left(\underline{b}, b, \overline{b}\right); p_{\tilde b}, q_{\tilde b} \right\rangle$ be any triangular intuitionistic fuzzy numbers and $k \neq 0$ be any real number. The algebraic operations are stipulated as follows:

- The sum
  $$a + \tilde{b} = \left\langle \left(\underline{a} + \underline{b}, a + b, \overline{a} + \overline{b}\right); p_a \wedge p_{\tilde b}, q_a \vee q_{\tilde b} \right\rangle$$
- The difference
  $$a - \tilde{b} = \left\langle \left(\underline{a} - \underline{b}, a - b, \overline{a} - \overline{b}\right); p_a \wedge p_{\tilde b}, q_a \vee q_{\tilde b} \right\rangle$$
- $$k + a = \left\langle \left(k + \underline{a}, k + a, k + \overline{a}\right); p_a, q_a \right\rangle, k > 0$$
  $$k + a = \left\langle \left(k + \overline{a}, k + a, k + \underline{a}\right); p_a, q_a \right\rangle, k < 0$$
- $$k \cdot a = \left\langle \left(k\underline{a}, ka, k\overline{a}\right); p_a, q_a \right\rangle, k > 0$$
  $$k \cdot a = \left\langle \left(k\overline{a}, ka, k\underline{a}\right); p_a, q_a \right\rangle, k < 0$$

  Let $a_i = \left\langle \left(\underline{a}_i, a_i, \overline{a}_i\right); p_{a_i}, q_{a_i} \right\rangle, i = 1,..,n$ be TIFNs, where n is a nonnegative integer, n≥ 2. Then we define the mean value of the a_i 's to be the: $a = \frac{1}{n}\left(a_1 + a_2 + ... + a_n\right)$.

3. DEFUZZIFICATION OF TIFNs

In this section we shall use the COG technique for defuzzifying a given TIFN. Starting from [8], We extended the proposition 1 for ITNF.

Proposition The coordinates (X, Y) of the COG of the graph of the TIFN $a = \left\langle \left(\underline{a}, a, \overline{a}\right); p_a, q_a \right\rangle$ are calculated by the formulas $X = \frac{\underline{a} + a + \overline{a}}{3}$, $Y = \frac{p_a{}^2 - q_a{}^2 - q_a + 2}{3\left(p_a + 1 - q_a\right)}$

Proof: The graph of the TIFN $a = \left\langle \left(\underline{a}, a, \overline{a}\right); p_a, q_a \right\rangle$ is the triangle ABC and the triangle DEF of Figure 1, where A ($\underline{a}$, 0), B (a, p_a) and C ($\overline{a}$, 0) respectively D($\underline{a}$,1), E (a, q_a) and F ($\overline{a}$, 1). Then, the COG, say G, of ABC is the intersection point of its medians AN and BM, where N $\left(\frac{a + \overline{a}}{2}, \frac{p_a}{2}\right)$ and M $\left(\frac{\overline{a} - \underline{a}}{2}, 0\right)$. Therefore the equation of the straight line on which AN lies is $\frac{x - \underline{a}}{\frac{a + \overline{a}}{2} - \underline{a}} = \frac{y}{\frac{p_a}{2}}$, or

$x\, p_a$ - (a+$\overline{a}$ -2$\underline{a}$)y = $p_a\, a$ (1).

In the same way one finds that the equation of the straight line on which BM lies is 2x p_a + ($\overline{a}$ - $\underline{a}$ -2a)y = p_a ($\overline{a}$ - $\underline{a}$ -2a) (2).

The linear system of (1) and (2) has a unique solution with the respect to the variables x and y determining the coordinates of the triangle’s COG, G1$\left(\frac{\underline{a} + a + \overline{a}}{3}, \frac{p_a}{3}\right)$

Similar to determine the coordinates of the triangle’s COG, G2$\left(\frac{\underline{a} + a + \overline{a}}{3}, \frac{2 + q_a}{3}\right)$.

Further, the areas of the two triangles are equal to S1 = $\frac{p_a\left(\overline{a} - \underline{a}\right)}{2}$ and S2 = $\frac{\left(1 - q_a\right)\left(\overline{a} - \underline{a}\right)}{2}$ respectively. Then the coordinates of the COG of the TIFN, being the resultant of the COGs Gi (x_i, y_i), for i= 1, 2 are calculated by the formulas $X=\frac{1}{S}\sum_{i=1}^{2}S_i x_i$, $Y=\frac{1}{S}\sum_{i=1}^{2}S_i y_i$, S= S1+ S2= $\frac{\left(\overline{a}-\underline{a}\right)\left(p_a+1-q_a\right)}{2}$ is the area of the TIFN $a=\left\langle\left(\underline{a},a,\overline{a}\right);p_a,q_a\right\rangle$.

$$X=\frac{1}{S}\sum_{i=1}^{2}S_i x_i=\frac{2}{\left(\overline{a}-\underline{a}\right)\left(p_a+1-q_a\right)}\left[\frac{p_a\left(\overline{a}-\underline{a}\right)}{2}\cdot\frac{\underline{a}+a+\overline{a}}{3}-\frac{\left(1-q_a\right)\left(\overline{a}-\underline{a}\right)}{2}\cdot\frac{\underline{a}+a+\overline{a}}{3}\right]=\frac{\underline{a}+a+\overline{a}}{3}.$$

$$Y=\frac{1}{S}\sum_{i=1}^{2}S_i y_i=\frac{2}{\left(\overline{a}-\underline{a}\right)\left(p_a+1-q_a\right)}\left[\frac{p_a\left(\overline{a}-\underline{a}\right)}{2}\cdot\frac{p_a}{3}-\frac{\left(1-q_a\right)\left(\overline{a}-\underline{a}\right)}{2}\cdot\frac{2+q_a}{3}\right]=\frac{p_a^{2}-q_a^{2}-q_a+2}{3\left(p_a+1-q_a\right)}.$$

4. CONCLUSION

Decision and games with intuitionistic fuzzy sets are remarkably different from fuzzy decision and games. Starting from [8] We extended the proposition 1 for ITNF.

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RESEARCH ON THE GROWTH PERFORMANCE OF SCRAPER CONVEYORS WITH JACKHAMMERS ARMORED WITHIN THE COMPLEX WITH ENERGY

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Abstract In this article we present the cases in which the use of those who carry with is better than scraper conveyors with the band or vice versa featuring construction, operation and optimize them.

Key words**: transport, optimizations, mechanics**

GENERAL CONSIDERATIONS

The vast majority of world production of coal is extracted from underground with long front, and the only means of transportation of coal in these underground is the scraper conveyors armour, due to the following advantages: The can Works on undulating land; can have curves in the hearth, allowing ripate to be able to be in front by şerpuire behind combines; solid construction of the gutter frame represents the directions on moving cars jackhammers (combines, plows and tunnelling machinery); the height of the gutters allow easy loading coal cut at any point on the route; resistant to blows and even rocks spillages; can work under big angles, up to (30 °; operating safety presents and can retrieve overloads; long and short can be easy, small intervals of 0.5 ... 1.5 m.

Scraper conveyors are not used as the primary means of transportation, mining works due to the fact that they have the following disadvantages: extra large crush coal at the rate of 4 to 7% at 100 m long; high weight per linear and intense leading to wear big metal consumption; have power consumption 10 w. .. 15 times higher than tape conveyors and about 20 times larger than the carriage by rail; the maximum length that a can have is limited to 300. .

400 m.

II. SCRAPER CONVEYORS FOR UNDERGROUND FRONT ESTE WALL ARMOUR WITH LONG FRONT

The construction of these armored conveyor, which consists of guides for leading chains with scrapers, allows working on undulating land and riparea without dismantling even during operation. Are presented in table 1 of the technical characteristics of the conveyor with scraper. The help of TR-3 has an older building and is replaced by conveyors TR-4 (fig. 1) and TR-5. Transports TR-4 and TR-5 and the unified have interchangeable parts differ among themselves only with respect to the width of the gutter and number of chains. The help of TR-7 (fig. 2) is high capacity, a new construction. The main parts of the scraper conveyors are: scraper chains, gutters, gutters, action groups and ripare systems.

The chains are calibrated chain (table 2) and are subject to duty and blows that have values ... 7 times larger than the rated capacity, as well as an intense frictional wear and corrosion. In the manufacturing process, the links is welded with a step lower than the nominal, then chain undergoes a process of normalization, after which leads shall be calibrated.

Through a hardening with tempering (improvement), steel, which has the initial resistance of 1 200 ... 1250 N/mm2, reaches a strength of 1 400.. 1 500 N/mm2 and hardness 340 HV. Hardness of the material for the chain makes it to be brittle and leads to intense wear of gutters. For quality chains, particularly the request to fatigue cyclic loading for the first time, it is recommended that after quenching and tempering to apply mechanical treatment superficial hardening (hardening) by jet bombing.

Table 1
Technical characteristics of conveyors with armored raclele what factory "Unio" Satu Mare

Type conveyer	TR-3	TR-4	TR-5	TR-7
Flow [t/min]	2,5; 4,1	4,1; 6,0	3,3; 4,1	7,0; 10
The maximum inclination at which can work [degrees]	±20	±20	±10	±35
Gutter width [mm]	590	642	596	736
Fixed height (sigma profile) [mm]	181	183	181	220
The angle of deflection of the gutter, degrees:				
-horizontal	3	3	3	3
-vertical	3	3	3	3
Chains speed [m/s]	0,4; 0,8	0,8; 1,0	0,8; 1,0	0,7; 0,9
The number of chains	2	3; 2	2	2; 1
Caliber chains [mm]	18	18	18	26
The engine power of a group of actuator [kW]	22	20 ; 35 32 ; 40 45	20 ;25 32; 40; 45	110; 135
The supply voltage of the motors [V]	380	380	380	660
Engine speed [RPM]	1 500	1 500	1 500	1 500
Type hydraulic coupling	CH 370	CH 370; CH 420; CH 420 MA	CH 370 CH 420 CH 420 MA	CH 500 MA
The maximum number of groups operating from a head of spiral conveyor	2	2	2	1
The maximum number of drive groups of spiral conveyor	4	4	3	2
Front engine layout of the conveyor	paralel	paralel	parale!	paralel; perpendicular
Delivery length of conveyer [m]	60 ; 120	60; 120;	60 ; 120	60 ; 120

		180; 240		
Total weight at the maximum length [t]	-	60	-	67
The maximum combines that can move around the conveyor [t]	-	-	-	40

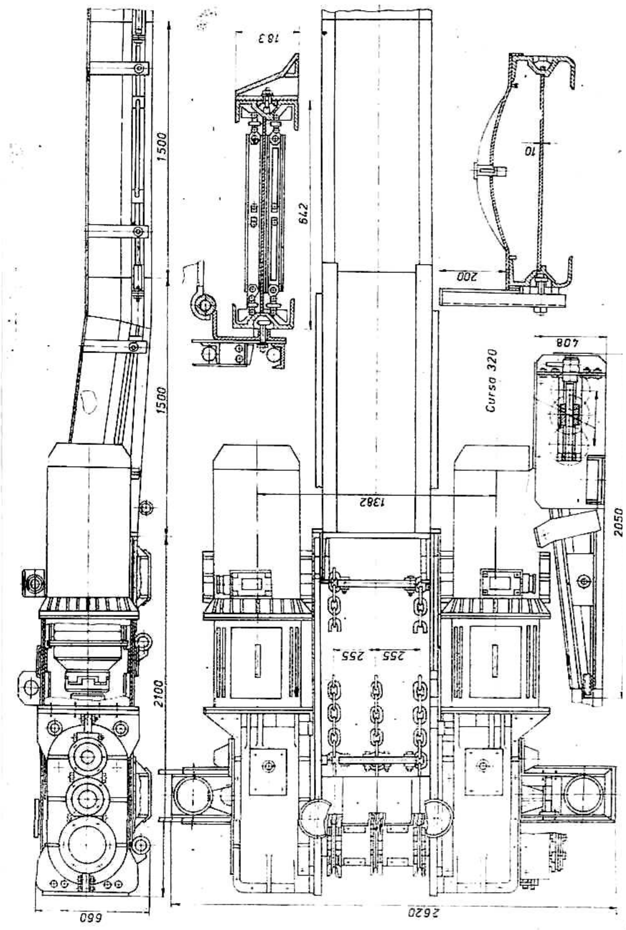

Fig. 1. Scraper conveyor belt TR-4

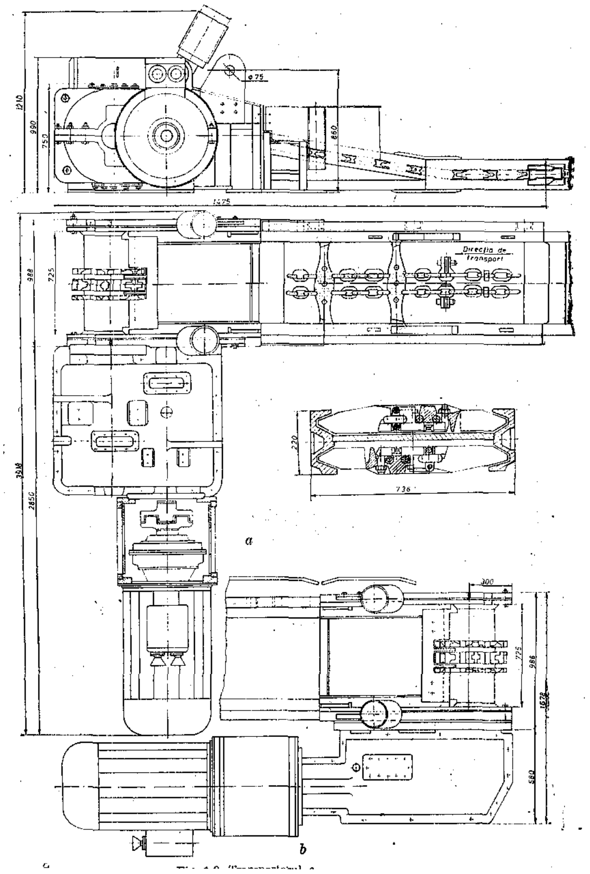

Fig. 2. Scraper conveyor belt TR-7 A – with the engine placed perpendiculer; b – with the engine placed parallel

se the largest chains took a type C and D he D proved sometimes being brittle), whose characteristics are presented in Table 2.

Table 2. Technical characteristics of calibrated chain chains heavy-duty mining (for belt conveyors scrapers, plows, combine) according to the standard C.A.E.R.

Diameter of steel ' (calibrated) [mm]	Chain pitch (mm)	The width of the link {mm}		Mass of 1 m chain [kg/m]	Task. breaking [kN]
		maximum	minimum		Class of

		outer	indoor		C	D
14 ± 0,4	50 ± 0,5	48	17	3,9	250	310
(16 ±0,5)	64 ± 0,6	55	20	4,9	320	402
18 ± 0,5	64 ± 0,6	60	21	6,5.	410	510
(20 ±0,6)	80 ± 0,8	67	23	7,7	500	620
(22 ±0,7)	86 ±0,9	75	26	9,4	610	760
24 ± 0,8	86 ± 0,9	79	28	12,4	720	900
26 ± 0,8	92 ± 0,9	86	30	14,7	850	1 060
28 ± 0,9		93	33	18,5	980	1 220
30 ± 0,9		98	34	19,2	1 130	1 410
32 ± 1,0		106	37	22,0	1 285	1 610

The links of these chains must be rigorously calibrated at manufacturing, and during operation should not be decalibreze under load. This condition is imposed by ensuring good windings on the categories of action and of the need for balance between the chains when number two or three. According to C.A.E.R., the maximum elongation of the test load must not exceed 1.6% for chains of type C and 1.9% for chains of type D, and minimum elongation at break to be 12% (in world practice varies between 7 and 14%).

The bonds shall be delivered in sections of about 960 mm, and on-demand delivery is made and with lengths up to 25 t. .. 30 m Difference between chains working together must not be greater than 2 mm, when the chains have length up to 2 m and not more than 0,15% of the total length, when bonds have length over 2 m.

When carrier has two chains located in the Middle, the chain segments lengths difference must not exceed 10 mm in the case of long chains. Some companies perform such chains with deviations within the limits of ± 3 mm compared to the nominal length of chains to a length of 25 m.

The roller conveyors with chains located in the gutter guides are used more frequently with caliber 18 chains ... 24 mm at the set myself two chains the Middle sizes 22. predominate. 26 mm, and the ones with a chain in the Middle, it typically has higher caliber 26 mm scraper Conveyors I may have one, two or three chains. On the construction of two chains of figure I 3, and three chains from Figure 3, b, length of sections chain is equal to the distance between scraper side chains, and link with each other and with racletele through the eyelets. Ocheţii have resistance to bursting with 12 ... 15% less than the chain and runs wrought with heat treatment with the revert, 35 Mn-12 (for chains of class C) or Cr Ni Mo steel 30 20 (for chains of class D).

The construction of Figure 3, d-i, the chains have a length of 25 ... 30 m, on which are mounted at different intervals racletele. in this case, when the two groups lies at the ends of chains racletelor as shown in Figure 3, c and d, merging chains is made as shown in Figure 3, a and b in all other cases, the combination of chains is made with different construction elements, such as those shown in Figure 4.

Three chains presents the advantage that in case, breaking of chains, racletele retain normal position and not get out of the gutter guides, which is very important especially when tearing occurs on the lower branch and working with layers (thickness (0.7 m). Instead, the three chains lead to further increase of the mass of the traction and ' consumption of chains without contributing to the increase in total labor force breaking traction body, whereas the degree of unevenness of the distribution of tasks is much larger than the two chains (usually one of the three chains almost takes over the task). Even if the use of the two chains, distribution of tasks between chains is uneven, and if they place pokes and locks, thrust what is engines develops only a chain.

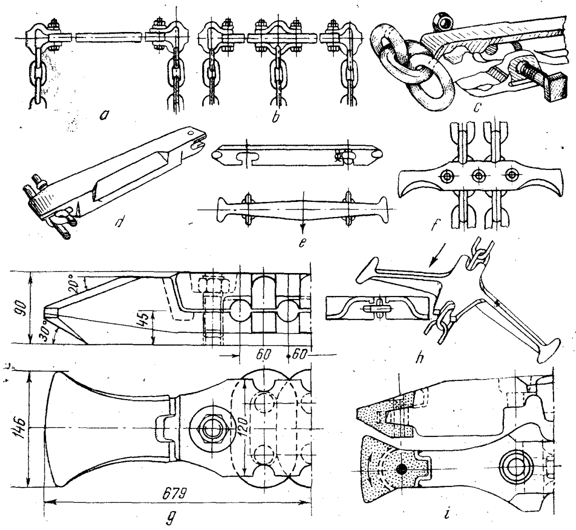

Fig. 3. Scraper chains

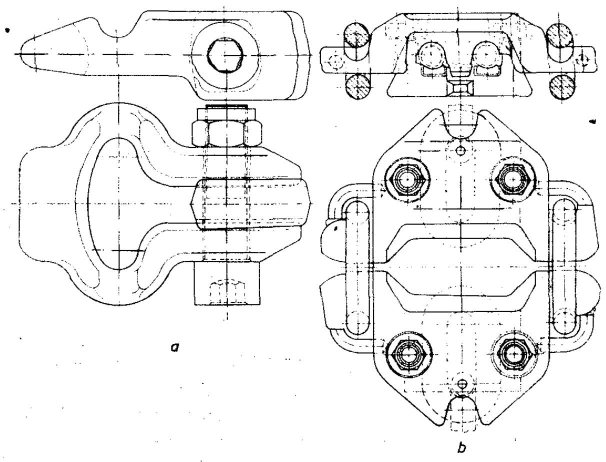

Fig. 4. Chains merge elements of type-eye swivel bearing; b-type

Another shortcoming of the conveyors with two or three chains, but with side chains at the ends of the racletelor (the guides), is that they allow a man to have only curves of equal amount on both sides , and the curves must have big RADIUS. To mitigate this shortcoming, using construction with wo chains, placed in the middle (fig. 3, f nd g). This reduces ageing chains and llow the use of larger chains, without large utter height, contributing to chains involve argo. With how bonds are closer, with oth their enrollment in the spiral conveyor made easier, and disturbing the balance f tasks between the two chains, due to urvature, is lower, the difference in dvertising as well as smaller lengths chains (3 mm) for racletele not take the iagonal position.

The transports with a chain (fig. 3, h and i) are removed for these shortcomings, presented in plus the following benefits: it uses the entire tensile body thrust; It reduces wear and breakage frequency so the chain; reduce costs of data consumption chains; carrier may have small radius curves and even curves with 90 ° deviations; decreases the load area length curves behind combines, which facilitates faster support rocks from the roof; the chain may have great arms, up to 34 mm, at a relatively small height of the gutter; scraper chain trees and stars are the cheapest with 30. . 40% than the transports with 2 or 3 chains at the same flow rate and length of the conveyer. scraper conveyer TR-7 (fig. 3 g) allows mounting on either one or two chains. The ends of these scrapers are subjected to heat treatment to enlarge them wear resistance. Scraper in Figure 3 has removable heads, i made of high-strength steels. great to wear.

The main disadvantage of a chain conveyor with scraper, is that having high stability, can acquire diagonal positions (oscillations) when her large resilient there ends when passing through the gutter guides.

For this reason, with a chain conveyors can be used only at the coals that have relatively small coefficient of friction (particularly coal coal-fatty) and especially to those who do not have components with high trend of bonding and cementing in the gutter guides.

To increase the stability of scraper, this dress with vertical bilateral links with neighbouring zala is fixed horizontally on the scraper.

Racletele is run by forging the mold and heat treated. Form racletelor should allow easy passage over joints in the gutter and the stars, to resist as small as when passing through the gutter guides, to clean up coal's ass and fine soldering gutters, handles do not result in fine coal under the conveyor on the empty branch bypassing stars at downloading, easy to stomp the pieces falling under coal scraper transverse stability, to have higher (required with a chain conveyors) for not having oscillations and can be easily mounted and dismantled (if possible without screws, as shown in Figure 2.3, e and h).

Tare weight of the coal conveyor makes it to be pushed into the gutter guides with a certain pressure. The roller conveyors with one or two chains in the Middle, this pressure makes coal to penetrate between the Cape and scraper wall luminaire, which guides the movement cumberers, crush the coal in a position higher than the chain conveyors with guides and even have a higher power consumption. This negative phenomenon is accentuated at the transports with a chain, to which wide squeegee having in the Middle working as a feather what pushes outwards, coal in the guides. To mitigate this phenomenon, attempting to use scrapers with ends pointing forwards, giving rise to coal towards the middle of the gutter. The distance between scraper is 1000. 1 200 mm and when carrying the higher gradients of 16. .. 18 °, this distance shrinks up to 600 mm.

The transports with a chain that also curves, the distance between scraper t is calculated according to the expression:

$t = (2R + lr)\sin \varphi \qquad [m]$,

where R is the radius of curvature, in m; LR-scraper , length in m; (deviation angle of direction of the path.

IV. CONSTRUCTION OF THE SCRAPER CONVEYORS GUTTERS

Gutters have sidewalls laminated steel in the form of sigma (fig. 5), which has the top edge at right angles to take big fine weight of combines, and the bottom edge is round to allow slight movement on the fireplace. the height h of the gutter is depending on the caliber of chains and their location (table 3). C thickness of the walls is 10 ... 12 mm when the motor has a height of 180 ... 190 mm, while the chains are placed in guides, and reaches 32 mm height when the motor has 266 mm, intended to work with a chain located in the Middle.

Table 3
Sizes of gutters

Chain size [mm]	Gutter height [mm]		Thickness bottom [mm]	The dimensions of the screws joining
	Conveyor chains located in guides	With a chain conveyor		
14 x 50	140 - 145	-	6 - 10	M l6
18 x 64	180 - 190	150	12 - 14	M l2
23 x 86	200 - 228	170 - 190	14 - 20	M 24
26 x 92	255 – 264	200 - 205	20 - 25	M 24-M 30
30 x 108	-	216 - 222	22 - 28	M 30
32; 34 x 114;	-	222 - 264	25 - 30	M30

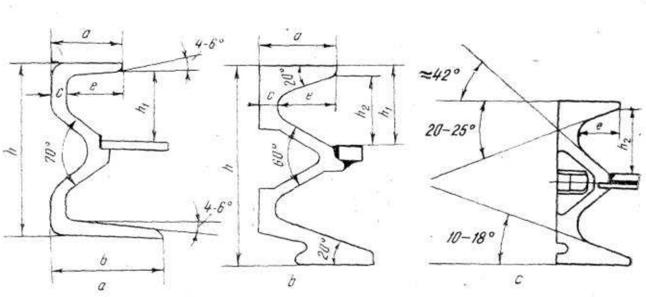

Fig. 5. Walls of gutters

The construction of the wall is three-course sigma, depending on the location of the chains: a. the Gutters are chains in their guides (fig. 5 a) and who are unable to work with chains located in the middle. Height h1 in the right shaft chain is equal to the width of the link chain plus 10 mm. Depth of guides is equal to the width of the link chains when the bonds have high caliber, and equal to the width of the link plus 10 mm when the chains have small arms. Lower side support width b = (1.15 ... 1) a. b. Troughs with one or two chains located in the middle (fig. 5 b), which may not work with chains entered into the guides. Height h1 on the lively branch is equal to the width of the link chain of minimum size with which it is intended to work, and h2 is lower than h1 with 10 ... 12 mm when using a single, maximum width of chain link of the chain can be 20 mm higher than h1. Depth e = (0,7 0,8) h2. The width of the side lower b is greater than 40 ... 50% (the maximum amount is taken for height small troughs and vice versa). c. Gutters that can work with both guides can be found in chains and with a chain located the middle (fig. 5 c). These troughs are er. The depth of the handle is 55 ... 60 , when the chain has 18 mm caliber, and . 75 mm, when the chain has size 26 , height h2 width is equal to I link plus . 12 mm.

At one end of the gutter are welded in the outer walls of the two sigma head feathers in the console of the other channels trough. This will ensure the merge has centered the gutter. The connection between the gutters or screws with special form (without screws). Merge gutter you must confuse them at 3 ... 6 ° in the vertical plane and 2 ... 5 ° in the horizontal plane. The gutter width is 600. 860 mm, and their length should be consistent with the pace of installation of mechanized support sections and lies between 1350 — 1 900 mm (1,500 mm more often). the Endowment is also a gutter with length less than required lungirilor and scurtărilor a, 1000 and 500 mm (sometimes and 750 mm). Gutters are running out of steel, Silicon electrical steel mangano siliceous or cil-chromium and manganese that have resistance to contact pressure of 700. . .800 N/mm2 and high resistance to wear. To increase the duration of life is necessary to quench the gutter a distance heads, 150. . 200 mm, especially in places where the chains rubs or racletelor heads in the guides. Sometimes it uses these places with plating of specially shaped steel with high wear resistance, which is mechanically welded in places. Some companies charging the surface of these places with width 40 and. .. 50 mm welded with high strength alloys to wear. This solution, which is achieved with special automatic installations, can also be used at the new gutters and gutter restoration. Rubs surfaces on bands chains from guides on the whole length of the gutter or the entire surface of the imaging on the lively branch at the transports.

When exploration the help of explosives, shooting direct the conveyor, gutters may be covered by protective caps, I did remove the effect from the head of downloading, as is discharged by coal.

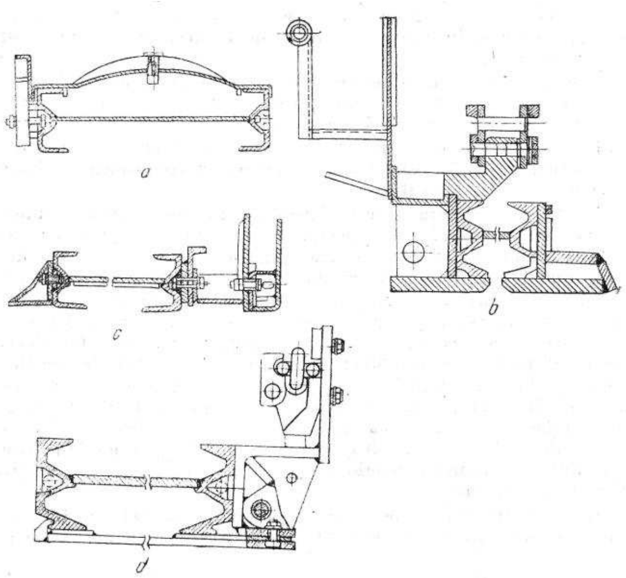

Fig. 6. Auxiliary machinery

In the walls of the welded sigma you are gutter. plaques, flush with the wall surface with holes or places of various forms, which allow the mounting of equipment side (fig. 6). The front mounted ramps for the loading, and exploited the space to mount kerbs, guides combine captive, in which the gutters capture the worm gear speed on cables, it combines autodeplasează (when not having traction chain) and hydraulic pushers binding. In order to ensure a better and more fitting resistant to such equipment, it tends to use screws placed on two occasions and with diameter up to the M26. These nuts are recommended to have screw caps software for blocking and protecting the thread.

When ramps are not the same height, tilt throughout the lower part to have an inclination to the horizontal 30... 40 ° at the top to have an inclination of 30 vertical... 35 °. Loading may take a lower horizontal extent (fig. 6B) on the passage of the rollers or bearings off handsets. Sometimes, this stage has diagonal cut ends to facilitate the transition from the cold rolls or handsets.The exploitable space to mount the gutters in support who is posing as the power cables, namely: a trough or trim lines for cables and mounts stationary (i.e. those that are fueling the engines of the other end of the spiral conveyor for feeding or combines in the middle of slaughter) and the motor power cables required for mobile combines. These two troughs can be superimposed (fig. 6 b) or they can be placed side by side of each other, when you have layers thick. Gutters for laying cables together with the Guide to be trapped construction combines forming monolithic welded or assembled together by screws. In modern construction, cables for powering mobile combines are mounted between a racletele tractor chain type, which takes the efforts of reconditioning traction pulling the flexible and allows their movement in both directions along the slaughter without requiring manual intervention. The chain elements may lie in the middle of sideways. The use of such chains reconditioning results in increased bandwidth load.

Cogwheel railway items on moving combine very solid must be fitted on the sidewall of the gutter, and their heads bind to each other by the joints with high strength, able to take the effort of combines thrust. Links gutter heads do not have to take over that effort. These worm gear speed can be bolted (form a) or with the teeth. If the second rack can be single or double (two parallel), when a tooth worm gear speed lies between two teeth do you have other worm gear speed. Some firms use instead a cogwheel calibrated chain mounted on the entire length of the spiral conveyor (fig. 6 d), when the links may be of the same kind or when horizontal links (he enters the star's teeth) were greater than those step. Sometimes, the equipment shall be mounted on both sides of the gutters have surface contact with hearth and a much greater resistance than the sigma walls you gutters. Heads of such equipment may have related items of high strength (with a diameter of 40 ... 50 mm). in this case the screws between the ends of gutter may be missing. To get better combines weight, lateral equipment can have falling support soles and under the walls of sigma you gutters, how is the conveyor belt TR-7 (fig. 6 b). For simplification, lightening, hardening and increasing resistance welded construction, some firms on the lateral gutter equipment (construction).

v. Scraper conveyor drive

The head of a download is always the head actuator, and head back and he has, in most common cases, groups. The main requirements to ensure actuator heads are as follows: to allow combines come out with jackhammers to cut up bodies in the Gallery (and head), to eliminate the need of niches; does not require large space free, especially in the areas of connection with slaughter appearing high pressures; the whole body can be easy; the ripa installed power, especially the starting time to be sufficiently large.

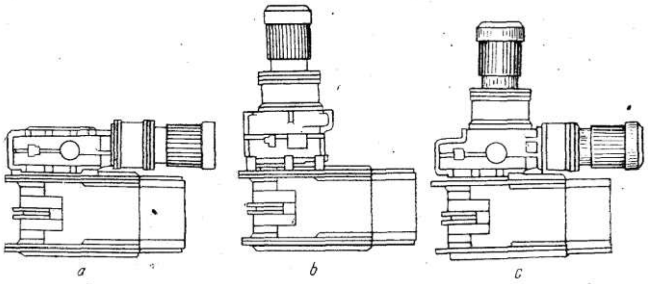

Fig. 7. Assembly and action groups: a-with the engine placed parallel to the carrier; b-with the engine placed perpendicular to the conveyor; c-with two motors (one parallel and one perpendicular to the).

Action groups are made up of electric motors, gearboxes, hydraulic couplings and all building , building block (fig. 7).

6. CONCLUSIONS

To improve performance of scraper conveyors used in the JIU Valley, it is necessary to navigate a programme of refurbishment and modernisation, which mainly take into account the recommendations set out in the work relating to the construction, operation and exploitation of scraper conveyor-type armored jackhammers. Scraper conveyor drive is recommended to be performed with groups of actuators with perpendicular one settlement located at the two ends on the front side. The transport Gallery, based on the analysis carried out, it is advisable to generalize the solution with scraper conveyor type rider followed by unloading conveyor rollers. This solution involves reconsidering the diggers section galleries and maintaining this section during ration panel jackhammers.

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STUDY AND RESEARCH IN THE FIELD OF IMPROVING CONSTRUCTION AND EXPLOITATION OF ROLLER CONVEYORS WITH COMPLEX ENERGY USED IN OLTENIA

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Abstract — In this article we present the cases in which the use of stretching systems with tuning, head stations are always mounted on concrete foundations. long and short can be easy with mounting and dismantling, the links between sections of the trail are easily removable (desirable without screws), have installed smaller, they transport speed 1 ... 2 m/s (which increases with tread width), and the construction of the propulsion system and the return of the head is compact in size and minimized especially in width so that it does not require special arrangements or for mining works. At these conveyors, head back, stretching, and even the light conveyors head actuator can be fitted without foundation, with columns

Key words**: transport, optimizations, mechanics**

1.Introduction

Roller conveyors with the band is in constant expansion, occupying the first place compared to other types of conveyors. For this reason when it uses the term loading conveyor, without any other indication, it goes without saying that the unloading conveyor rollers. These represent the primary means of conveyor transport most widely used inclined planes on the galleries and in the mining industry, yielding to other means of transportation only from clear over 18 ... 22^{o} or on curves galleries. Their use is economical if the flow rate is at least 150 ... 200 t/h at an operating time of 5000 h/year. It is not recommended to be used for the transport of materials with large soft solder on trend and strong of rocks (ores) in large chunks. For this reason there are used on a smaller scale from ores, shortages are especially inclined planes provided pieces of ore may not have large sizes. Thus, when the tread width is 800 ... 1 600 mm, it is desirable that the size of the pieces of ore does not exceed 150 ... 300 mm to the larger sizes are recorded an intense wear of the tape.

These conveyors can be stationary. The stationary is used for mining works and secondary sector boundaries, they work duration to 1 ... 2 years and usually shortens the working or periodically, with the advancement of the work. Stationary conveyors are used on the main mining works opening horizontal and inclined, have long (over 2 ... 3 years) and it is not working, and when it cuts out or such operations take place, is at large intervals of time, over 1 ... 2 years.

Unlike stationary conveyors, the stationary have easier construction, reduced overall dimensions, can be long and short easy mounting and dismantling, the links between sections of the trail are easily removable (desirable without screws), have installed smaller, they transport speed 1 ... 2 m/s (which increases with tread width), and the construction of the propulsion system and the return of the head is compact in size and minimized especially in width so that it does not require special arrangements or for mining works. At these conveyors, head back, stretching, and even the light conveyors head actuator can be fitted without foundation, with columns.

Stationary conveyors have solid and rigid construction, the transport speed of 2 ... 4.5 m/s (on the surface can reach 8.4 m/s), installed power up to 8 000 ... 10 000 kW, stretching with auto, head stations are always mounted on concrete foundations, and the length reached the surface up to 15 km. In practice are often used as conveyor half stationary conveyor.

According to inclination, tape roller conveyors can be categorized as follows: horizontal and mining works with small inclination from-3 to + 6o; these conveyors do not have brake systems not to be feared as the band to move under its own weight alone;

- For transport plane pitched upwards, under the angle from + 6 to + 18o; transporters have brakes, don't go in a circle systems and devices for catching Strip. Maximum inclination is hampered by the danger of slipping on smooth surface material of the band, for a tilt of the rollers side of 30 ... 35 °;

for transport plane pitched down under angle from-3 to-16o; transporters have brakes and devices for catching the tape; as with the previous group, maximum inclination is hampered by the danger of slipping on smooth surface material of the band, for a tilt of the rollers side of 30 ... 35 °; for transport plane pitched, under angle greater than 18o 16o upwards and downwards; These, in addition to the braking and safety systems mentioned above, why not have a special construction allows slipping or rolling down the strip material under its own weight.

Parts of conveyors with roller tape: tape, rollers, drive route, skeleton, stretching and turning drums.

2. CONSTRUCTION AND USE OF THE CARPET TAPE

The bandwidth is the most expensive element of the conveyer, occupying up to 70% of the cost of a and whose lifetime depends mainly on the economic efficiency of the use of conveyors.

The main conditions you have to meet the bands for conveyor belt are as follows: high tensile strength longitudinal; longitudinal flexibility (at winding on drums) and transverse (to take the form of stream bed); transverse stiffness limited in order not to open too much between two racks with rollers; longitudinal elastic and permanent deformations as well as smaller work load; exfoliation resistance due to the switch over the drums and rollers; dielectric breakdown strength (for large lumps of rock); high resistance to wear and tear once the part material is transported; reduced Hygroscopicity as; resistance to rotting; linking together as smooth; the greatest possible stability to increases in temperature; not umfa; to not load electrostatic; keeping the characteristics and low temperature-30 ...-40 ° c; stability against aging due to environment.

Used in underground bands have widths between 650 and 1400 mm (use the largest ones have a 1000 and 1200 mm,

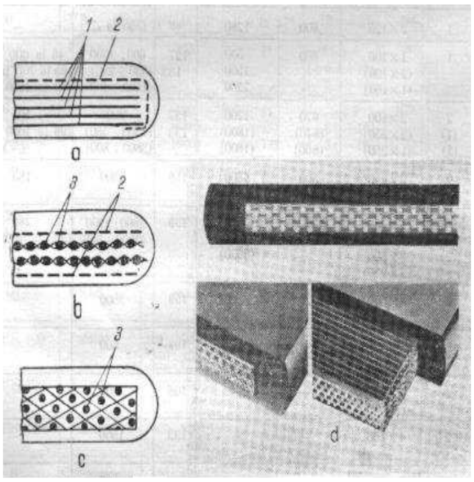


Fig. 1. Bands with liners
a-studded fabric; b-with cord fabric; c-with a single monolithic insertion; d-indigenous manufacturing; 1-reinforcement fabric inserts; 2-protective inserts; 3-cord fabric

1400 mm are found only on main lines and inclined planes) and are with liners (fig. 1) or with steel cables (fig. 2). Bands for TMB are: conveyors for TMB 800 with 3 inserts resistance 250 daN/cm and with total thickness of 12 mm; for TMB 1000 with 4 inserts resistance 250 daN/cm and with total thickness of 14 mm; for TMB 1200 resistance inserts 4 400 d/cm and with total thickness of 16 mm.

A new trend in the construction of the bands is that bands instead of multiple inserts have a single unified fabric-monolith (see fig. 1, c) warp consists of several rows of thick yarn (cord) high resistance polyester, polyamide or nylon , which are linked together by a betel municipality of polyamide. Each weft thread linking all longitudinal rows of cord, be two by two, i.e. 1 2-2 3-4 3, etc. These bands, which have specific tensile strength of 3,000 ... 10000 N/cm and widths up to 1300 mm, presents the following advantages over those with more inserts: au thickness less than at the same strength (6 ... 13 mm); eliminates flaking; have greater flexibility, both lengthwise and crosswise; rubber has better adhesion to such fabrics; have lower elongation; better resists the loads of percussion; the edges of the tape holds up better to wear; the maximum size of pieces of material that can be carried is a little

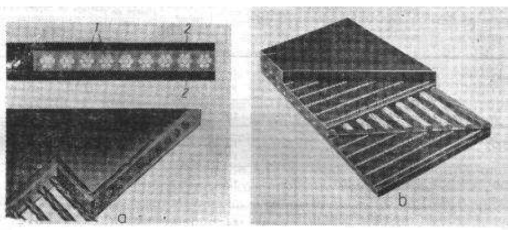


Fig. 2. Bands with steel-cord manufacturing indigenous; b-French manufacturing; 1-housing; 2-rubber face

Bigger than the other, for the same width thereof are cheaper. The downside is that these strips is achieved through the combination of hard heads and tape vulcanizing repair places heavily damaged. They are well-behaved in demountable joints.

The tapes are delivered to pieces with a few tens of meters up to 200 ... 300 m. their Merge cannot be concealed or break down into components.

Merge the tape

Dismountable joints are used at the usual stationary that conveyer is working or it shortens periodically, but it may also be used in stationary conveyor when there are conditions of vulcanization, or when the merge operation must be performed in a short time. They present the advantage of easy runs in 20 ... 60 minutes and without the need for any complicated equipment or even at all. Also allow for lengthening or shortening the band easy and quick fitting and fitting only, without a cut. The disadvantages of these systems are as follows: merge have little resistance (25 ... 60% of the breaking strength of the tape);

have low operating duration (1 ... 6 months); additional efforts to give dynamic crossing over rollers and drums; tires wear and intensifies notably drums; decreases the total force of friction between the band and drum drive; by Petty's material flows merge branch, leading to increased wear of the rubber on the front of the nonworking; the width of the tread appear uneven voltages, which leads to the lateral movement of the rollers; cleaning devices wear out quickly. All these drawbacks appear particularly at hinged joints fitted with mounting screws, although not advertised as special devices are required for other systems. The stationary conveyors, which are working at large intervals or shortens the time or not at all, merging is done mechanically or Do not remove by vulcanization. Merge is done through hot vulcanization (most commonly) or cold. Studded tape heads what is vulcanized cut as shown in Fig. 3. Merge what is done after fig. 3, he must not have deviations greater than 1 mm (compared to the thickness of the tread and provides a connection to a maximum strength equal strength minus a resistance tape sur face an radial beat as low. equal to that of the band, in turn leads to an increase in its thickness equal to a thickness of inserts, making them feel at the passing over of drums and rollers, which is why it is recommended to use the lanes with small number of inserts and the speed may not be great. The length of a flight of Lt. Cutting wooden inserts (fig. 3) is calculated according to the

$$S_{i\max} = S_d e^{\mu\theta}, \text{cm}$$

expression:

(1)

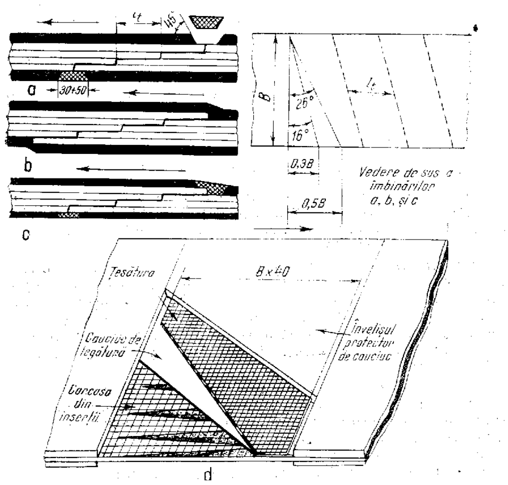


Fig. 3. Merge with bands through the vulcanization of the inserts ... c-joints with wooden inserts cutting steps (a-settlement level; b-settlement with marginal insertions superimposed; c-the two bands have different number of inserts); d-cut wedge inserts into housing.

In which: σ_{ti} is the resistance to tearing of a specific inserts, N/cm;
(resistance to loosening the adhesive force of shear (sliding), N/cm2, which has cotton insert value of 80 ... 100 N/cm2, and synthetic fiber insert 150 ... 220 N/cm2 (maximum amount take for inserts with very high resistance to breakage); k- coefficient for fatigue that takes into account the frequency of crossings over the drums and rollers and 1.6 (2 value (minimum value is taken for inserts with high tear resistance and in small numbers). The length of the steps most commonly recommended literature is:σ ri [N/cm]:

550 1000 1500 2000 3000 4000 6000
lt [mm]: 150 180 200 250 300 350 450

Automotive industry, recommends the following values for the length of a tiered approach: 200 mm for inserts PES/PA 125, 160 and 250 and 250 for VC/PA; 250 mm for inserts PES/PA 400; 350 mm for inserts PES/PA 630. Whereas the upper and lower gear take efforts far higher than those in the Middle, it is recommended that the two marginal increments to have length greater than 50% than the average resulting from the calculation. Going the length of the interior stairs shrinks, as inserts in the middle to have length less than your average resulting from the calculation, so as not to exceed the total calculated length of the connection. Angle of inclination of the cut-off of the diagonal steps towards transversal line bandwidth increases with the breaking strength of the tape, as in section perpendicular to the centerline of the tread may not be crossed more than two steps. For bands with inlays with little resistance to breakage, this tilt is recommended to be 16 ... 22 °, and for bands with inlays from artificial fibers (with very high resistance to breakage) 26 ... 30o.

4. Construction of the trail band conveyors

The main element of reels represents that depend on specific resistance to transport, of efforts and the specific energy consumption. The reels on the branch pipe can be filled (rigid) or with flexible shaft. Pipe rollers (fig. 4), which are most commonly used in practice, must be perfectly smooth surface and radial beat as low.

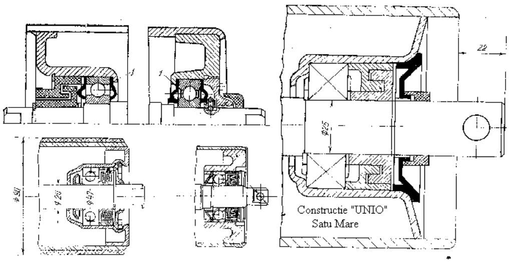


Fig 4. Pipe rollers 1-protective rings Niles spill switch lubricant leakage

In order to have as low resistance to motion and reduced tread wear, diameters should be selected depending on the material and the width of the Strip, as shown in table 1. The minimum diameter of the rollers is limited and depending on the speed of the tape as follows: 89 mm for v = 2 m/s; 108 mm for v = 1.5 m/s; 133 mm v = 3 m/s; 159 mm v = 4.0 m/s and v = 195 mm 5 m/s. Kinds of material Table Specifies the material loose, t/m3

Table 1 Diameters depending on the width of the Strip and the sorts of material

Kinds of material	Table Specifies the material loose, t/m3	Strip width, mm				
		800	1000	1200	1400 … 1800	1800 … 2000
Lightweight with low and medium particle size, medium size up to 60 mm and in general for coal	<0,8	89 108	108 133	133 159	133 159	159 194
With weight and size average particle size: average between 61 and 160 mm	0,8…1,6	133	133 159	159	159	194
Heavy, with granulometric average and in big chunks, average size greater than 100 mm	1,7…2,5	159	159	159	194	194

The reels on the empty branch, besides the tube with smooth surface, when the diameter varies between 89 and 133 mm, can be also from pipe or shaft mounted rubber rings or plastic with a diameter of 120 ... 160 mm or wrap a spiral. Against pipe rollers with smooth surface, these rollers have the advantage that they are lighter, cheaper and helps cleaning the Strip and transverse movements. To clean the entire surface of the tread, the discs are mounted on roll, with 12 ... 15 mm moved sideways toward the roller discs. Rollers with rib or helicoidally, which are wrapped in two halves reverse the meanings, pose the advantage that helps focus the Strip.

Winding angle of propeller should not exceed 3, 5o, whereas by increasing the angle of coiling above this value gets smaller training force and increases the wear Strip. The drawback of these rolls is that the ribbed disc screw grinding hard if they paste material, and if you don't spin webs, discs and through its edges form the bluntness that can carve out tape. When the ends of the rolls do not have a continuous smooth surface over a certain length, there is an intense wear of the tread due to lack of support. The reels on the empty branch will usually be mounted one, and the width of the Strip over 1,0 m, pipe rollers or discs are mounted and two with an angle of inclination of 10 ... 12 ºc, which assists the centering and tread stiffness, which reduces the transverse oscillations. The two rollers are mounted individually on a support or in rolls of rattles when on full branch are in rattles. The rollers can be mounted directly on the load or on the skeleton. Construction cutting data support or suspension systems, Musculoskeletal and conveyer rollers is conditional upon each other.

Skeletons conveyors can be divided into two groups: rigid frames and suspended from cables. Those in rigid frames can be divided into two sub-groups, namely: for stationary conveyors and conveyors for half stationary. Stationary conveyor frames (fig. 5) can have lower branch covered with metal sheet of 2 mm (transverse bracing for pass-band ripple) or plastic sheets; It runs from steel profiles, rolled or folded, have very solid construction from parts welded to each other what bolted assembles and mounts on concrete foundations, and more rarely on wooden sleepers.

These frames are posing most of the times the phone cables for signs, etc., and sometimes compressed air pipes and drinking water. On the lower branch conveyors with frames covered mounts three superiors always rolls of the same construction, which are interchangeable. Fixing the cutting data support must allow for adjusting their position perpendicular to the centerline of the tread in order to load centering.

Consideration on exploitation of tape conveyors

The main problems of exploiting the tape roller conveyors are set out below. The first condition of which depends on the functioning and obtaining a cost of transport as is choosing the right type and main parameters of spiral conveyor, depending on concrete conditions of exploitation. The cost of the tape which represents cca. 50% of the cost of the load, and maintenance expenses and relatively short life span of it, will cause the tape to be the determining factor in defining the scope of effective use of conveyors. Due to the large share of tape, and appreciably and eating affects transport costs, for a given, the cost of transporting one tonne of material increases approximately in proportion to the length of the conveyer, as shown in Fig. 6 (this is the field where the length exceeds 15 ... 20% of the maximum load).

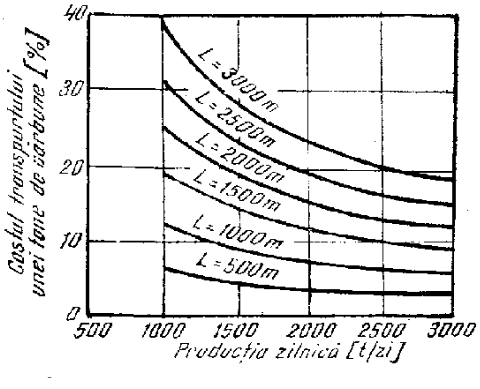


Fig. 6. Variaţia costului transportului unei tone, în funcţie de producţia zilnică transportată la diferite lungimi L şi o

functional you load refers to the band itself with its geometrical

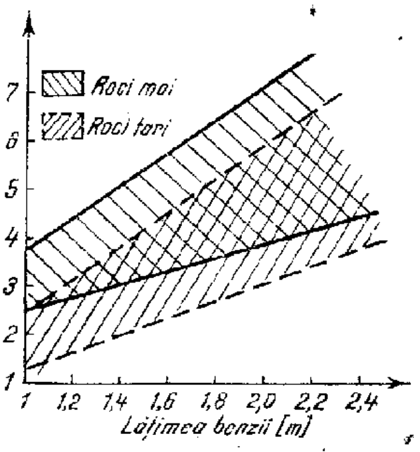


Fig. 7. Speed Strip fields depending on the width of the Strip

At the same time, with increasing slope for the same length of the conveyer, transport costs increase in extent (for example by increasing the incline at the cost of 15 ° to 8 ° one tonne increase with 25 ... 30%), and because the gradients up to 15°, the component of gravity affects movement opposes what able reduced energy consumption. Order share of the different forms of attrition, which lead to the removal of tape, is as follows:

- wear through abrasion of rubber coating on the top surface of the material pressure at the point of loading due to stroke the edges of borders for the centering of the material on the surface of the tread, and due to the passage of material rolls over on route;

- Aging and tearing pieces of rubber upper protective layer from the edge of the Strip due to the transition Strip with rollers and over load falling pieces of material to load; longitudinal breakage due to of a cyclic bending angle crossing over the rollers and falling pieces of material to load between two racks with rollers, making to concede and weft wires snapping wooden inserts;

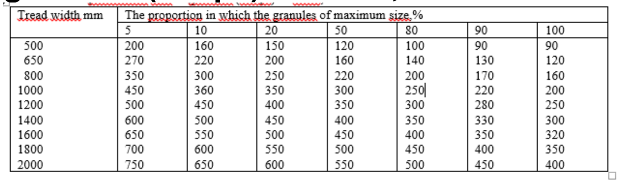
Wear through abrasion of rubber marginal strata due to the friction of the metal parts of the frames and the rolling tires baffles centering; piercing and tearing of the Strip due to accidental fall of some large pieces of material; wear through abrasion of rubber coating due to partial or full slips to tread on drums.

Where it is necessary to use a different type than the one indicated by the manufacturer in the technical plant to load, then choose which band should be checked from the point of view of the resistance, of how material is transported, the diameter of the drum, stretching system race etc. A very great influence on the cost of the transport of one tonne of material a daily production increase, which has carried influence increases with the length of the spiral conveyor (fig. 6). When carrier takes over the production of a slaughter, a flow must correspond to the maximum flow per minute cut by machine jackhammers. When carrier collects directly (without buffer silos) production from several abated, the flow is taken equal to 70 ... 80% of the debt amount per minute of workings (jackhammers cars). cylinders leads to the emergence of bottlenecks with the transport and impairing the work abated, and burners with oversized dimensions at operation under his nominal load capacity and increase the cost of transport.

In order to ensure a uniform load conveyors as marginal and collectors in order to ensure a certain degree of independence between the abated and the main transportation access, it is recommended that at the point of loading on carrier trucks collector to provide buffer silos. When charging points have long running and mining conditions (i.e. difference in level) allow, the silo-cylinders-buffer capacity depending on the size and degree of unevenness of the flow. At the bottom, rotating shall be fitted with a power supply that allows variation and maintaining a constant flow of food.

When the difference in level does not permit the construction of cylinders, use the horizontal buffer silos of metal construction, who at the bottom two belt conveyors scrapers. Main parameters, constructive and functional you load refers to the band itself with its geometrical parameters and resistance, what forces oppose motion tread material transported, the efforts from all points on the contour, the actuator power and its distribution on drumming, assurance of engines by transmitting signals efforts by friction without slipping on the tape drive drums as well as the parameters that ensure the normal operation of the conveyer, such as resistance to breakage and maximum tread arrow. A critical finding has chosen on rational values for width, and on the other hand the tape speed. Are presented in Figure 7 areas of variation of what speeds are recommended for the conveyor, depending on the width of the Strip and the rock. The minimum values are recommended for conveyor stationary, who works on the preparation conditions galleries underground and carrying heavy materials with large lumps, and maximum values for stationary conveyors bands very correctly fitted and well maintained working to the surface and when the material is not in big lumps versus the width of the Strip. For stationary conveyors on the main galleries and inclined planes working in good conditions of installation and maintenance, and when the material is not in big lumps, it is recommended that the average values in charts (when tilting the load is less than 8o speed may be increased by 10%). Choosing the right transport speed has particular importance. By increasing the speed reduces the required width of the Strip and strip, requiring effort with lower resistance to breakage. At the same time, when the band has high speed and low bandwidth, appear the following drawbacks: it reduces the transverse stability of the Strip, leading to the fall of the material; the tape comes out slightly sideways during loading and cross route; increases tread wear at the point of loading; increase the amount of dust. Standardized range of speeds in accordance with standards in force: 0.63; 0,8; 1; 1,25; 1.6; 2; 2.2; 2,5; 2.7; 3.15 permissible deviations with + 8% ...-4%. In practice, it was underground at speeds of 4 m/s and sometimes even more. The roller conveyors for the transport of personnel, and the speed is limited to 2.5 m/s, which is why, to many main conveyor the strips with width of 1600 mm for the flow. For a more precise correlation of bandwidth with maximum size of pieces of material it is recommended to use the values in table 2.

Table 2.
The maximum permissible size of granules (lumps) of amax, mm



Tread width mm	The proportion in which the granules of maximum size,%						
	5	10	20	50	80	90	100
500	200	160	150	120	100	90	90
650	270	220	200	160	140	130	120
800	350	300	250	220	200	170	160
1000	450	360	350	300	250	220	200
1200	500	450	400	350	300	280	250
1400	600	500	450	400	350	330	300
1600	650	550	500	450	400	350	320
1800	700	600	550	500	450	400	350
2000	750	650	600	550	500	450	400

The maximum permissible size of granules (lumps) of amax, mm

If the width of the tread does not comply with the maximum size of the pieces of fabric to choose a larger width of the Strip, but in this case must be reduced and the speed of transport in order to ensure a maximum load of the tape. Whereas the unsorted materials is difficult to set the maximum size of granules, amax, confines itself to the minimum width of belt conveyor to 0.8 m for work on the preparation and galleries to 1.0 m for those lines.

Conclusion

Using roller conveyors with the coal mines is a prerequisite for achieving with benefits performance parameters in the process of drawing. To achieve this aim, it is influenced by the level of conveyors and how to use the service. The band represents the most important subset of load considering just that represents up to 60-65% of the total expenditure of acquisition thereof. For this reason must be given particular attention both in terms of scope (taking into account the material transported and grit abrasiveness) as well as in terms of merging, centering yourself and laying. The establishment of efficient maintenance leads to an increase in the coefficient of use of conveyer, reduce expenditure, increasing the length of material, etc. From this point of view the use of rules.

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PROBLEMS AND NEW TRENDS IN CONSTRUCTION AND OPERATION EXCAVATION MACHINERY FROM THE QUARRIES OF LIGNITE

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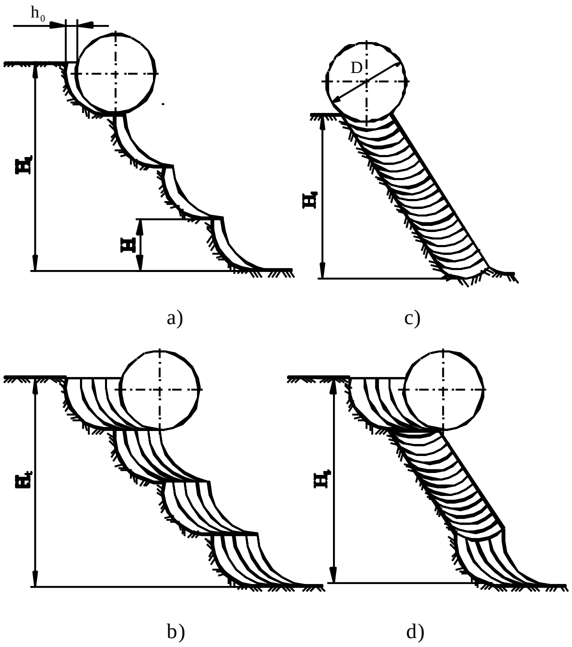
Abstract: Geometric and technological aspects of cutting rock with excavators, wheel portcupe, having dealt with extensively in the literature. Are studied and determined both graphically and through relationships of computing elements that define the cutting process. There are analyzed the elements of influence of process and of these interdependencies, being introduced new concepts and a suitable methodology for analysis. The problem of determining the capacity of the excavation, if the low-rotor is analyzed under various aspects, are defined and established relationships for the calculation of the theoretical excavation capacity, technique, and ability to return, per day, per month and per year.

Key words**: transport, optimizations, mechanics**

1. Analysis of the parameters of the cutting system-loading rotor for backhoes

Geometric and technological aspects of cutting rock with excavators, wheel portcupe, having dealt with extensively in the literature. Treaties, technical books, studies or post-graduate courses on indigenous and abroad in the field of mining to date deals on offshore technologies and methods for extracting and analyzing tips, envisage extensively their choice for concrete data. Thus, if the steps above work excavating plan vehicular excavator, there are four versions of the block shown in Figure 1.1, where he noted:



a) c)

b) d)

Figure 1.1. How to retrieve the block and

slices

Ht – height of the working stage, m;
h-the height of cut (a chip);
h0 – maximum thickness of şpanului, m;
D – diametrul de tăiere a rotorului, m.

Excavation can take place with individual vertical shavings (fig. 1.1), with multiple chips vertical (fig. 1.1), with wood horizontal (fig. 1.1) or combined (fig. 1.1). Besides if you can achieve vertical unit of height increment, experience has shown that in this case the specific energy consumption throughout the excavator and dynamic applications are minimal. The yield is higher in cases b and d towards a and c. in the case of stable, according to the literature, it is recommended to work with vertical multiple chips (case b).

In the case of classic low-rotor to be used within the C.N.L., "Oltenia" Miami-load cutting system is characterized by the following parameters:-cutting parameters; -cinematici parameters; -geometric parameters. Cutting parameters characterizing the process of chipping from the point of view of geometry unit (thickness, width, height) and energetically (specific resistance to cutting forces, specific energy consumption, power consumption, power required for cutting), which refers to teeth, cutting edge of the cups, and rotor. Cinematici parameters refers on the one hand the cups, and on the other hand the rotor. Those that refer to the Cup are: ω the angular velocity of the rotor speed cutting (peripheral to the Summit of treble) V_T.

Those who refer to the rotor are: the speed of the rotor, vp of the swivel angular swivel ωp, lifting-lowering speed vr arrow (arm), rotor speed vd of excavator. Geometric parameters refer to the arrow at the rotor, the rotor cups at the cutting edges of the cups and the teeth. The most important geometrical parameters, which refers to the cutting edge and the teeth are: shape, dimensions and positioning of the cutting edge, the dimensions of the tooth (the tooth of the cutting edge width, length, length, etc.), setting parameters of teeth, positioning angles. Cups are characterized mainly by the following parameters: volume, geometrical dimensions (length, height, width), the shape of the bucket, and the number of teeth on the bucket, Cup (open, closed, rigid bottom with elastic bottom, etc.), the way of mounting the rotor. Bucket wheel (impeller) has as main geometric parameters: diameter cutting (RADIUS R), measured at the Centre of the buckets, cutting edge number of CN's bucket rotor angular distance φ between cups. Analysis of cutting system-load, in addition to the parameters listed, you need to know:-characteristics of the rocks dislodged; -characteristics extraction technology.

The characteristics of the rocks of aşchiat are: cutting characteristics (resistance to cuts, specific cutting forces, penetration and lateral angle of breakage, the specific energy consumption, etc.), structural features (solder ability, fisuraţie, abrasion, etc.). Characteristics extraction technology are: operating parameters (excavation, line flow technological machinery, maintenance, organization, etc.), extracting parameters (dimensions, the dimensions of the slice extracts steps, angles of rotation of the rotor button, slope angles of the stairs and stair system, etc.). The technical data and the ascertainable through direct calculation are also cutting and technological features.

Table 1.1.

Nr. crt.	The name of the	The notation	Unit of measure
1.	The theoretical capacity of excavation	Q_T	m^3/h
2.	Volume buckets	V_c	m^3
3.	Cutting diameter (RADIUS) of the impeller	D(R)	m
4.	Number of downloads of the cups	z	s^{-1}
5.	The number of cups	n_c	buc.
6.	Slewing speed of upper deck	v_p	m/s
7.	Maximum step height	H_{tmax}	m
8.	Running speed	v_d	m/s
9.	Lifting speed of the rotor button	v_r	m/s
10.	Rated engine power actuator wheel-portcupe	P_N	kW
11.	Rated motor rotation mechanism	P_{Np}	kW

Quantifiable data from initial technical characteristics: the revolution of the wheel-portcupe

, n:

$$n = \frac{z}{n_c}, \qquad s^{-1} \qquad (1.1)$$

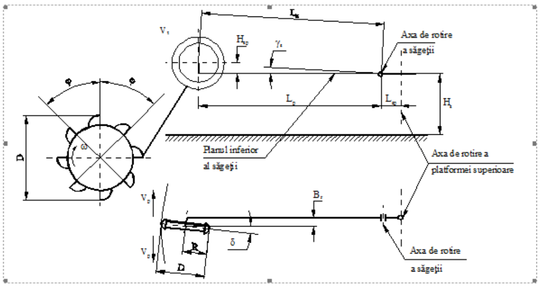


Figure 1.2. Kinematic and geometric data of the impeller and rotating mechanism

The angular velocity of the rotor, ω:

$$\omega = 2\pi\, n, \qquad s^{-1} \qquad (1.2)$$

Cutting speed (peripheral rotor)v_t:

$$v_t = R\, \omega, \qquad m/s \qquad (1.3)$$

The angular distance between the cups,φ:

$$\varphi = \frac{2\pi}{n_c}, \text{ rad}$$

or

$$\varphi = \frac{360^o}{n_c} \qquad (1.4)$$

Cycle time of emptying of the cups, ΔT, equal time scroll the distance between adjacent cups:

$$\Delta T = \frac{1}{z}, \qquad s \qquad (1.5)$$

$$\Delta T = \frac{\varphi}{\omega} = \frac{2\pi}{n_C \cdot \omega}, \qquad s \qquad (1.6)$$

Geometric characteristics of the location and mechanism of rotor rotation are shown in Figure 1.2. These features are necessary for determining the exact range of the swivel and swivel velocity in a certain position of the impeller extraction.

Outside data previously determined, in Figure 1.2, the following notations are used:

H_s – the height of the axis of rotation of the arrow towards the level of vehicular excavator, m;

L_{sp} – distance between the axis of rotation of the arrow and the axis of rotation of the upper deck, m;

L_p – the length of the swivel to the arrow, m;

H_{sp} – the distance between the Centre of rotation of the impeller and lower arrow plane, m;

B_r – the distance between the Centre of rotation of the impeller and the vertical plane of symmetry of the arrow, m;

δ -the angle between the longitudinal axis of the rotor and swivel axis of the arrow. The rotation movement of the arrow (rotor) occurs in the vertical lifting-descent, around the axis of rotation of the arrow when arrow swivel movement (rotor) takes place in the horizontal plane, around the axis of rotation of the upper deck. Regardless of the position of the two Planar excavator are perpendicular. It is advantageous, and energetic, as these planes to be upright, horizontal, respectively. Permissible deviation from vertical to horizontal, respectively, at most low is 2-3% longitudinal and transverse, which corresponds to an angle of 3.5 ... 4.5%.

Slewing radius of rotor in the vertical plane (lifting-lowering) represents the distance between the Centre of rotation of the rotor and the center of rotation of the arrow, as shown in Figure 1.2, IE is:

$$L_S = \frac{L_p}{\cos \gamma_S}, \qquad m \qquad (1.7)$$

where represents the angle between the γs mirror plane and the plane of the arrow

$$\text{, i.e.: } \gamma_S = \operatorname{arctg} \frac{H_{sp}}{L_p} \qquad (1.8)$$

The maximum radius of a rotor swivel represents the distance between the Centre of the pivot has the upper deck and the center of the cutting edge of the cups mounted on the rotor, which can be determined as shown in Figure 1.3. So the maximum slewing RADIUS will be approximately:

$$R_{p\max} = R + L_s + L_{sp}, \quad \text{m} \quad (1.9)$$

Slewing speed vp of rotor, including the minimum and maximum amount min vp vp max, determine the maximum slewing range Lp max. Depending on the position of the rotor (extracting various slices, such as those denoted by ①, ②, ③ and ④ in Figure 1.3, the slewing RADIUS changes. That's why speed swivel vp max calculated for the Lp, it should be corrected depending on the position of the rotor. The angular velocity of the swivel to upper deck is not influenced by the technology of work. This speed is adjustable between two limits and can be determined with minimum value:-relationship:

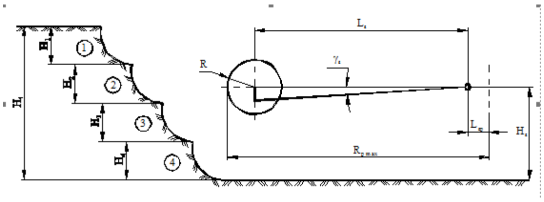


Figure 1.3. The maximum slewing RADIUS

$$\omega_{\min} = \frac{v_{p\min}}{L_{p\max}}, \quad \text{s}^{-1} \quad (1.10)$$

-maximum value:

$$\omega_{\max} = \frac{v_{p\max}}{L_{p\max}}, \quad \text{s}^{-1} \quad (1.11)$$

If the extraction steps, into slices when splinters cut are vertical at a height increment and once Ht in case of different heights of split H1, H2, H3, H4, slewing RADIUS and viteza the corresponding swivel can be determined, in accordance with the diagrams in Figure 1.4 (a, b, c, d), drawn up as an example for excavată gear into four slices. Sure, the relationships are generalizabile. Slewing RADIUS in the slice i can determine with relation:

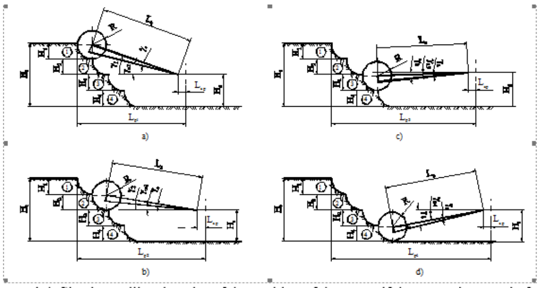


Figure 1.4. Slewing radii and angles of the position of the arrow if the extraction step in four slices

$$R_{pi} = R + L_{sp} + L_s \sin\gamma_i, \quad \text{m} \quad (12)$$

where γ_i represents the angle between the plane passing through the Centre of rotation of the impeller and the arrow, the slewing plane respectively, i.e.:

$$\gamma_i = \arcsin \frac{\left|H_{i+1} + H_{i+2} + H_{i+3} + R - H_s\right|}{L_s}, \qquad (1.13)$$

where: i = 1, 2, 3, 4, dar i+1; i+2; i+3 ≤ 4, Thus H = 0.

The maximum speed of the swivel in the slice i shall be determined by the relationship:

$$v_{p\max i} = R_{pi} \cdot \omega_{p\max}, \text{ m/s} \qquad (1.14)$$

Whether in relationship (1.13) the numerator is positive, $\gamma_i > 0$ and if:

$\gamma_i - \gamma_s > 0$ the arrow is tilted upwards (fig. 1.4, and 1.4,b)

$\gamma_i - \gamma_s = 0$ the arrow is in the horizontal position (see Figure 1.4,c)

$\gamma_i - \gamma_s < 0$ the arrow is tilted down (fig. 1.4,d)

Whether in relationship (1.13) numerator is negative,$\gamma_i < 0$ and the arrow is tilted down. Thus, so the angle between the plane of the lower arrow and slewing plane

γ_{si} will be:

$$\gamma_{si} = \gamma_i - \gamma_s \qquad (1.15)$$

as shown by the diagrams shown in Figure 1.4.

2. Conclusions

Specifically, the cases studied in the plight of those two careers and excavators, it follows that both Roşiuţa, lignite of and grey clay at specific resistance Lupoaia cutting were higher than the limits of the Ke1, where it appears that the conditions will be both a backhoe to power close to that, but with diminished flow against rated flow, as shown by the figures 1.10 and 1.11. Hence it follows that the two cases analyzed can form the basis for the implementation of an automated equipment command and control operation system of cutting load, so as to achieve a great thing for both the excavator and the entire plant.

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DETERMINATION OF PARAMETERS OF MACHINING ROTOR AT BACKHOES

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Abstract The problem of determining the capacity of the excavation, if the low-rotor is analyzed under various aspects, are defined and established relationships for the calculation of the theoretical excavation capacity, technique, and ability to return, per day, per month and per year. This approach allows an efficient and complete analysis of the capacity of the excavation, degajându and ways to improve this parameter in terms of work.

Key words: **transport, optimizations, mechanics**

1.Introduction

For determining the parameters of machining is necessary to know the technology and working procedure of the main draw. In general, the most advanced technology used is based on extracting the steps above vehicular level excavator in slices, with wood vertical (see Figure 1.1). In this case the cutting is carried out mainly by combining rotational movement of the impeller and the swivel movement (rotation) of the upper deck of the excavator. Thus, the tip of the cups mounted on a rotor trajectory in the form of helical, placed on the surface of •separate toroidal created . The volume occupied by a sliver in the space segment actually represents a toroidal. Its main dimensions are:

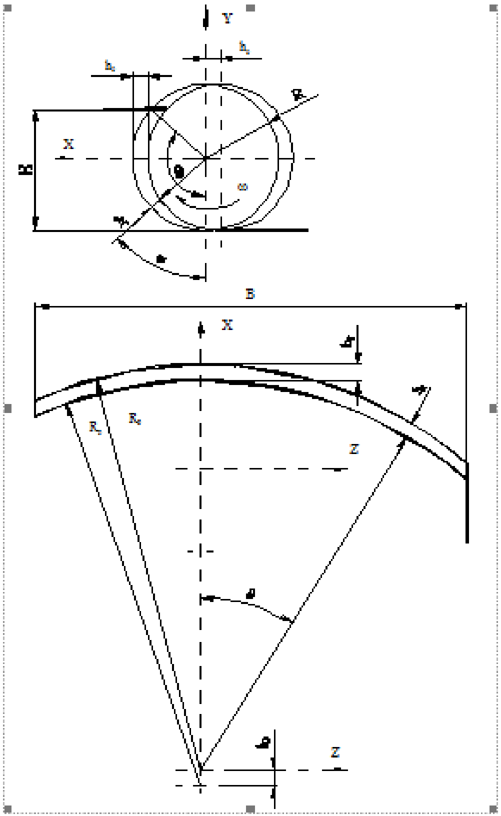

Figure 1.1. Chip parameters determination

-height H, corresponding to the height of the slice extracts, m; -width B is exactly the width of the block extracted; -slewing plane has arrow has an arc of a circle with RADIUS, slewing as described R_p, m;

-in the plane perpendicular to the plane of the pivot has an arc of a circle whose RADIUS is described Cup by cutting of the impeller, m R. Parameters of machining rotor and buckets are you presented in figs. 1.1and 1.2 in a coordinate system
X-Y-Z.

The most important parameters are: the Cup-chip thickness h, m;
-chip width, b, I;
-cross-sectional surface of the chip,
St. -position angle α of the cups.

Parameters that refer to wheel-portcupe are:-cutting height H of the bucket wheel which coincides with the height of șpanului, m; -turning angle (between the impeller and the massive) AA; the angle θ position of the impeller

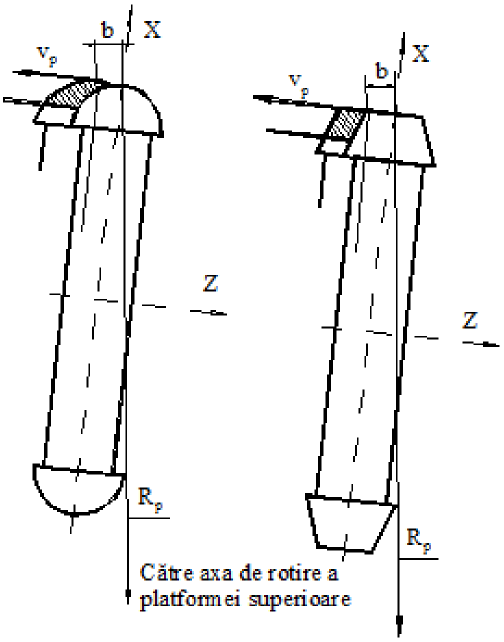

Figura 1.2. Determination of the width of the chip

n the width of the block excavated.

Analyzing the process of chipping it appears that both the plan and swivel in the sweep of the impeller there are an infinity of cutting planes. Basic parameters of rotor and buckets are reported to the two "principal planes": turning-horizontal plane (X-Y, as shown in Figure 1.5) that passes through the axis of rotation of the impeller and through the axis of the pivot of the upper deck; -vertical plane (X-Z, as shown in Figure 1.5) is perpendicular to the horizontal axis and passes through the upper deck of the swivel in the direction of vehicular excavator.

Chip thickness is variable in both main cutting plans, taking values in the range [0, ho]. In the vertical plane main chipping chip thickness in a certain position of the Cup, can be determined as follows:

$$h_i = h_0 \sin\alpha \quad , \quad m \qquad (1.1)$$

where α represents the angle position of the axis OY, as shown in Figure 1.5. In the main horizontal machining chip thickness in a certain position of the Cup is expressed as follows:

$$h_j = h_0 \cos\theta \quad , \quad m \qquad (1.2)$$

where θ represents angle of the position of the OX axis, as shown in Figure 1.5.
In a certain position on the surface of the Cup is described by •separate toroidal combining the two main movements (tilt and pivot) the thickness of the chip will be given by the relationship:

$$h_{ij} = h_0 \sin\alpha \cdot \cos\theta \quad , \quad m \quad (1.3)$$

Chip width is defined in the main horizontal plane. Represents the distance between adjacent cups that are moving and are going through this plan. This is changing with the slewing speed v_p, According to the relationship:

$$b = v_p \cdot \Delta T = \frac{v_p}{z} \quad , \quad m \qquad (1.4)$$

The maximum width of the chip is:

$$b_{max} = v_{p\,max} \cdot \Delta T = \frac{v_{p\,max}}{z}, \qquad m \qquad (1.5)$$

Cross-sectional area of chip depends on its thickness and width:

$$S_t = h \cdot b, \qquad m^2 \qquad (1.6)$$

For determining the characteristics of strength and energy, respectively, for the constructive parameters determination you need cups and teeth is to know the parameters of the excavation you impeller. These parameters are defined in the main cutting planes defined above. In the vertical plane of cutting excavation parameters are represented in Figure 1.1, and in the horizontal plane in Figure 1.4 .

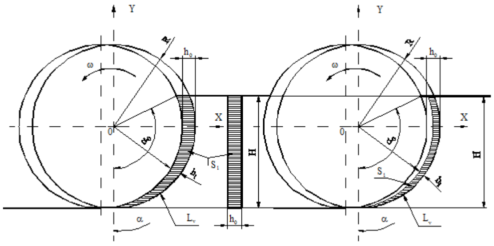

Figura 1.3. Parametrii de excavare în planul principal vertical

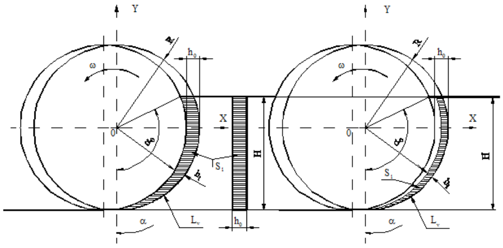

Figura 1.4. parametrii de excavare în planul principal orizontal

To characterize the main vertical cutting plan to introduce notions:

α_o – cutting angle, rad;

L_v – road of hearts in touch with a rotation of the massif of the rotor, m;

S_l – longitudinal section of the chip surface, m2.

Cutting angle (between the impeller and the material) can be determined with the relation:

$$\alpha_o = \arccos\left(1 - \frac{H}{R}\right) \qquad (1.7)$$

Road to a cup rotating in contact with massif, is determined by the relationship:

$$L_v = R\,\alpha_o, \qquad m \qquad (1.8)$$

Cross-sectional area of the chip will be:

$$S_l = H \cdot h_o, \qquad m^2 \qquad (1.9)$$

In Figure 1.1 it appears that chip's surface is equal to the actual area of the rectangle with sides h_o and H, the chip surface equivalent thickness constant hm that represents in fact the average chip thickness. From the geometric conditions one can write

:

$$S_l = Hh_o = L_v h_m, \qquad m^2 \quad (1.10)$$

that is to say:

$$h_m = h_o \frac{H}{L_v} = h_o \frac{1-\cos\alpha_o}{\alpha_o}, \qquad m$$

(1.11)

When the rotor rotates in a vertical plane, which has a front angle θ from the vertical plane main cutting, then you can write the average thickness of the chip:

$$h_m = h_o \frac{1-\cos\alpha_o}{\alpha_o} \cdot \cos\theta, \quad m$$

(1.12)

The average cross-sectional area of chip stems from the relationship (1.1):

$$S_{tm} = h_m \cdot b = h_o \cdot \frac{1-\cos\alpha_o}{\alpha_o} \cdot \frac{v_p}{z},$$

$$m^2 \qquad (1.13)$$

Considering the known width of the block what some with a backhoe, which is constant regardless of the charity in which it excavates at some point, it will take the portion of the existing front line and the vertical plane main cutting the block on the left, and the main portion of the plane and the front line newly created the block on the right.

They will have the width of B_S, respectively B_D and thus may be expressed:

$$B_D = R_p \sin \theta_D, \quad m \qquad (1.14)$$

$$B_S = B - B_D, \quad m \qquad (1.15)$$

Slewing angle corresponding to the left θ_s, the maximum θ_S, slewing angle respectively θ_d, the maximum θ_D shall be determined by the relations:

$$\theta_S = \arcsin \frac{B_S}{R_p} \qquad (1.16)$$

$$\theta_D = \arcsin \frac{B_D}{R_p} \qquad (1.17)$$

The total angle of swivel will be:

$$\sum\theta = \theta_S + \theta_D \qquad (1.18)$$

Road to the Cup a complete swivel will be:

$$L_H = R_p \cdot \sum\theta \qquad (1.19)$$

Cross-sectional area S_h the chip in the main horizontal cutting plane (see Figure 1.1) is determined by the relationship:

$$S_h = h_o \cdot B, \quad m^2 \qquad (1.20)$$

Geometrically, this surface can be written depending on the thickness of the average chip varying in horizontal plane (h_{jm}) and the road of hearts (L_H maximum thickness) of the chip (h_o) and the width of the block (B), thus:

$$S_h = h_o \cdot B = L_H \cdot h_{jm}, \quad m^2 \qquad (1.21)$$

whence:

$$h_{jm} = h_o \frac{B}{L_H} = h_o \frac{\sin\theta_D + \sin\theta_S}{\theta_D + \theta_S}, \quad m \qquad (1.22)$$

The angle position of the environment follows so as follows:

$$\theta_m = \arccos \frac{h_{jm}}{h_o}, \quad rad \qquad (1.23)$$

2. Capacity analysis of excavation

In the case of low action continues to define the different capabilities of the excavation, such as theoretical capacity, technical ability, capability, capacity, capability Exchange per day, per month and per year of excavation. The theoretical basis is the ability of the excavation, which is determined by the relationship:

$$Q_T = 3600 V_c \cdot z, \quad m^3/h \qquad (1.24)$$

Relationship (1.24) is valid for the case when they are perfectly filled cups, filling coefficient $k_u = 1$, for the case when during excavating no disturbance which involved to delay the process of excavation. Capacity is determined in m3 afânaţi. The technical capacity of excavation considering real coefficient of filling

$k_u < 1$ and raising coefficient $k_a > 1$, that is to say:

$$Q_t = Q_T \frac{k_u}{k_a}, \quad m^3/h \quad (1.25)$$

Both k_u and k_a are determinabili through direct measurements on samples. This flow

Q_t falls below the maximum value where

:-the power required to drive the rotor exceeds the rated wattage;

-the power required to drive the rotation mechanism (swivel) exceeds the rated wattage;

-slewing speed required is greater than the maximum slewing speed excavator;

-restrict themselves to the thickness or width of the chip dislodged.

Momentary capacity of excavation Q_m can be calculated according to the volume V_a the chip dislodged from the Cup:

$$Q_m = 3600 V_a \cdot z, \quad m^3/h \quad (1.26)$$

This value represents an average excavation cycle. Chip volume results from the relation:

$$V_a = H h_o b, \quad m^3 \quad (1.27)$$

When the rotor cut into horizontal plane cutting principal. Any cutting plane located at the angle θ at the main volume şpanului is given by the relationship:

$$V_a(\theta) = H \cdot h_j(\theta) \cdot b(\theta), \quad m^3 \quad (1.28)$$

Such a relationship (1.26) becomes:

$$Q_m = 3600 \cdot H \cdot h_o \cdot b \cdot z, \quad m^3/h \quad (1.29)$$

When $\theta = 0$
And

$$Q_m(\theta) = 3600 \cdot H \cdot h_o \cdot \cos\theta \cdot v_p(\theta) \quad (1.30)$$

knowing that:

$$b = \frac{v_p}{z}, \ m.$$

Slewing speed in any other plan, towards the main cutting plane is given by the law of cosines:

$$v_p(\theta) = \frac{v_p}{\cos\theta}, \quad m/s \quad (1.31)$$

Taking into account this can calculate slewing angle limit θ_L over cutting capacity no longer is constant, but decreases with increasing $\theta > \theta_L$ to zero for $\theta = 90^o$.

The relationship is:

$$\theta_L = \arccos \frac{v_p}{v_{p\,max}}, \quad rad \quad (1.32)$$

Hence the dimensions of the excavated block must be determined so as not to excavate with slewing angle θ over the limit value θ_L.

Momentary capacity excavation may be expressed according to the average surface cross sections of Tsi cut cups of wood chips that are in contact with the mountain at one time. Thus one can write:

$$Q_m = 3600 \sum_{i=1}^{n_{ca}} S_{ti} \cdot v_t, \quad m^3/h \quad (1.33)$$

where n_{ca} the number of active cups at a time, i.e.:

$$n_{ca} = n_c \frac{\alpha_o}{2\pi}, \qquad \text{buc} \qquad (1.34)$$

and

$$\sum_{i=1}^{n_{ca}} S_{ti} = n_c \frac{\alpha_o}{2\pi} h_o \frac{1-\cos\alpha_o}{\alpha_o} \cos\theta \frac{v_p(\theta)}{z}, \qquad \text{m}^2 \qquad (1.35)$$

Such a relationship (1.35):

$$Q_m = 3600 n_c \cdot \frac{h_o}{2\pi}\left(1-\cos\alpha_o\right)\cdot\cos\theta\cdot\frac{v_p(\theta)}{z} v_t, \qquad \text{m}^3\text{/h} \qquad (1.36)$$

where the flow rate is given in m3/hour solid.

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12. DAN VISALON Actionari electromecanice

13. CAROL ZOLLER, ION FOTAU MIRCEA RÎŞTEIU, LEON PANĂ Using vee pro6 software to control the Quality of energy in to the electrical power Networks

UTILIZAREA MICROCONTROLERULUI PIC16F877 IN APLICATII INDUSTRIALE

Antonie Nicolae, *"Constantin Brâncuşi"* University from Târgu Jiu
Borcosi Ilie, *"Constantin Brâncuşi"* University from Târgu Jiu
Adrian Runceanu, *"Constantin Brâncuşi"* University from Târgu Jiu

ABSTRACT. In this paper we present the development of a real timer clock with a DS1307 circuit, this system built around a core type PIC16F877A microcontroller.

The description of development PIC16F877A

The PIC16F877A Microcontroller is part of the 8-bit PIC microcontrollers family, has a complex internal structure, is able to acquire analog signals having constituted an analog-digital 10-bit, can generate PWM signals, can communicate with external devices lends itself particularly well in industrial applications.

High-Performance RISC CPU:
- Only 35 single-word instructions to learn
- All single-cycle instructions except for program branches, which are two-cycle
- Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle
- Up to 8K x 14 words of Flash Program Memory,
- Up to 368 x 8 bytes of Data Memory (RAM),
- Up to 256 x 8 bytes of EEPROM Data Memory
- Pinout compatible to other 28-pin or 40/44-pin PIC16CXXX and PIC16FXXX microcontrollers.

It presents five bidirectional ports configurable for use by installation and can be used in very complex applications.

In the next figure shown pin assignment of PIC16F877A microcontroller.

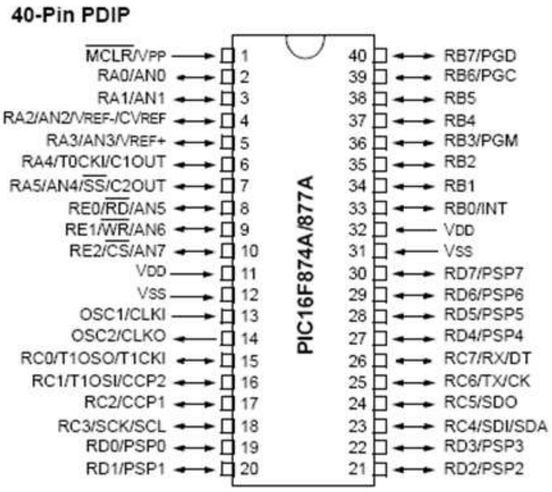


Fig. 1. Pin diagrams of PIC 16F877A

In this paper we propose creation a industrial clock application of PIC16F877A microcontroller.

The block diagram of industrial real-time clock shown in the next figure.

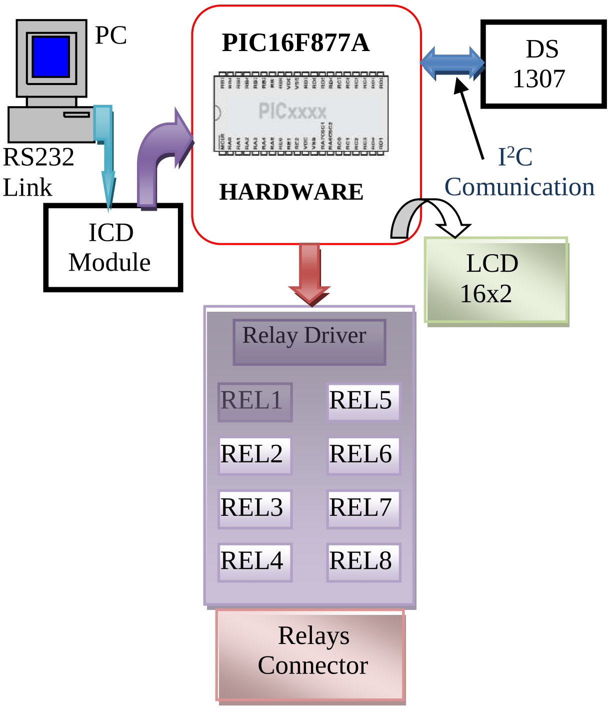


Fig. 2. Block diagram of industrial real-time clock

Some the features of this assembly we mention:
- It has 32 possible alarm set for 8 relay, but they can be extended;
- A 16x2 alphanumeric display and 5 buttons for interfacing with the user;
- Time management is done using specialized circuit DS1307 and storage data on alarm settings is in the internal EEPROM memory of the PIC16F877A microcontroller.

DS1307 is Dallas Semiconductor’s serial RTC IC, that can provide full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM.

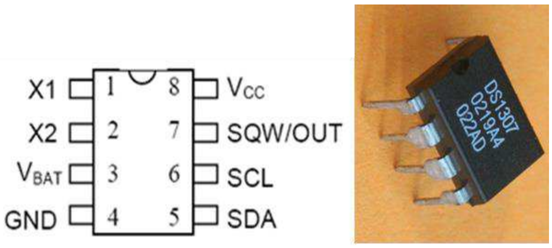
Address and data clock are transferred serially via a 2-wire, bi-directional bus.

Clock operates in either 24-hours or 12-hours format with AM/PM indicator.

DS1307 has built-in power sense circuit that detects power failures and automatically switches to battery supply mode.

This feature makes the circuit very used in real time applications, especially in industrial applications.

In the next figure shown pin assignment of DS1307 RTC.



VCC: Primary Power Supply
GND: Ground
VBAT: +3V Battery Input
SDA: I2C Serial Data
SCL: I2C Serial Clock
SQW/OUT: Square Wave/Output Driver
X1, X2: 32.768 kHz Crystal Connection

Fig. 2. Pin assignment of DS1307 RTC

I^{2}C (Inter-IC Communication) was developed by Phillips Semiconductor and is that data transfer uses only two wires, that are SDA (Serial Data line) and SCL (Serial Clock line).

I2C Bus must be controlled by a master device, in this case the PIC16F877A microcontroller, that generates the serial clock (SCL), control bus access, and generates the START and STOP condition.

DS1307 operates as a slave device on the serial bus and are controlled by master device (PIC 16F877A microcontroller).

The following figure shows the typical mode of connecting a DS1307 circuit on I2C bus, using 2-wire protocol.

When using more than one device in the bus slave, slave can be connected to the bus parallely, every slave communication can be separate by slave address byte will be sent after start condition.

In the next figure shown DS1307 and microcontroller I2C connection.

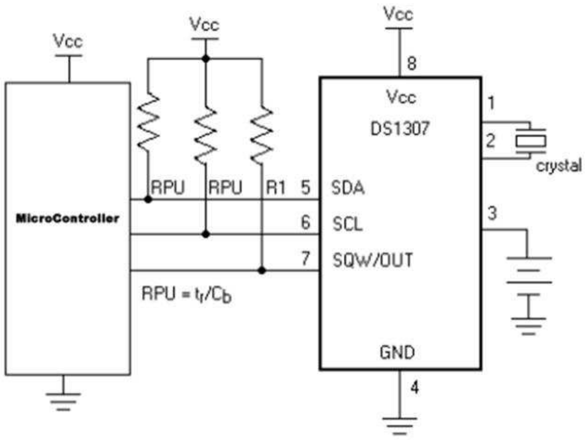


Fig. 3. DS1307 and microcontroller I^{2}C connection

The I2C protocol is based on two important rules:

- Data transfer is initialized only when bus, is not busy;
- During data transfer, data line must remain stable whenever the clock line is the HIGH level.

Changes in the data line when the clock line is high level, is interpreted as control signals.

Next figure presented data transfer protocol I2C bus.

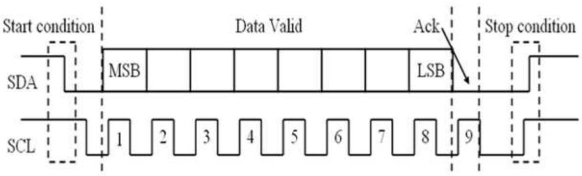


Fig. 4. I^{2}C protocol

Each data transfer begins with START condition and ends with STOP condition.

Number of data byte transferred between START and STOP are not limited, and is determined by the master device (in this case is determined by the PIC16F877A microcontroller).

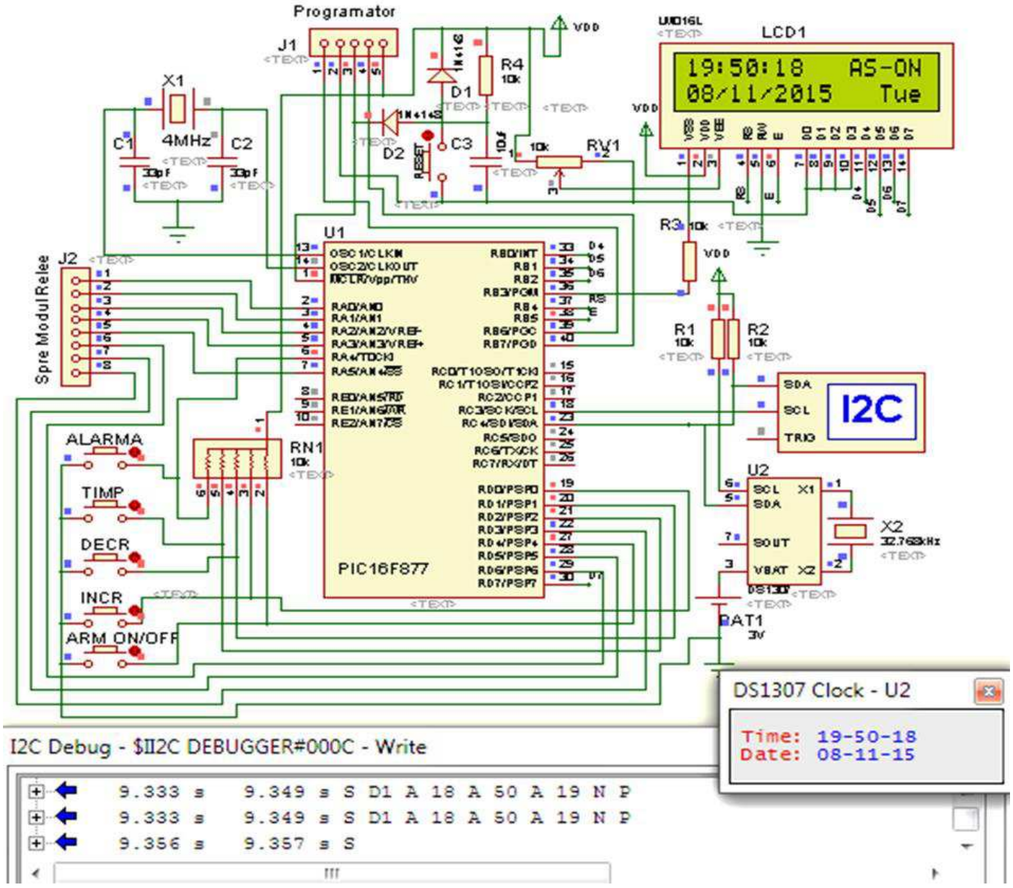
All these signals are processed by the microcontroller through the program written in his memory.

The program code running in the microcontroller is developed using the environment MPLAB programming, by which to generate hex file that is programmed into the microcontroller.

Testing program before operating the electronic device for viewing smooth operation is done in the ISIS Proteus development environment specialized in working with microcontrollers.

In the 5 figure shows the result of testing ISIS PROTEUS and hence proper functioning of electronic scheme and data transmitted via the I^{2}C interface to the DS1307 and PIC16F877A microcontroller.

Setting the alarm is done using buttons on the D port of microcontroller and data display is via a 16x2 LCD placed on port B of PIC16F877A microcontroller.



I2C Debug - $II2C DEBUGGER#000C - Write

```
9.333 s    9.349 s S D1 A 18 A 50 A 19 N P
9.333 s    9.349 s S D1 A 18 A 50 A 19 N P
9.356 s    9.357 s S
```

DS1307 Clock - U2

```
Time: 19-50-18
Date: 08-11-15
```

Fig. 5. Electronic scheme simulated in ISIS PROTEUS

In the 6 figure shows the result of testing ISIS PROTEUS functioning relays block (digital outputs) one of the ports connected to the microcontroller.

To generate digital outputs for process control using a module that is designed to take digital signals from port configured to generate digital outputs of microcontroller.

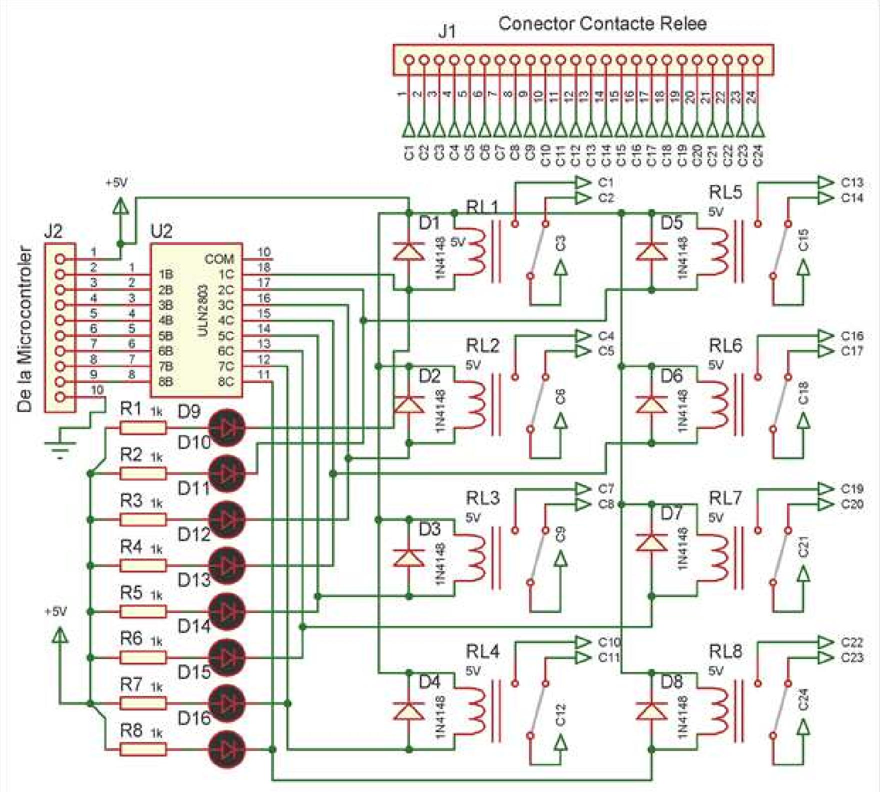


Fig. 6. Digital outputs

Digital signals from microcontroller port are taken ULN2803 chip, which functions as driver circuit for the eight relays connected to the outputs.

Connecting to the core microcontroller module is achieved through J2 connector and relay contacts can be found on J1 connector.

CONCLUSIONS

The complexity of developing such a system does not stop here, it may be extended depending on the requirements and complexity of technological devices that must be managed. By simply removal in the external using connector of the microcontroller port, we can expand the applications that can be achieved through the platform and the possibilities, and not only, of serial communication such microcontrollers with a process computer or other such devices to be increasingly used in complex industrial applications, etc.

An important advantage of the application submitted is the discounted price of made and flexibility.

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Section

Environmental Engineering

THE STUDY OF QUALITY INDICATORS OF WASTEWATERS IN DRĂGUŢEŞTI LOCALITY

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ABSTRACT: Water is a vulnerable resource to human activity, because of that the water is subjected to a strong degradation process with great consequences to humans and to the enviroment. This paper presents the *quality indicators of wastewaters from Drăguţeşti locality. The physical*-chemical indicators were drawn from quality of wastewater, biochemical oxygen demand, chemical oxygen demand, total suspended matter, fixed residue, ammonia nitrogen and total phosphorus. The increased value of ammonia nitrogen from the samples of the treatment station indicates a malfunction of the biological stage (insufficient oxygen to oxidize organic matter).

KEY WORDS: wastewaters, quality indicators, treatment station

1. INTRODUCTION

Water is a vital element to life and society, due to the fact that is an important factor in activities that produce energy, in transport routes, in aquaculture and in recreation and watersports. The alarming rate of depletion of these resources is a matter of analysis and reflection at national level but also at world level,[1-3] to solve this problem it is required a joint effort from scientists everywhere and policymakers.

The complex nature of water management involving different sectors of society and economy requires cooperation and coordination of actions among those who have duty to administer water. Practic efforts of all stakeholders should focus the use, development and protection of resources waterin a fair and reasonable way, is by applying the concept of sustainable water management. Drăguţeşti locality is located in the Oltenia region, in the south-west part of Romanaia, in Gorj County, being located at the border of Parâng mountains, from the Carpathian mountainous chain. Parallel 45 croses the northern border of Drăguţeşti commune, which is known as a large commune, which is known as a large commune in surface, with plains and hillocks. The water flow in which the residual waters treated in the treatment station are discharged in Amaradia brook. This is affluent of Jiu river on the left side , the confluence being in Drăguţeşti locality.

The land on which the treatment station is build is in Drăguţeşti commune, approximately 100 meters from the nearest house. Building this treatment station provides the quality of Amaradia brook waters. Sanitary waste that is collected by the sewerage network and is transported to the treatment station comes from the following sources:

- domestic wastewater resulted from the needs of individual houses;
- domestic wastewater resulted from the needs of the public institution;
- wastewater from economic activies in the area(catering, trade, industry etc.)

Since the locality Nou-Iaşi, commune Drăguţeşti is having a sewage network from over 20 years, the treatment station is inoperable and undersized for the needs of the village, with SAPARD FUND it was build a new sewage network and a new treatment station. The treatment station consists of the following main parts:

- Mechaninc grating;
- Sand clearing basin- fat separator;
- Electromangetic flow meter;
- Equalling and pumping basin;
- Compact treatment unit N2-Resetivols compact treatment unit

In figure 1 it is shown an overview of the treatment unit N2-Resetilvos .

Fig.1. Treatment unit N2-Resetilvos.

Technical parameters of treatment unit N2 purge unit – Resetilovs

Capacity:

- Every day 120 m^3/day
- Per hour calculated 4,7 m^3/day
- Up to 8,3 m^3 per hour/day

Compact treatment unit N2 - Resetilovs consists of the following components: primary clarifier, aeration basin, secondary clarifier and ultraviolet disinfection plant. Applying the solution treatment using compact unit N2 - Resetilovs has the following advantage: ensure the degree of purification necessary, in compliance with the quality requirements imposed by NTPA 001-2002, thanks to advanced technological process the excess sludge is not discharged, leading to the elimination of costs related to its treatment and reduced energy consumption. Ultraviolet disinfection has an advantage over chlorination solution ,disinfection facility provides up to 99 % efficiency on the reduction of total coliforms.

N2 purge unit - Resetilovs, reaches in a few days it’s optimum operating conditions , even in the case of longer interruptions wastewater.

Automation station leads to reliability and reduced operating staff. Domestic wastewater that is discharged into the brook Amaradia must meet the quality requirements set out in NTPA 001/2002.

There is constant monitoring from Gorj Water Management System for the treatment plant in operation. The beneficiary is obliged to observe the operating instructions and provided by suppliers in the technical unit N2 purge - Resetilovs.

2. EXPERIMENTAL PART

The physic-chemical and biological indicators of wastewater were drawn from the town Drăguţeşti. pH was determined using a pH meter Hanna and to determine total suspended material was used the gravimatrica method. The consumption of biochemical oxygen was determined using the Winkler method. The consumption of oxygen was determined by titration with ammonia with $K_2Cr_2O_7$. The nitrogen was determined fotocolorimetric and the total phosphorus was determined spectro-photometrically.

3. RESULTS AND DISCUSSION

The results of physical-chemical indicators determinations from 2012-2014 are presented in Table1-7 and Table 9.

Interpretation of results is under the Ministry of Environment and Water Order no. 161/2006 approving the Norms regarding the classification of surface water in order to determine the environmental status of watercourses.

According to this law, good chemical status of water is reached where all the quality indicators that characterize standards the fall in chemical water quality.

For specific values pursued quality classes according to the Order 161/2006 attempts are the Table 8.

Table 1. Variation of pH from period 2012-2014.

Determination	Month	Year					
		2014		2013		2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
pH	January	7,84	7,71	7,33	7,66	7,82	7,62
	February	8,1	8,04	7,58	7,33	7,79	7,59
	March	7,43	7,76	7,43	7,89	7,65	7,45
	April	7,70	8,09	8,02	8,16	7,66	7,46
	May	7,58	7,44	8,36	8,04	-	-
	June	8,20	8,06	7,65	8,10	-	-
	July	7,06	7,83	7,13	7,00	-	-
	August	7,70	7,18	7,14	8,23	-	-
	September	7,86	7,58	6,99	7,50	-	-
	October	7,34	7,66	7,37	8,10	-	-
	November	8,02	7,43	7,45	7,94	-	-
	December	8,12	7,92	7,49	8,05	-	-
	Average	**7,37**	**7,72**	**7,49**	**7,83**	**7,73**	**7,53**

Table 2. Variation of total suspension matters.

Determination	Month	Year					
		2014		2013		2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
Total suspension matters	January	79	61	70	61	58	46
	February	68	76	84	73	66	53
	March	88	83	79	62	70	57
	April	106	95	66	58	78	60
	May	92	66	72	65	-	-
	June	82	58	62	46	-	-
	July	123	74	94	58	-	-
	August	88	85	86	65	-	-
	September	79	72	98	64	-	-
	October	66	62	83	65	-	-
	November	71	58	71	58	-	-
	December	63	65	61	50	-	-
	Average	**83,75**	**71,25**	**77,16**	**60,41**	**68**	**54**

Table 3. Variation CBO_5 from period 2012-2014.

Determination	Month	Year					
		2014		2013		2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
CBO_5	January	58,2	54,1	53,4	28,1	32,3	24,8
	Februay	38,6	40,2	61,8	30,6	41,6	26,2
	March	55,25	54,75	67,4	25,3	43,2	28,5
	April	63,0	53,0	60,1	17,20	44,6	21,2
	May	118,2	110,0	53,2	22,60	-	-
	June	68,0	46,2	68,4	10,20	-	-
	July	54,3	52,6	59,8	16,40	-	-
	August	37,7	34,8	100,0	15,0	-	-
	September	61,4	44,6	88,4	12,8	-	-

	October	68,3	55,3	60,8	23,7	-	-
	November	53,2	28,9	50,0	24,2	-	-
	December	51,6	38,7	38,7	21,1	-	-
	Average	**55,39**	**51,09**	**63,5**	**20,6**	**40,42**	**25,17**

Table 4. Variation CCOCr from period 2012-2014.

Determi-nation	Month	Year					
		2014	2013			2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
CCOCr	January	91,26	74,59	90,6	52,8	70,82	56,08
	February	82,68	72,04	88,42	51,2	82,56	60,23
	March	92,06	88,77	108,0	56,1	96,50	73,18
	April	99,70	84,90	103,59	45,04	78,32	62,84
	May	192,3	178,8	90,57	40,75	-	-
	June	114,75	78,24	153,40	44,50	-	-
	July	98,6	91,3	99,70	24,90	-	-
	August	66,57	78,32	148,51	38,10	-	-
	September	86,2	73,56	163,97	20,50	-	-
	October	77,3	62,50	106,67	39,51	-	-
	November	89,7	71,18	86,69	46,44	-	-
	December	93,5	70,56	60,0	32,0	-	-
	Average	**98,71**	**85,39**	**108,34**	**40,98**	**82,05**	**63,08**

Table 5. Variation of $N\text{-}NH_4^+$.

Determi-nation	Month	Year					
		2014		2013		2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstrea m
$N\text{-}NH_4$	January	18,9	16,6	20,65	10,26	28,16	17,02
	Februariy	16,13	18,22	28,36	12,54	30,24	17,67
	March	36,32	27,4	36,2	18,28	24,15	13,46
	April	26,76	16,9	16,96	11,4	26,18	10,20
	May	38,95	44,6	19,20	13,15	-	-
	June	52,42	44,79	12,22	12,0	-	-
	July	33,45	29,30	26,10	13,73	-	-
	August	23,85	16,46	17,2	12,45	-	-
	September	42,3	36,20	17,0	13,48	-	-
	October	38,5	25,20	25,3	14,82	-	-
	November	28,9	20,60	19,7	13,48	-	-
	December	20,62	18,20	14,7	10,7	-	-
	Average	**31,42**	**26,19**	**21,13**	**13,02**	**27,18**	**14,58**

Table 6. Variation of P_{total}

Determi-nation	Month	Year					
		2014		2013		2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
P_{total}	January	2,24	1,98	1,84	1,38	1,02	0,68
	February	1,88	1,50	2,08	1,46	2,34	1,86
	March	2,54	1,90	2,11	1,35	1,54	0,92
	April	2,14	1,82	1,77	1,22	2,18	1,74
	May	4,16	3,24	1,84	1,35	-	-
	June	7,12	5,58	1,55	0,52	-	-
	July	4,64	3,82	0,82	2,83	-	-

	August	2,54	1,76	1,91	0,37	-	-
	September	2,96	2,11	1,82	0,85	-	-
	October	2,34	1,72	2,53	0,65	-	-
	November	2,42	1,86	1,82	0,22	-	-
	December	2,08	1,54	1,46	0,20	-	-
	Average	**3,08**	**2,4**	**1,79**	**1,03**	**1,77**	**1,3**

Table 7. Variation of TDS indicator.

Determi-nation	Month	Year					
		2014		2013		2012	
		Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
TDS	January	718	574	684,4	617,6	486	401
	February	595	570	596,2	524,2	652	504
	March	646	635	612,8	528,4	684	582
	April	814,8	599	304,6	594,6	712	634
	May	630	738,8	561,6	516,4	-	-
	June	913,2	548,8	508,6	576,4	-	-
	July	882,8	533,6	680,6	660,4	-	-
	August	618,4	487,8	678,6	601,6	-	-
	September	528,4	612,8	756,2	663,6	-	-
	October	396,2	304	594,8	614,4	-	-
	November	516,5	508,6	604,3	547,2	-	-
	December	601,6	500,8	509,6	451,8	-	-
	Average	**655,07**	**551,1**	**591,02**	**574,7**	**633,5**	**530,23**

Table 8. Elements of physico-chemical quality standards in water.

No.	Quality Indicator	U/M	Quality class				
			I	II	III	IV	V
1	pH		6,5-8,5				
2	CBO_5	mg/l	3	5	7	20	> 20
3	CCOCr	mg/l	10	25	50	125	> 125
4	$N\text{-}NH_4$	mg/l	0,4	0,8	1,2	3,2	> 3,2
5	P_{total}	mg/l	25	50	100	250	> 250
6	Fixed residue	mg/l	500	750	1000	1300	> 1300
7	MTS	Indicator for whitch Order 161/2006 doesn't show value					

The averages of the three years for pH observed that:

- 2014, the pH had an average of 7,72 creek Amaradia ranged between quality limits, according to Order 161/2006;
- 2013, the pH had an average of 7,83 Amaradia creek ranged between quality limits, according to Order 161/2006;
- In 2012, the pH had an average of 7,53 creek Amaradia ranged between quality limits, according to the Order 161/2006.

The averages of the three years for CBO_5 observed that:

- 2014, CBO_5 indicator had a value of 51,09 mg/L, Amaradia stream water quality was within classV according to Order 161/2006;
- 2013, CBO_5 indicator had a value of 20,6 mg/L, Amaradia stream water quality was within classV according to Order 161/2006;
- In 2012 the indicator was worth CBO_5 de 25,17 mg/L, Amaradia stream water quality was within class V according to the Order 161/2006.

The averages of the three years for COD is observed that:

- 2014, COD indicator had a value of 85,39 mg/L, stream water was classified as class III Amaradia quality according to Order 161/2006;
- 2013, COD indicator had a value of 40,98 mg/L, stream water was classified as class II Amaradia quality according to Order 161/2006;

- COD indicator in 2012 had a value of 63,08 mg/L, stream water was classified as class III Amaradia quality according to the Order 161/2006.

The averages of the three years for fixed residue is observed that:

- 2014, TDS indicator had a value of 551,1 mg/L, ranged in Amaradia stream water quality class according to Order 161/2006;
- 2013, the indicator value TDS had de 574,7 mg/L, ranged in Amaradia stream water quality class according to Order 161/2006;
- TDS indicator in 2012 was worth de 530,23 mg/L, stream water was classified as class I Amaradia quality according to the Order 161/2006.

The averages of the three years for ammonia is noted that:

- 2014, ammonia nitrogen indicator had a value of 26,19 mg/L, Amaradia stream water quality was within class V according to Order 161/2006;
- 2013, the indicator was worth ammonia nitrogen de 13,02 mg/L, Amaradia stream water was classified as class V quality according to Order 161/2006;
- Ammonia nitrogen indicator in 2012 had a value of 14,58 mg/L, Amaradia stream water quality was within class V according to the Order 161/2006.

The averages of the three years for total phosphorus is observed that:

- 2014, the indicator had a value of P total 2,4 mg/L, stream water was classified as class II Amaradia quality according to Order 161/2006;
- 2013, P total indicator had a value of 1,03 mg/L, ranged in Amaradia stream water quality class according to Order 161/2006;
- 2012, P total indicator had a value of 1,3 mg/L, stream water was classified as class I Amaradia quality according to the Order 161/2006.

For the classification of the two sections in each class quality saprobic index value was used for biological elements microfitobentos and macrozoobenthos.

Saprobic index (S) is calculated using the formula:

$$S = \frac{\sum(S_i \cdot h_i)}{\sum h}$$

where:
h = frequency bodies;
S = the numerical value belonging to saprobic feature;
i = taxon ;
$\sum(S_i \cdot h_i) =$ the amount and frequency products of the numerical value for each taxon;
$\sum h =$ the sum of frequencies tax;

Saprobic index values obtained in the sampling sections (the upstream and downstream exhaust purifying waste water) are shown in Table 9.

Saprobic index values analysis highlights that the upstream section wastewater discharged from river water Amaradia falling within Class II quality , which corresponds to a good ecological status for both the biological elements analyzed.

In section downstream saprobic index values is calculated, at a value for Class III quality (environmental status moderate).

Table 9. Saprobic index values.

Sampling period	Amaradia Upstream		Amaradia Downstream	
	Microfitobentos	Macrozoobentos	Microfitobentos	Macrozoobentos
April 2014	2,13	2,2	2,57	2,42
June 2014	2,21	2,57	2,5	2,38
September2014	2,23	2,17	2,67	2,56
November 2014	2,2	2,06	2,47	2,26

CONCLUSIONS

Sewage waters that result from Drăguţeşti commune include organic and mineral suspension, colloidal matters and solutions,as well as orgaisms, especially bacteria and protoa which are the main energy source for the biochemical transformations of organic matters.

In the treatment plant for Drăguţeşti the following activities are developed:

- retaining large bodies and suspensions with help of graiting and sieves
- sedimentation or dencatation of solid suspension matters separable trough decantation,made in sand clearing basins and decanters;
- water treatment(reducing bacteria until they are eliminated)with help of UV rays in the disinfection plant.

In order to determine the efficiency of the treatment plant, several physical and chemical indicators were monitored both for sewage waters and for discharged waters ,and the following cold be noticed:

- in the case of total suspension matters indicator both at inlet and discharge point, the limit admitted values by NTPA001/2002 were exceeded, a normative which provides limit admitted values for waters discharged from the treatment plant;
- in the case of CBO_5 indicators,values were higher at inlet and very close to the admitted limits on the samples discharged from the treatment plant;
- Ratios BOD_5/COD for the period are always greater than 0,4, so these waters have a high content of organic substances readily biodegradable;
- Elevated ammonia nitrogen entering both samples and those vacating the treatment plant indicates a malfunction of the biological stage (insufficient oxygen to oxidise organic matter)

Amaradia brook is the outlet that takes over the treated sewage waters of this plant. Samples were collected both downstream and upstream discharged from the treatment plant and the conclusion was that both downstream and upstream, Amaradia brook is included in the first quality class acording to the Order 161/2006.

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THE CURRENT STUDY OF THE COAL DEPOSIT INFLUENCE ON AIR AT THE MINING OPERATION JILT NORTH

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ABSTRACT: The mining activity will increase, particularly by extending the exploitation to date in mining quarries, where you can obtain more productivity than in those obtained underground. Usually these activities are concentrated in certain geographic perimeters, the same areas being influenced by both direct and indirect mining activities. This paper presents the current study of the coal deposit influence on air at the mining operation Jilt North .The determination of the settled powders was realized in conformity with STAS 10195-75 by using the gravimetric method.. The lowest values of settled particles were recorded in December. This may be related to the fact that this period of work and transport of lignite extraction is interrupted for a long time.

KEY WORDS: exploitation, mining, sediment particles

1. INTRODUCTION

Various worldwide studies and statistics attest that the production of the mining industry will remain high in many products due to the increasing consumption of more and more useful mineral substances and the fact that, as time passes, deposits with increasingly lower content are valued.

The negative impact of mining activities on the environment is a direct one, that depends strictly on the actual extraction activity of useful mineral deposits and another, indirect one, that is related to the processing and use of mining products.

The Jilt North quarry is located in Gorj county and, the exploitation perimeter of the quarry occupies the northwestern part of the mining basin Jilt, situated on the territory of the localities Runcurel, Bradet, Mătăsari.

Lignite mining activity in North Jilt quarry is the main source of atmospheric pollution, particularly with dust.

Air quality is affected by the technological process from the quarry,waste dump and the coal deposit.

The main sources of air pollution with air-suspended particles are excavators[1-7]. Through continuous process of excavation and transport, these excavators ensure a large production to be obtained. They can operate selectively, by appropriate adjustment of the cutting height.

On the route of transport, large amounts of dust are formed when the mining mass discharges from one conveyor belt to another as it is shown in Figure 1.

The main factors that influence the high concentration in the case of transport by belt conveyors are:

- low humidity of the mining mass;
- low rainfall;
- high speed transport;
- drop height on the conveyor belt.

In addition to the factors listed above intervenes and the production concentration of all the technological lines in the flux, in the distribution node, which makes the concentration of powders to increase.

Fig.no. 1. Conveyor belts.

From the point of distribution the coal is taken onconveyor belts and deposited with the help of the combined machine for depositing type KsS5600/3800 and with the storage equipment type ASG 6000 which are presented in Figure No. 2

Fig no.2. Coal deposit.

At the previously listed factors that lead to dust formation, coal takeover from the storage equipment is added and its discharging from about 10 - 15 m height, the deservent following the descent, namely lifting the arm accordingly to the deposition cone increase so that the distance between the tip of the cone and spillway body of the conveyor belt to be minimized (2-3 m).

Also, in the excavation of coal from the deposit a significant amount of dust is formed. For excavating the coal from the deposit it is used an excavator with rotor type KsS5600 / 3800.

The main source of dust is the loading of the cups, their rotation and the discharge from height of the coal on the conveyor belt towards the dispatch station.

The coal extracted from the deposit is directed by conveyor belts to the dispatch station, where it is discharged and loaded in wagons that are shown in Figure no3.

Fig.no.3 Loading point.

The fall from a height of approx. 8 m, favors the formation of large concentration of powders in the air.

2. EXPERIMENTAL

The monitoring points of imissions of settled powders were located in inhabited area, which is near the coal deposit and the lignite loading points in wagons. There were established two sampling points: point number 1, located to the east from the warehouse and the loading point, at a distance of approx. 100- 150 m and point number 2, located to the south-east, at a distance of approx. 500 m from the deposit.

The determination of the settled powders was realized in conformity with STAS 10195-75 by using the gravimetric method.For the gathering of the samples the figure 4 device is recommended.

In the cold season of the year , to prevent freezing,it is introduced in the collecting recipients a mixture of distilled water and ethyl alcohol instead of distilled water in a proportion of 3%.In the hot season of the year, to prevent the development of microorganisns, it is added in the distilled water from the collecting recipients a quantity of copper sulphate. The collecting recipients’ exposure period will be of 30 days. In the event that the water (abundant precipitations) crosses the volume of the collecting recipient, those samples are not taken into consideration.

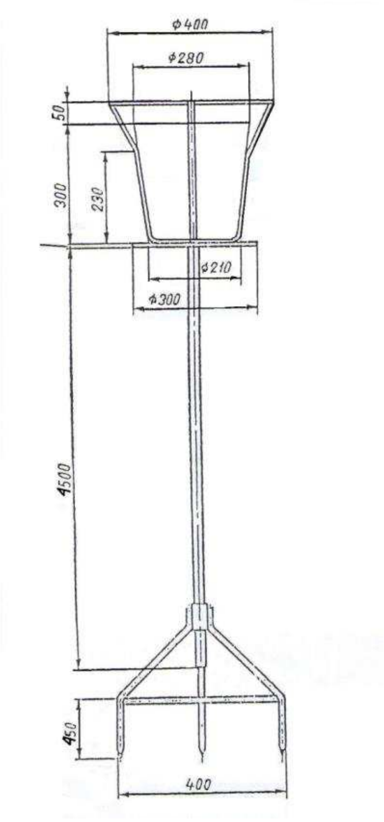

Figure no4 4. The settled powders sampling device.

The recipients that contain settled powders are covered and placed into the laboratory, taking care not to be polluted or to be spilled during transportation. The recipients’ exterior is wiped first with a wet gauze and, after with a dried one. By means of a pincers the leafs, the insects and other foreing bodies are lifted,being washed with a jet of distilled water.The content of the recipient is quantitatively passed in a beaked glass with the help of a glass stick provided with a rubber collar at one end.The passing of the sample in the glass is done by means of a bolt with the side of a mesh of 1 mm, the impurities on the bolt then being washed with a jet of distilled water that is placed also in the glass. The sample in the glass is evaporating almost to the point of dryness and the content of the glass is then quantitatively passed in a saggar (porcelain capsule), brought previously at a constant mass at a temperature of 105 ^{0}C.The solution from the saggar(porcelain capsule) is evaporated to the point of dryness on the water bath or on the electric hob, being careful that the temperature will not get beyond 100 ^{0}C.After evaporation , the capsule with the sample is wiped at the exterior with clean gauze and kept in the stove at a 105 ^{0}C temperature for two hours . It is cooled in the exicator for one hour and then weighted at the analytic balance. The drying, cooling and weighting operations are repeated until the constant mass.

RESULTS AND DISCUSSIONS

The results of the measurements of settled powders carried in 2013 and 2014 are presented in Table. 1.

Interpretation of the results for this indicator of air quality was done according STAS 12574/87. "Air in protected areas. Quality requirements ".

Under this standard, the maximum allowable settled powders in the air ofprotected areas is 17 g / m² / month.

In 2013, in the point number 1 (JN1) of all 12 measurements, six have higher values than the maximum allowable concentration, which is 50%. In point number 2 (JN2), the number of samples whose value exceeded maximum permissible concentration was 10 samples, in this case the frequency of the surpassings was of 83.3% which is presented in Figure no5.

Looking at the chart values obtained for 2013 it is observed that both the minimum and maximum values were registered in section 2 sampling point, located at a greater distance from the warehouse and the lignite loading point in wagons.

The lower values obtained in section 1 sampling point could be correlated with the fact that between this point and the point of coal loading in the wagons, a metal panel with a length of 90 m and a height of 8 m has been installed, as a measure of reducing the impact on the closest homes.

And in 2014, in the section 1 the same situation is maintained as in 2013, meaning that the frequency of exceedings this time was still of 50%, but the concentration amount was by 4,01g greater în2014 , presented in Figure 6.

Table 1. The results of measurements of settled powders

Month	2013		2014		C.M.A by STAS 12574/87
	Sampling point		Sampling point		
	JN$_1$	JN$_2$	JN$_1$	JN$_2$	17g/m^2/lună
January	26,91	90,74	18,96	13,48	
February	16,96	22,34	5,32	25,22	
March	17,72	50,86	31,73	39.37	
April	11,42	21,27	25,76	17,56	
May	9,83	35,30	6,32	24,75	
June	15,8 6	32,27	20,24	12,69	
July	18,69	29,27	13,14	60,37	
Augast	10,64	34,45	18,08	44,98	
September	20,98	30,83	15,25	30,80	
October	6,5 7	14,06	14,12	24,08	
November	28,07	24,21	18,7 1	18,3 1	
December	7,5 7	5,02	10,01	18,1 7	

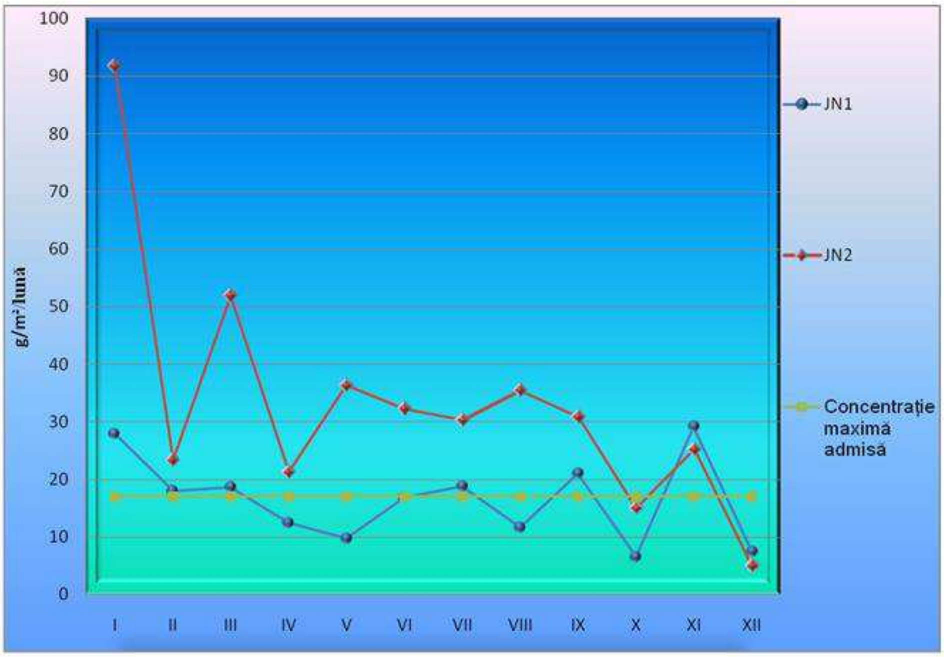

Fig. no.5. Settled powders in 2013

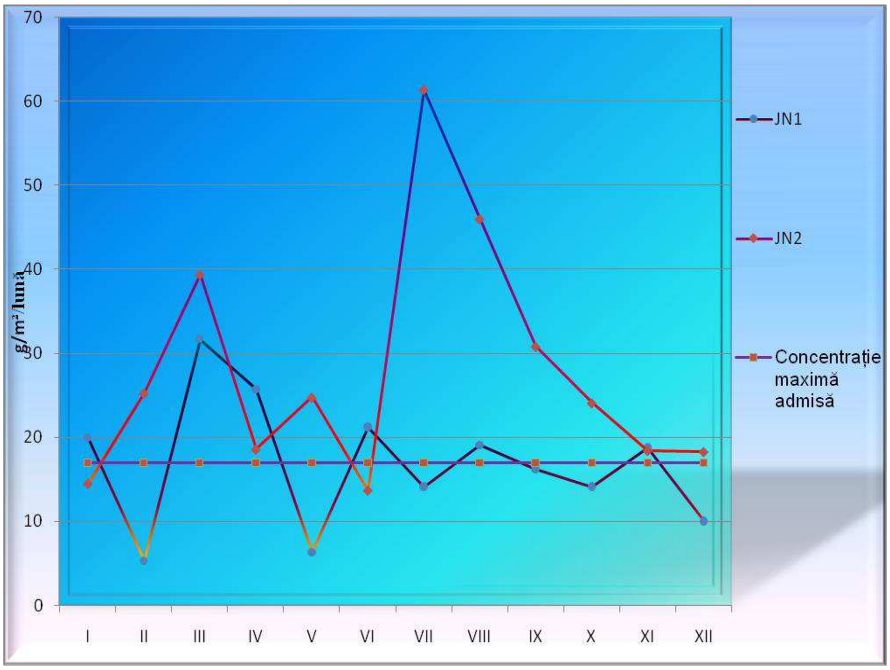

Fig. No.6 Settled powdres in2014

The highest concentration was recorded in March (31,73g/m²/month), which is 1.87 times the maximum permissible concentration.

The lowest concentration was measured in February (5.32g/m²/month), and represents 31.3% of the maximum permissible concentration.

And in station 2, of the 12 measurements taken in 2014, 10 exceeded the permissible limit value, with a frequency of 83.3% overruns. The concentrations sum was lower than in 2007 by 63,64g.

The highest value was registered in July (61,37g/m²/month), which is 3.6 times the maximum permissible concentration.

During exploitation, the following protective measures are set:

- During the summer, in which the concentration of dust in the atmosphere increases due to drought, mobile sources are provided to spray the access and maneuvering areas;

- Organizing ballasting services on all industrial roads to minimize dust emissions;
- Coverage of conveyors belts in the circuitsof coal and steril;
- The coal deposit of the quarry water splashings are done, periodically loosening and movement of coal stocks to prevent auto-ignition of coal in very hot periods;
- Placing metal panel walls of10m high, to stop dust spreading to neighboring villages, which are provided to the top of the panels with water sprayers;
- To prevent auto-ignition of coal in the layers that afloreate the coal does not completely uncover, leaving a layer of sterile roof approx. 10-15 cm;

If , the quarry Jilt North has no monitoring system implemented for air suspensions (ash, sand, dust, coal dust), summer can arise storms of such suspensions, which can migrate in large amount from the perimeter of the quarry to adjacent areas inhabited resulting in exceeding the allowable limits. Watering the quarry and dump contribute to reducing the amount of settled particles and dust in inhabited areas below the maximum allowed limit.

CONCLUSIONS

Given the set some conclusions can be made about the impact on the environment from the exploatation in North Jilt quarry.

- In carrying out technological process of mining of lignite in North Jilt quarry, are taken three main phases: excavation by excavators with rotor, transporting the excavated material using belt conveyors and depositing it in the coal deposit, respectively in the dump .
- Among the sources of environmental pollution, a special impact is attributed to the coal deposit of the quarry, it being very close to the inhabited area.
- The main source for the formation of various types of powders is represented by the loading of cups, their rotation and the discharge from height of the coal by conveyor belt to the dispatch station.
- Of the two points for monitoring settled powdres, none has recorded over the two years, values that lie entirely below the permissible limit value.
- Lower values obtained JN1 point could be related to the fact that in this area has been installed a protective panel 90 m / 8 m, as a measure to reduce the impact on housing in the area.
- The higher concentrations and frequent higher exceedances in JN2 point relatively to the JN1 point could be made on the lack of natural barriers (high vegetation) between the pollution source and the measuring point.
- The lowest values of settled powders were recorded in December. This may be related to the fact that this activity period of extraction and lignite transport is interrupted for a long time.

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CONSIDERATIONS ON THE EVOLUTION OF QUALITY INDICATORS OF WATER COURSES IN GORJ COUNTY

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ABSTRACT: Due to the functionality and multiple uses of water, the mismatch between the distribution in time and space of water resources and that the requirements and due to the phenomenon of reuse water along watercourses, it requires particularly necessary activities coordination of management and use of water resources. In this paper we present a study on the evolution of physical and chemical quality indicators of water courses in Gorj county, monitored in 2012-2014.

KEY WORDS: quality indicators, surface water, monitoring

1. INTRODUCTION

Water is an important factor in the environmental balances and its pollution is a current problem with consequences more or less serious on human population. The effects of pollution of water resources are complex and varied, depending on the nature and concentration of the contaminating substances. The complex nature of water management, involving different sectors of society and economy requires cooperation and coordination of actions of those who have a duty to administer water. Basically efforts of all stakeholders should focus the use, development and protection of water resources in an equitable manner and reasonable, by applying the concept of sustainable water management. Coordination of water management that the general interest of society imposes different users in order to capitalize on higher water resources, in terms of sustainable development, must be conducted in a most efficient way, using means most modern, provided by law and current practice in Europe [1,2]. Water quality monitoring is the activity of standardized measurements and continues observations on long term for knowledge and assessment of water characteristic parameters in order to manage and define the status and trends in their quality and highlighting permanent state of water resources. The main reason for water quality monitoring is to verify whether it is suitable for use. Yet monitoring has revealed certain features of the aquatic environment and how this environment is affected by pollutants released by human activities or waste treatment operations. This type of monitoring is often known as the monitoring - impact. Since water is in most cases used for beneficial purposes, monitoring should reflect the needs of consumers [3,4].

Creating a monitoring and evaluation program can be focused on the spatial distribution of quality, on directions for use and aquatic life. Reaching these three areas of interest is almost impossible, or very costly, being necessary to carry out preliminary examinations. Monitoring and evaluation of water quality based on the following fundamental traits: physical, chemical, biological and microbiological. It is a process of analysis, interpretation and communication of these properties within human activities, and conservation of the natural environment. So it is not a fixed process, adapted to the needs of local, national or international [5].

2. SURFACE WATER QUALITY IN GORJ COUNTY

Surface water quality is permanently controlled in the county Gorj by sampling. In 2012-2014 periods were analyzed samples taken from the river system of representative areas of our county. Analyzes were performed to determine some physic-chemical of surface water temperature, water pH, total suspended matter (MTS), dissolved oxygen (DO), biochemical oxygen demand (CBO_5), nitrates (NO_3^-) , nitrites (NO_2^-), ammonium (NH_4^+), total phosphorus (P total), chloride, sulphate. The values recorded for analyzed watercourses were relative to the maximum permissible concentration limits in accordance with Norm 161/2006 concerning the classification of surface waters in the way to determine the ecological status of water bodies. The Regulations provide five environmental statuses for rivers category/graded as follows: very good (first class quality), color coded blue; good condition (II-nd class quality), color coded green; moderate condition (III-rd class quality), color coded yellow; weak state (IV-th class quality), color coded orange and poor condition (V-th quality), color coded red.

Quality evolution of Amaradia River

Gilort River is the most important tributary of the Jiu left side. He drains the southern slopes of Parang Mountains; the springs are located at altitudes of 1800 m. It crosses the western region of the Oltenia sub-Carpathian, the central Getic Piedmont, then confluence with Jiu, draining an area of over 1348 km^2 with an altitude average basin slope of 544 m and an average basin surface of 103 m/km. In the upper wedge out of Parâng (Novaci) has a typical mountain valley with steep slopes over 65‰, profile V-shaped bed and a small portion limestone deposits formed keys.

Table 1 shows the values of the physic-chemical indicators of quality of Gilort River monitored in 2012-2014. Graphical representations of the evolution of quality indicators monitored for Gilort River are shown in Figures 1-4.

Table 1. Phisico- chemical indicators of Gilort river

Indicators monitored	Monitoring of Gilort river S1- Turburea; S2- Bengesti; S3 – upstream Novaci								
	2012			2013			2014		
	S1	S2	S3	S1	S2	S3	S1	S2	S3
Temperature (^{0}C)	13	11	10	7	11	10	5	4	3
Total suspended matter (mg/L)	25	20	20	22	21	17	17	23	21
pH	7.72	7.48	7.56	7.66	7.34	7.43	7.38	7.44	7.31
Nitrates (mg/L)	0.78	0.49	0.35	0.59	0.37	0.31	0.71	0.31	0.26
Nitrites (mg/L)	0.019	<0.002	<0.002	0.031	0.003	<0.002	0.043	<0.002	<0.002
Ammonium (mg/L)	0.103	0.029	<0.018	0.070	0.022	<0.018	0.044	<0.018	< 0.018
P- total (mg/L)	0.049	0.018	0.007	0.074	0.017	0.009	0.072	0.019	0.014
Dissolved oxygen (mg/L)	9.97	10.70	10.90	11.59	10.75	11.05	12.03	12.31	12.86

BOD_5 (mg/L)	2.3	2.0	1.8	2.5	1.9	1.7	3.0	2.7	2.3
Chloride (mg/L)	25.348	7.799	5.228	22.86	3.806	2.666	36.87	6.736	4.254
Sulphate (mg/L)	65.37	21.63	16.93	27.87	14.94	12.66	23.62	15.70	11.95

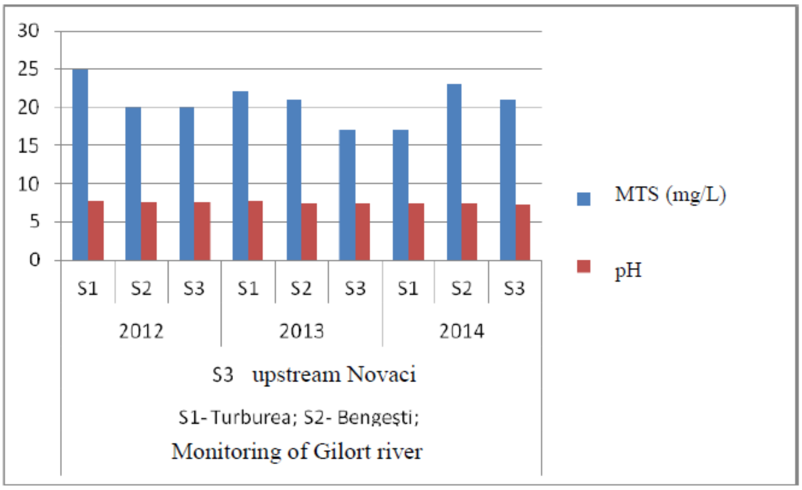

Fig. 1. Variation indicators pH and MTS (river Gilort).

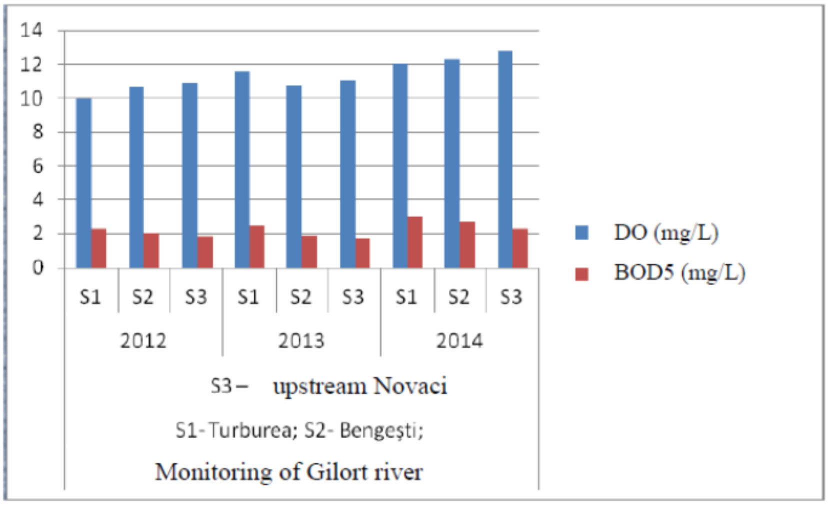

Fig. 2. Variation indicators DO and BOD_5 (river Gilort).

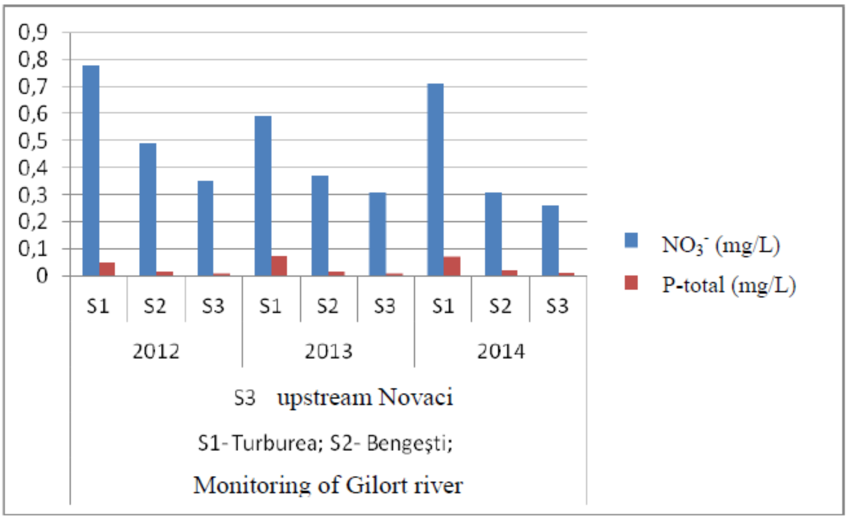

Fig. 3. Variation indicators NO_3^- and P_{total} (river Gilort).

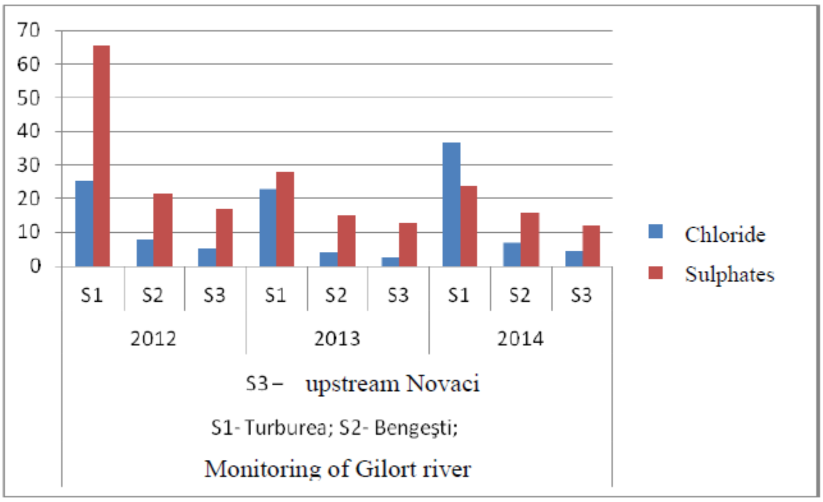

Fig. 4. Variation indicators Cl^- and SO_4^{2-} (river Gilort).

Data interpretation and recorded for Gilort river and reporting for the maximum values allowed by Norm 161/2006 indicates the following:

a) pH values are within the limits permitted by the regulation (pH= 6,5-8,5);

b) The average content of dissolved oxygen in the range of 9,97 to 12,86 mg/L limit value for first quality class of 9 mgO_2/L;

c) The content of nitrates are below the limit value for I-st quality class (NO_3^- = 1mgN/L limit value);

d)Total phosphorus content is between 0,017 to 0,074 falling below the limit (the limit value P_{tot}= 0,15 mg P/L);

e) Chloride and sulphate content is above the I-st quality grade falling into II-nd class (quality limit value I-st class Cl^- = 25 mg/L, SO_4^{2-} = 60 mg/L; limit value II-nd quality class Cl^- = 50 mg /L, SO_4^{2-} = 120 mg /L).

Quality evolution of Amaradia River

Amaradia is the second largest tributary of Jiu River as importance, on left side, springing from the foot of Parang Mountains, near the village of Rosia Amaradia in Gorj county. Pour in Jiu upstream of Craiova. Amaradia Pietroasa is a less tributary of Jiu. It rises in the Carpathians, gathers the waters of mountain slopes and hills, passing through Balanesti town flows through the city on the east and flows into Jiu near the Dragutesti town. In rainy times stormy down to the valley, swells, it becomes capricious tendency of jelly output. Usually dry in the summer, leaving behind small sand. It riverbed was not gravel.

Table 2 presents the values of water quality indicators reflecting the degree of nutrient loading, organic compounds and heavy metals, for Amaradia. Graphical representations of the evolution of quality indicators monitored for Amaradia River are shown in Figures 5-8.

Data recorded interpretation for Amaradia River and reporting at the maximum values allowed by Norm 161/2006 indicates the following conclusions:

a) pH values fall within the limits described in Standard (pH= 6,5-8,5);

b) the average dissolved oxygen leads to classification in I class quality for monitoring sections ranging from 10,64-11,52 mg/l (DO limit value = mgO_2/L);

c) The content of nitrates is within a limit to I –st class quality ranging from 0,36-0,41 mg/L (limit value NO_3^- = 1 mgN/L);

d) Total phosphorus values between 0,013-0,018 mg/L is below the limit (P_{tot}= 0,15 mgP/L limit value);

e) chloride content and sulphate are below the limit value for I-st class quality (limit value Cl^- =25 mg/L; limit value SO_4^{2-} =60 mg/L).

Table 2. Phisico- chemical indicators of Amaradia river.

Indicators monitored	Monitoring of Amaradia river upstream Stancesti					
	2012		2013		2014	
	Average value	Maximum value	Average value	Maximum value	Average value	Maximum value
Temperature (^{0}C)	9	30	11	30	6	30
Total suspended matter (mg/L)	27	35	29	35	30	35
pH	7.08	6.5-9.0	7.30	6.5-9.0	7.57	6.5-9.0
Nitrates (mg/L)	0.41	50	0.36	50	0.43	50
Nitrites (mg/L)	<0.002	0.5	<0.002	0.5	0.002	0.5
Ammonium (mg/L)	0.019	0.8	<0.018	0.8	<0.018	0.8
P- total (mg/L)	0.013	0.1	0.016	0.1	0.018	0.1
Dissolved oxygen (mg/L)	11.10	6.2	10.64	6.2	11.52	6.2
BOD_5 (mg/L)	2.2	6.0	2.7	6.0	3.82	6.0
Chloride (mg/L)	5.760	50	2.540	50	2.793	50
Sulphate (mg/L)	7.40	120	14.25	120	13.03	120

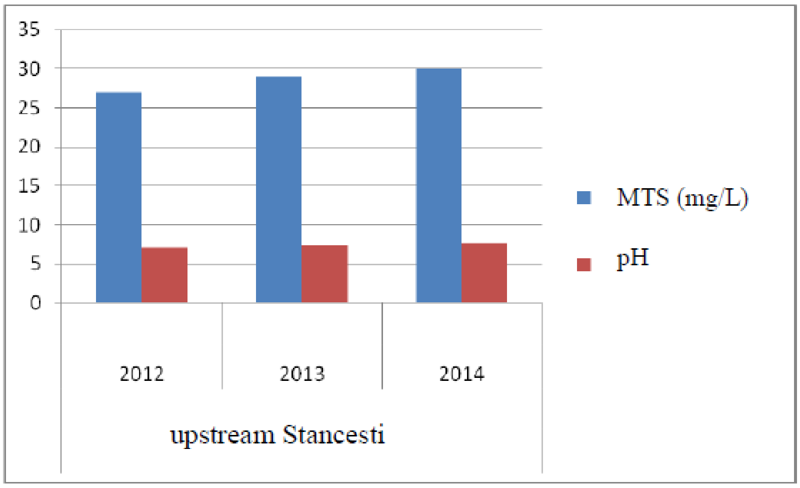

Fig. 5. Variation indicators pH and MTS (Amaradia river).

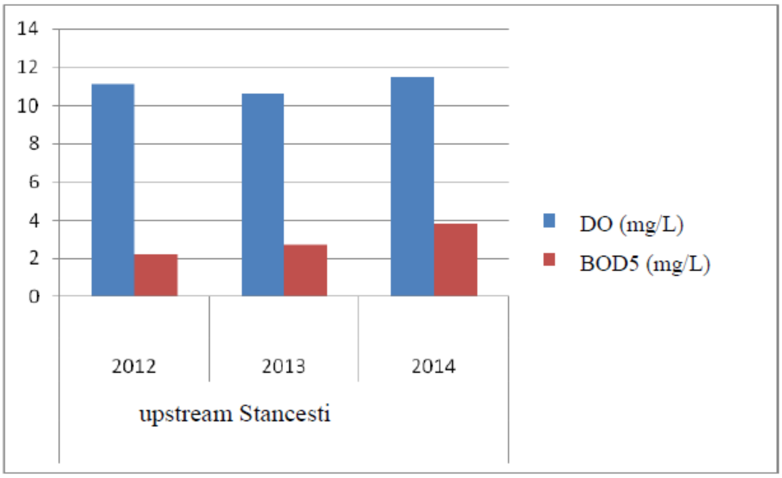

Fig. 6. Variation indicators DO and BOD_5 (Amaradia river).

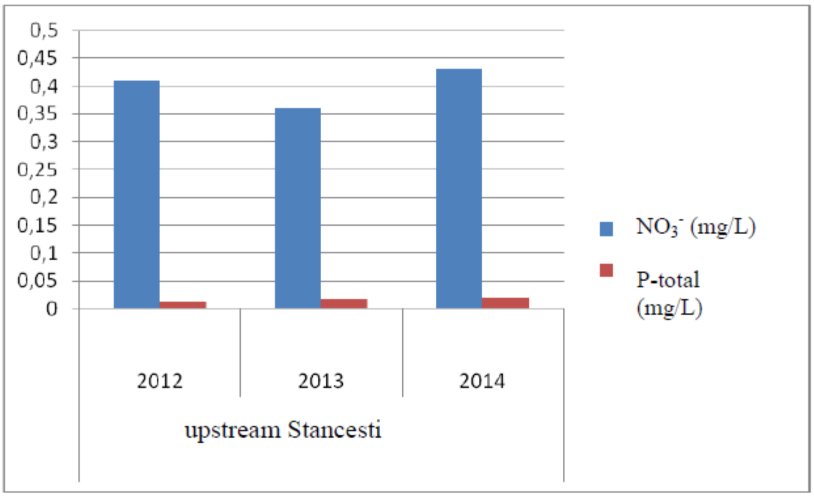

Fig. 7. Variation indicators NO_3^- and P_{total} (Amaradia river).

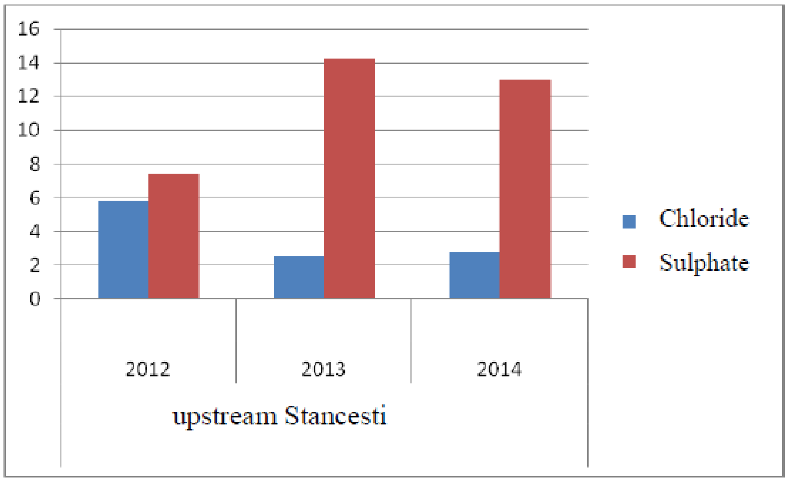

Fig. 8. Variation indicators Cl^- and SO_4^{2-} (Amaradia river).

3. CONCLUSIONS

Evaluation of surface water quality in Gorj county is achieved by monitoring indicators of quality of watercourses and reporting the obtained values to the normative 161/2006. In the study conducted during 2012-2014 were monitored temperature indicators, suspended solids, pH, nitrates, nitrites, ammonia, total phosphorus, dissolved oxygen, biochemical oxygen, chlorides and sulfates for Gilort and Amaradia watercourses. Analysis of recorded data indicates the classification of rivers monitored in the first class of quality except Gilort river falling within second class of quality on chlorides and sulphates indicators. Monitoring surface water allows the four main objectives in the knowledge of the state of water quality, namely, monitoring, forecasting, warning and intervention. By monitoring water quality is assessed systematic water quality characteristics being in a permanent dynamic and significant social and economic implications.

Preventing water pollution can be provided from a system of supervision and rigorously control followed by implementing measures to reduce water pollution such as the widespread introduction of clean technologies in industrial processes, reducing the amount of wastewater discharged into rivers through introducing the practice of water recycling, recovery of useful materials from waste water, thus having the advantage of ensuring true sources of raw materials, improve treatment efficiency through improvement of technologies, systems and operating them.

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ASPECTS REGARDING GROUNDWATER’S QUALITY IN GORJ COUNTY

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ABSTRACT: The primary role of the contemporary generation is sustainable management, rational and balanced distribution of groundwater resources in order to maintain quality and ensure their natural regeneration. In this paper it is presented a study concerning the characterization of the state of groundwater quality in Gorj county.

KEY WORDS: groundwater, physico-chemical indicators, the quality of water.

1. INTRODUCTION

It is now necessary to achieve a clear and permanent record, on the one hand on ground water (ground and depth) existing in a region and on the other hand, the volume or flow rate of groundwater exploitation. A great number of pollutants that are on the ground or carried by water can contaminate aquifers which are in most cases the source of drinking water in many places. To study the process of pollution of these water sources should be pursued following aspects:

- The type and characteristics of pollutants
- The modality of penetration of this into the soil
- The transfer of pollutants through the soil to groundwater surface
- The evolution of pollutants chemically, biologically and physically during transfer
- The evolution of pollutants in groundwater or aquifers called the saturated zone

Mainly groundwater pollution occurs as a result of solid or liquid waste disposition to land with great permeability and are placed near or over aquifers zones [1,2].

Currently the most important ways of groundwater pollution are:

- vertical seepages where pollutants are liquid by rainwater, snowmelt, water irrigation. The same situation refers to solid substances that dissolve in water;
- seepages from polluted surface waters or from the sea, where the groundwater table is below the groundwater surface water;
- infiltrations from faulty sewage system, tailings ponds, petroleum products storage tanks, flooded mines;
- pollutions with saline water, gas or oil products as a result of mining works or boreholes;
- contaminations caused by both seepage from the ground surface of all categories of water and polluted surface sources;
- contaminations produced in capture section because of failure to sanitary

protection zone or the conditions of execution.

The penetration of pollutants into groundwater layers is achieved due to the permeability of geological strata that are stored or where they are. Once in the soil, the pollutant will tend to penetrate the layers of the aquifer and to locate into the groundwater [3]. In addition to the direct effect of pollution, it is also found a process for the dissolution of crossed layers, and the substrate aquifer, which leads to an increase in the content of chlorine ion, sulfur, nitrogen, calcium, magnesium, iron, manganese. Studies have shown that the intensity and severity of pollution will depend also on how is placed the source of pollution, how isolating it is from the ground, the nature of the aquifer, the aquifer depth. Although groundwater reserves are estimated at over 29 million km^3, only 65000 km^3 are readily available and can be exploited effectively.

If in the case of the surface waters the effects of pollution might say that disappear once with the source of pollution, in groundwater its effects continue to manifest many years after the disappearance of the source (pollutant advancing slowly, at the speed of groundwater without to practically intervene). In terms of self-purification this is also manifested much faster to surface water compared to groundwater. As a result, ground water pollution is more dangerous compared to the surface, as on the one hand effects are difficult to remove and, on the other hand, they operate for a long time [4].

2. THE CHARACTERIZATION OF THE STATE OF GROUNDWATER QUALITY IN GORJ COUNTY

The importance of groundwater and the main objectives of knowledge management, exploitation and protection thereof are presented in the Water Law no.107/1996 as amended by Laws No. 310/2004 and 112/2006. Under Directive 60/2000/EC, regarding the setting of a framework for Community action in the field of water policy, both zoning free level aquifer systems and the level of pressure was done [5]. Under these conditions, they were identified in the perimeter Water Basin Administration Jiu nine bodies of groundwater, within the Gorj county it develops five water bodies, respectively:

- Body of groundwater in the mountain area Tismana-Dobrita - code ROJi03
- The body of groundwater from the terraces and meadows of Jiu and tributaries - code ROJi05
- The body of groundwater depth from Pliocene's formations - code ROJi07
- The body of groundwater depth from Sarmatian's formations - code ROJi08
- The body of groundwater depth from pleistocene's formations - code ROOt13

Table 1 shows the indicators values of physico-chemical quality of groundwater in the mountain area Tismana-Dobrita and Turceni, in 2012. Physico-chemical analyzes performed on water samples from the mountain area- Tismana-Dobrita indicates hydrochemical character type calcium-magnesium-bicarbonates, with a fund of mineralization between 288-352 mg/L and total hardness ranging between 12,65 to 14,56 german degrees, the drinking waters.

Table 2 shows the results of physico-chemical analyzes conducted for groundwater of Turburea and Stoina's area (2012).

Groundwater in meadows piedmont have fixed residue between 510 mg/L (Turceni) and 974 mg/L (Stoina). Increasing fixed residue is accompanied by a strong increase of ion SO_4^{2-} reaching values of 200-260 mg/L (Turceni), waters being bicarbonato- sulfates with a fixed residue below 1000 mg/L.

In the period 2013-2014 was monitored groundwater quality in areas: Ceplea, Câlnic, Scoarţa-Albeni, Stoina, Teleşti-Tămăşeşti, Turburea, Tismana.

Physico-chemical data made for the Ceplea and Stoina in 2014 highlights the following values for key quality indicators of monitored groundwater (Table 3 and 4).

Interpretation of the results of monitoring of groundwater quality in Gorj County during 2013-2014 was performed by comparing the measured values to the specified allowable in drinking water Law 458/2002 as you can see in Figure 1-6.

Table 1. Values of physico-chemical indicators for groundwater areas Tismana- Dobrita and Turceni.

No.	Indicator name	Unit	Indicators values Tismana-Dobrita	Indicators values Turceni
1	pH	unit. pH	6,88-7,47	6,42-7,7
2	Organic substances	mg/L	1,97-3,63	3,31-4,5
3	Total hardness	°G	12,65-14,56	25,42-36,51
4	Temporary hardness	°G	8,12-10,36	19,88-30,52
5	Permanent hardness	°G	3,97-5,2	4,98-7,67
6	HCO_3^-	mg/L	176,9-225,7	433,1-664,9
7	Ca^{2+}	mg/L	67,2-88,8	121,6-228,8
8	Mg^{2+}	mg/L	9,19-14,0	19,36-45,4
9	NH_4^+	mg/L	0,12-0,26	0-0,36
10	NO_3^-	mg/L	4,8-9,2	7,0-14,5
11	NO_2^-	mg/L	0,004-0,04	0,04-0,07
12	SO_4^{2-}	mg/L	70-89	98,0-260,0
13	Cl^-	mg/L	10,28-48,12	21,3-62,0
14	Fixed residue	mg/L	288-352	510,0-876,0
15	Alkalinity	ml HCl 0,1N	2,9-3,97	-

Table 2. Values of physico-chemical indicators for groundwater of Tu*rburea and Stoina's area.*

No.	Indicator name	Unit	Indicators values Stoina	Indicators values Turburea
1	pH	unit. pH	6,66-7,06	6,96-7,56
2	Organic substances	mg/L	3,55-4,66	1,9-3,0
3	Total hardness	°G	24,84-40,65	26,65-37,29
4	Temporary hardness	°G	19,88-29,12	21,56-28
5	Permanent hardness	°G	4,96-11,53	4,96-11,53
6	HCO_3^-	mg/L	433,1-634,4	469,7 -610
7	Ca^{2+}	mg/L	134,4-245,6	24,2-215,2
8	Mg^{2+}	mg/L	26,1-33,4	9,7-16
9	NH_4^+	mg/L	0,51-1,24	0-5,79

10	NO_3^-	mg/L	7,6-32,9	1,56-29,9
11	NO_2^-	mg/L	0,06-0,12	0,02-0,19
12	SO_4^{2-}	mg/L	85-200	58-159
13	Cl^-	mg/L	78,3-92,8	9,6-29,8
14	Fixed residue	mg/L	607-974	558-794
15	Alkalinity	ml HCl 0,1N	7,1-10,4	7,7-10

Table 3. Values of quality indicators from groundwater in the area Ceplea, 2014.

No.	Indicator name	Unit		Indicators values from Ceplea April /September, 2014			
1	pH	unit. pH		7,90		7,47	
2	Temperature water/air	ºC		12/6		15,5/11	
3	Dissolved oxygen	mg/l		6,25		6,05	
4	Conductivity	µS/cm		726		1016	
5	Chlorides	mg/l	mval/l	6,736	0,1897	-	
6	Sulfates	mg/l	mval/l	83,10	1,7313	-	
7	Nitrates	mg/l	mval/l	2,50	0,0403	1,79	0,0289
8	Nitrites	mg/l	mval/l	0,013	0,0003	0,006	0,0001
9	Phosphates	mg/l	mval/l	0,310	0,0100	0,100	0,0032
10	Bicarbonates	mg/l	mval/l	423,34	6,9400	458,72	7,5200
11	Ammonium	mg/l	mval/l	0,17	0,0094	0,5	0,0278
12	Sodium	mg/l	mval/l	16,20	0,7043	-	
13	Potassium	mg/l	mval/l	1,60	0,0410	-	
14	Calcium	mg/l	mval/l	80,16	4,0080	-	
15	Magnesium	mg/l	mval/l	50,82	4,2000	-	
16	Iron	mg/l	mval/l	0,044	0,0008	0,053	0,0009

Table 4. Values of quality indicators from groundwater in the area Stoina, 2014.

No.	Indicator name	Unit		Indicators values from Stoina April /September, 2014			
1	pH	unit. pH		6,99		7,05	
2	Temperature water/air	ºC		12/18		12,5/8	
3	Dissolved oxygen	mg/l		6.10		4.36	
4	Conductivity	µS/cm		1109		1234	
5	Chlorides	mg/l	mval/l	43,607	1,2284	-	
6	Sulfates	mg/l	mval/l	97,70	2,0354	-	
7	Nitrates	mg/l	mval/l	0,56	0,0090	1,74	0,0281
8	Nitrites	mg/l	mval/l	0,020	0,0004	0,020	0,0004
9	Phosphates	mg/l	mval/l	0,164	0,0053	0,010	0,0003
10	Bicarbonates	mg/l	mval/l	567,3	9,3000	412,36	6,7600

11	Ammonium	mg/l	mval/l	0,185	0,0103	<0,023	-
12	Sodium	mg/l	mval/l	31,45	1,3673	-	
13	Potassium	mg/l	mval/l	1,48	0,0379	-	
14	Calcium	mg/l	mval/l	176,35	8,8175	-	
15	Magnesium	mg/l	mval/l	30,00	2,4793	-	
16	Iron	mg/l	mval/l	0,063	0,0011	0,064	0,0011

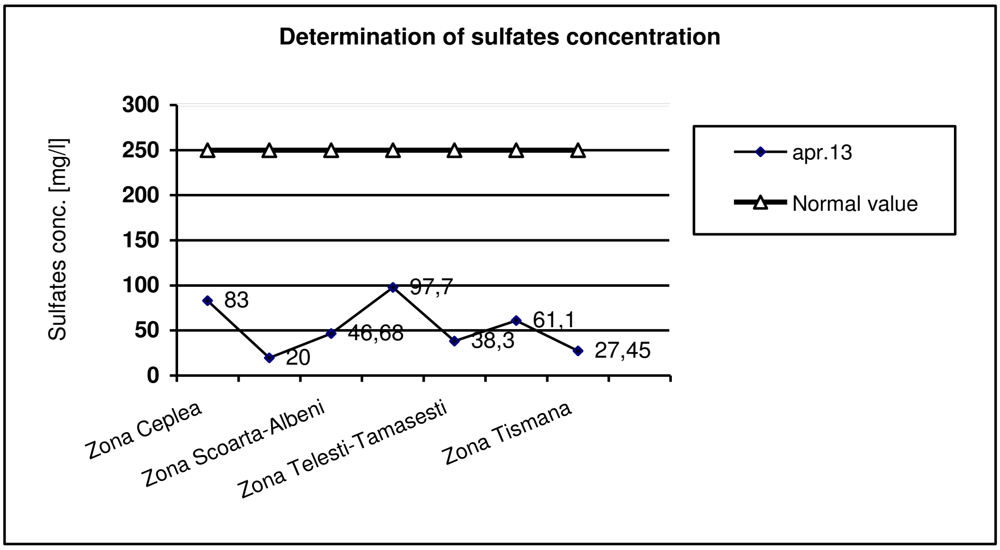

Fig.1. Sulfates content in groundwater.

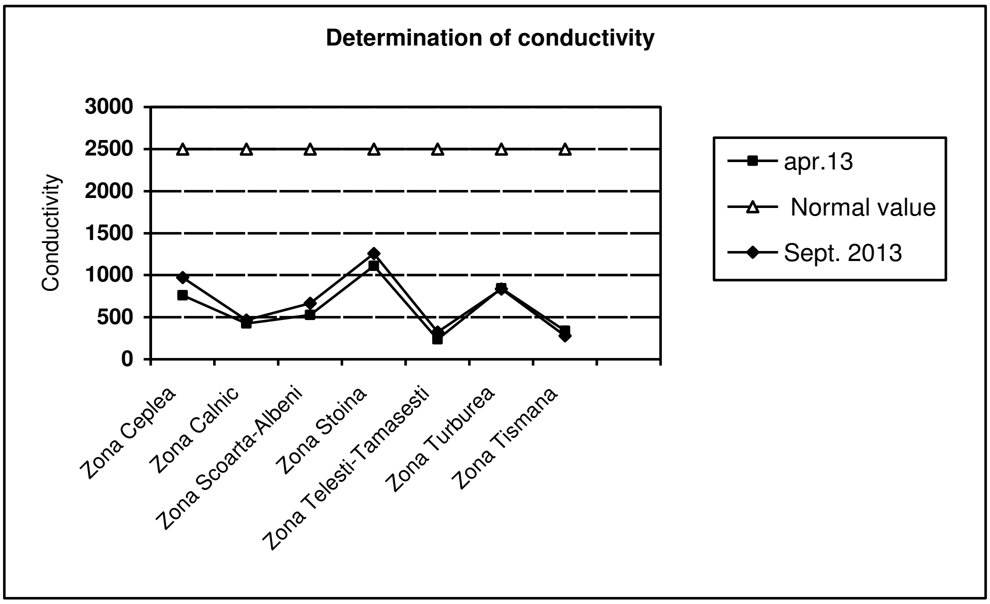

Fig.2. Conductivity of groundwater.

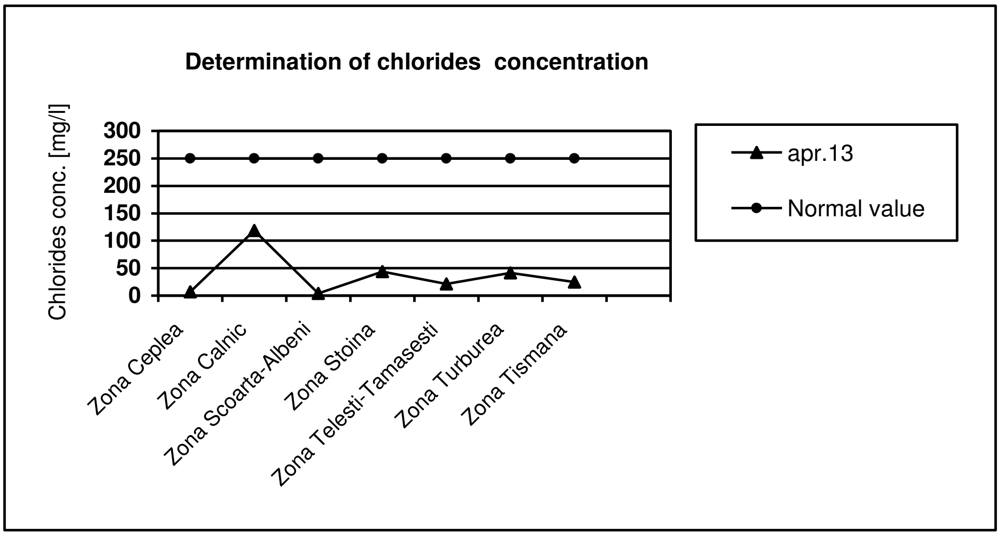

Fig. 3. Chlorides content in groundwater.

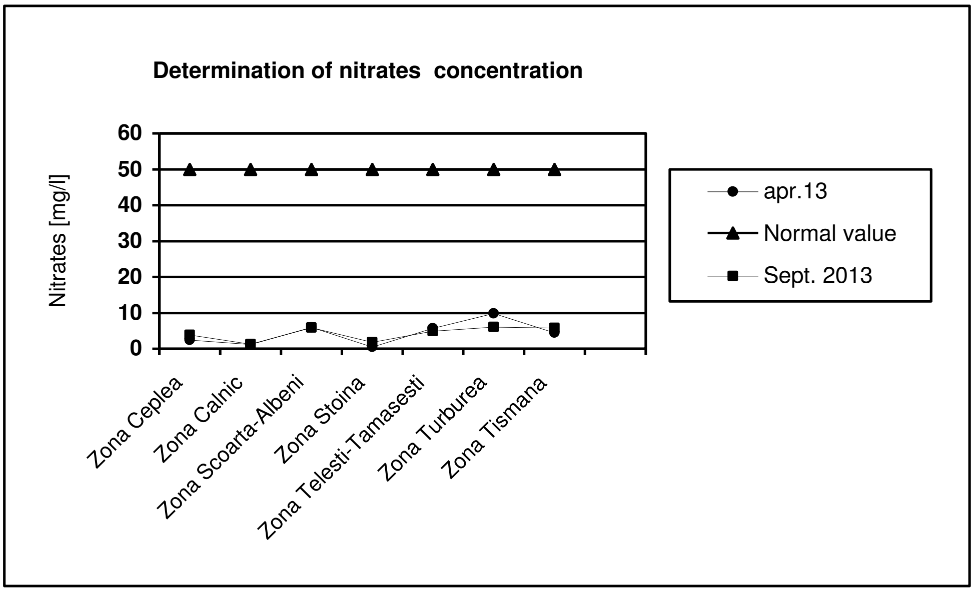

Fig. 4. Nitrates content in groundwater.

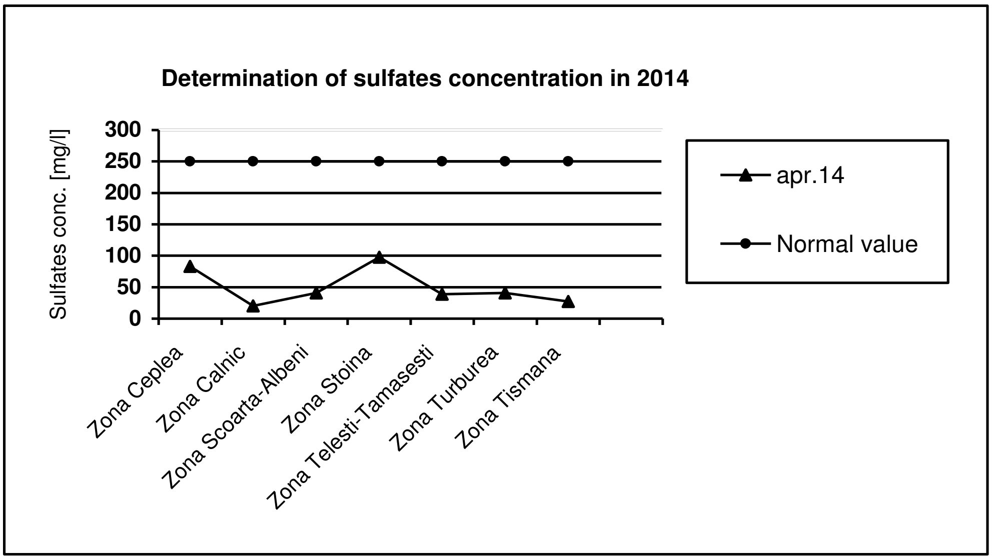

Fig. 5. Sulfates content in groundwater (2014).

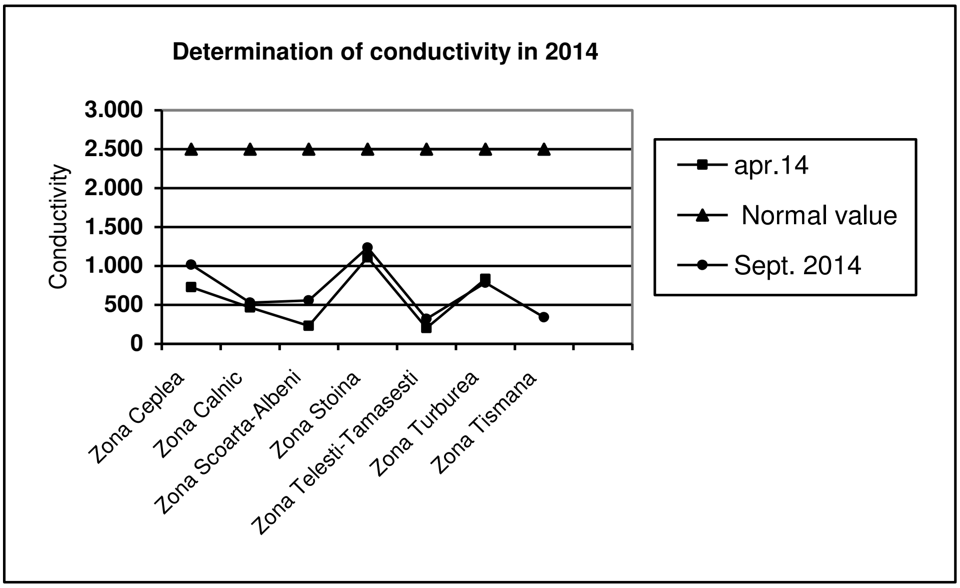

Fig. 6. Conductivity of groundwater in 2014.

4. CONCLUSION

Evidence of groundwater resources in the territorial units for water management was imposed by the need to achieve their management, of their management conjugated to the surface ones as well as the adoption of a policy of preferential allocation. Maintaining water quality and ensuring natural regeneration is the main objective in the field of water policy. In this regard it is necessary to make a clear and permanent record on groundwater resources, volume or flow rate of groundwater exploitation and on their state in terms of quality.

In this study, groundwater quality monitoring was carried out in Gorj County in the 2012-2014 period by measuring quality parameters: nitrates, nitrites, sulfates, chloride, conductivity, pH, temperature, dissolved oxygen, hardness, fixed residue etc.

In 2012, in the Turceni area it was found exceeding the limit of sulphates and elevated fixed residue.

After monitoring in the period 2013-2014, it was found by comparing the measured values of the drinking water provided by Law 458/2002, that none of the monitored areas were exceedances of the allowable limit.

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ASPECTS OF AIR CHEMISTRY IN GORJ COUNTY

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ABSTRACT: Gorj County is located in the south-east, in northern Oltenia, being polluted due to natural sources (volcanoes, fires, burning waste), and anthropogenic (industry, transport, cigarette smoke, human niche). For air quality indicators are measured pollutants and CMA PBB or g / m3. To highlight air chemistry from Gorj county is achieved in continuous monitoring and continuous automatic monitoring stations 3 in Tg-Jiu, Rovinari and Turceni. It constantly monitors SO2, NO, NO2, CO, O3, PM10 and meteorological parameters: temperature, precipitation, pressure, wind direction and speed, humidity, solar radiation.

KEY WORDS: chemistry, air , pollution,Gorj county

1. INTRODUCTION

Gorj County is located in the south-east, in northern Oltenia, on the middle and upper Jiu, where he comes from the name. It is located between parallels 45 ° 38 'north, Peak Parângu Mare and the parallel of 44 ° 58' north latitude, near Tantareni between meridian 23 ° 39 'east, passing near the village Alimpeşti and meridian 22 ° 6 'east longitude, Peak Dobru of Godeanu (fig. 1)

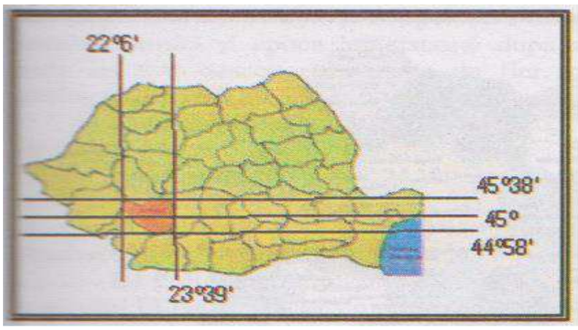

Fig. 1. Location of Gorj between meridian and parallel

Relief of the county consists of three major physical and geographical units which descend in steps from north to south and includes mountain ranges, foothills and hills hillside. Carpathians are represented in Gorj county of Parang, Valcan and Godeanu.

The climate is temperate continental with a wide variety of shades, due to its geographical position, atmospheric circulation and relief components present.

Hydrography Gorj county consists of surface waters (rivers and lakes) and groundwater (freshwater and mineral waters). The artificial lakes reservoirs with power purpose are rivers Cerna, Motru, Tismana, Bistrita, Jiu Gilort and Oltet. Areas richest in groundwater are karst areas of Runcu and Pocruia - Isvarna (Tismana) where supplies drinking water to the city of Targu-Jiu and Craiova.

Gorj county's air quality is affected in a very little pollution than natural and man-made pollution. Gorj county anthropogenic activities are industrial and agricultural activities:

- Lignite mining industry (in Motru basins, Jilt, tomatoes and Rovinari, which represents the main source of pollution in the county of Gorj), anthracite (in Staging) and graphite (in Baia de Fier and Polovragi)
- Building materials industry (powder and dust pollute, because of exploitation of limestone and granite in quarries in Pades Meri and Porceni, but with rare metals, titanium and ziborniu to Golgova and Boboiesti)
- oil exploration industry (Balteni area and Ticleni) and natural gas (Bustuchin and oak)
- electricity generating industry (in the two large plants, Rovinari and Turceni, pollute SOx, NOx, Cox, heavy metals and sediment particles in suspension)
- agriculture (through uncontrolled and inappropriate use of fertilizers and pesticides)

2. CHEMISTRY OF THE AIR IN GORJ COUNTY

The main sources of pollution of natural Gorj county are burning forests (polluting CO, CO2, NOx, PM), decomposing vegetation (polluting with CH4, H2S) and ground (by viruses and any dust on its surface and carried in a storm or strong wind). Pollution sources anthropogenic are industrial processes (especially combustion in two large power plants Rovinari and Turceni), transport, agriculture, the resultant polluted find CO, NO, NO2, N2O, SO2, SO3, PM, VOC, HAP, O3 and the main effect is climate change, the emergence of poles and smog acidic, destroying vegetation.

In Gorj county air quality is monitored by continuous measurements 3 automatic stations located in Tg. Jiu (GJ-1 station) - Str. V.Alecsandri no. 2 Rovinari (GJ-2 station) - Str. Manufacturers no. 7 and in Turceni (GJ-3 station) - Str. Labor no. 452b, location criteria stipulated in Law no. 104/2011. The three automatic stations, industrial type, part of the National Network for Monitoring Air Quality in the country consisting of over 100 stations. Are monitored pollutants: SO2, NO, NOx, NO2, CO, O3, particulates (PM10).

Air quality is represented by specific indicators and general quality derived from the concentration values main air pollutants measured, which are represented by integers between 1 and 6 corresponding ratings: excellent, very good, good, average, bad, very bad . The general index is the biggest day of specific indications that pollutants monitored that day. Air quality indices are disclosed to the public through information panels exterior and interior of the site and the www.calitateaer.ro national daily bulletin of information for the public.

In this respect, based on data provided by the National Network of automatic stations of Air Quality Monitoring, changes in April 2015 index daily general air quality monitoring stations in each county of Gorj is shown in fig. 2, 3 and 4.

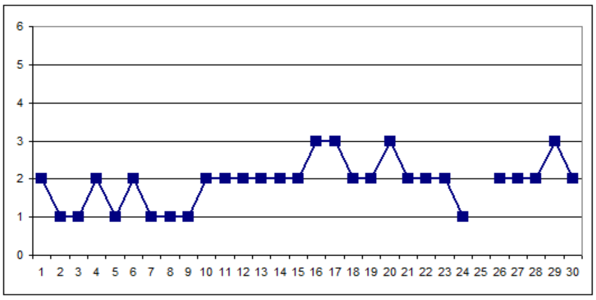

Fig.2. Evolution of the general air quality station GJ-1

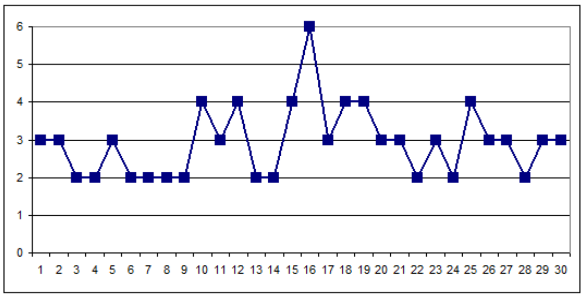

Fig.3. Evolution of the general air quality station GJ-2

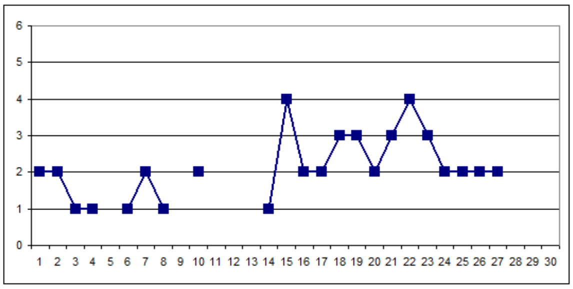

Fig.3. Evolution of the general air quality station GJ-2

According to Law no. 104/2011, highlight pollutants monitored for air quality are: SO2, NO2, PM10, O3, CO, particulate sediment NH3.

Analysing the variation in average daily concentrations of SO2 in FIG. 5 is observed that there were no exceedances of the daily VL 125 mg / m (VL = limit value). For NO2 pollution, no exceedances of the hourly VL 200 mg / m nor the PA (alert threshold) of 400 mg / m (Fig. 6)

Daily average concentrations of particulate matter PM10 in all stations were monitored by automated method (Figure 7), and by the gravimetric method, which is a reference method according to EN 12341/2002 (fig. 8) and shown as PM10 indicator has surpassed VL daily 50 mg / m through automated method at any of the stations and gravimetric method were recorded two exceedances of VL daily 50 mg / mc station GJ-2. In the monitoring point APM Gorj, there have been two VL exceeding 24 hours in total of 21 determinations (Fig. 9).

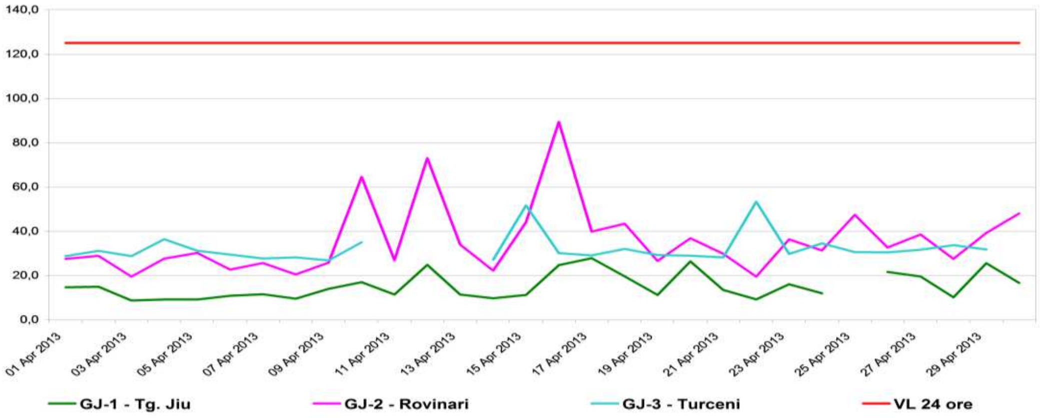

Fig. 5. The evolution of the average daily NO_2

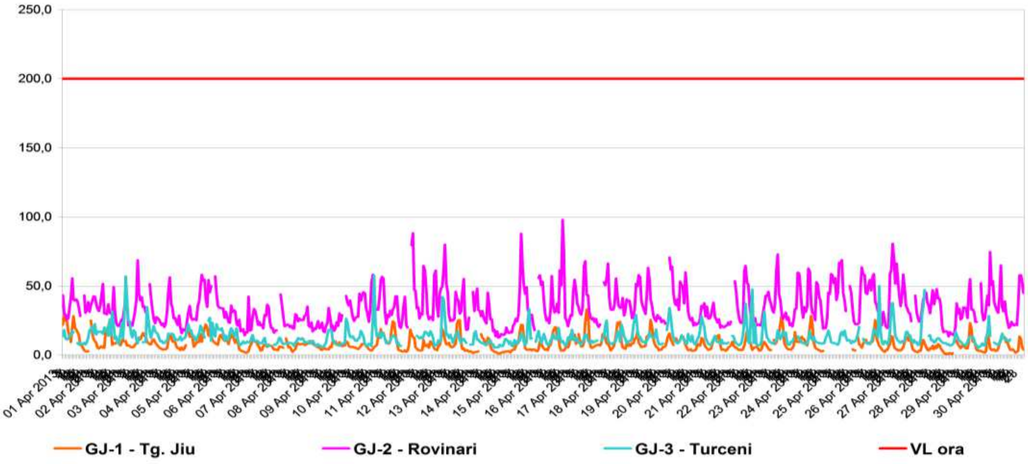

Fig. 6. The evolution of the average daily SO_2

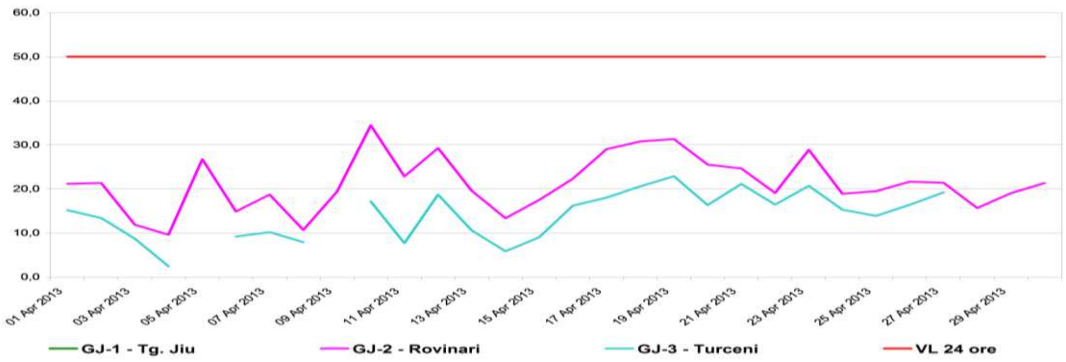

Fig. 7. The evolution of the average daily dust (PM10) caused by automatic method

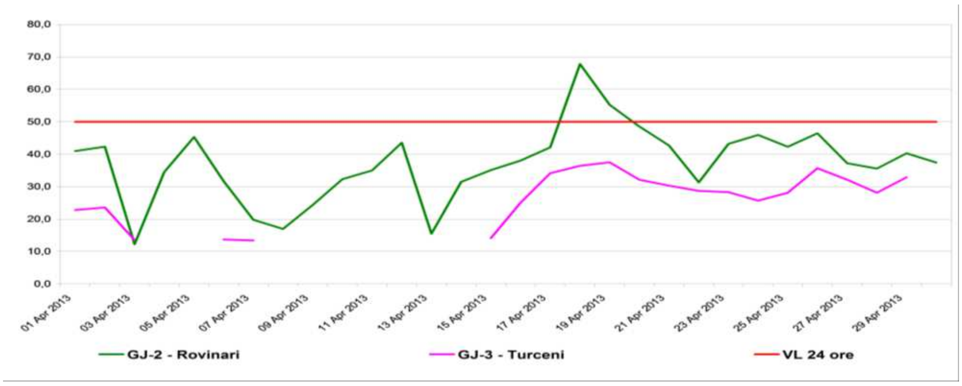

Fig.8. The evolution of the average daily dust (PM10), determined by gravimetric method

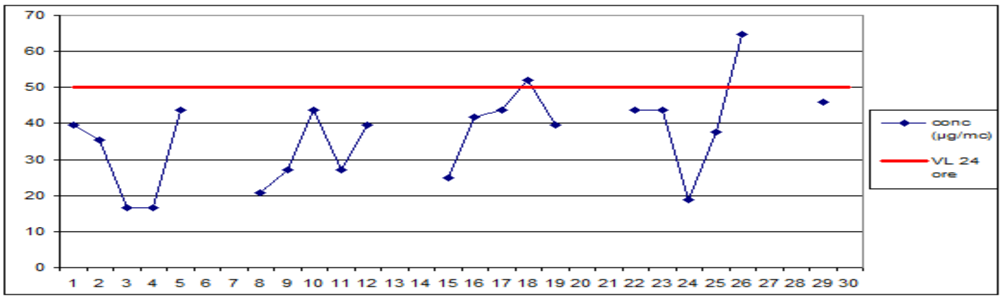

Fig.9. PM10 values in point APM Gorj

And for ozone, which was monitored stations GJ GJ-1 and-2, the maximum daily 8-hour average recorded EVC below the target value of 120 mg / m (fig. 10).

Peaks daily 8-hour average for carbon monoxide were placed well below the limit of 10 mg / m3, stations GJ GJ-1 and-2 from jud. Gorj (fig. 11).

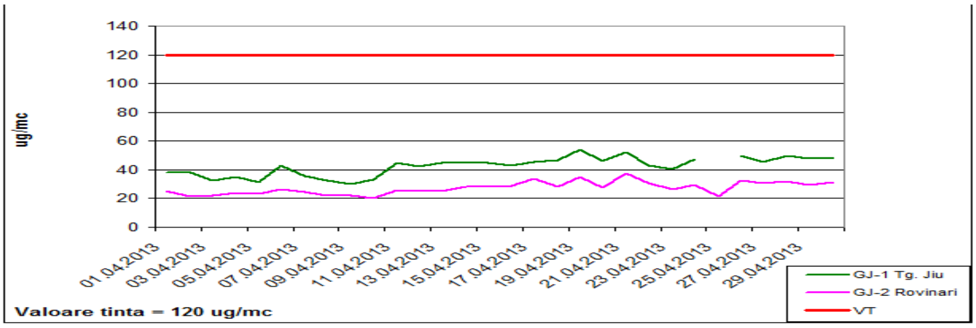

Fig. 10. Evolution of the daily maximum 8-hour average for O3

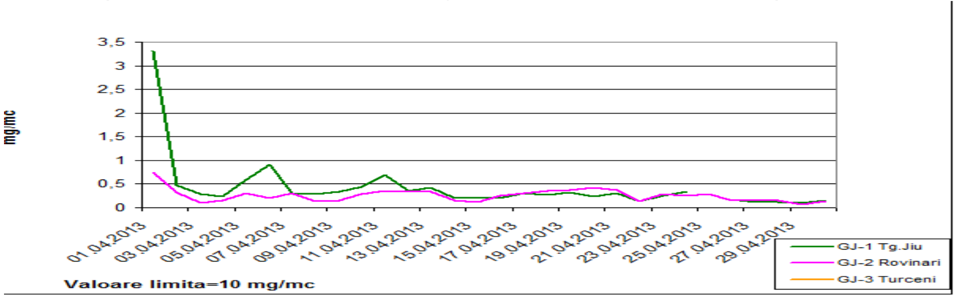

Fig. 11. Evolution of the daily maximum 8-hour average for CO

Air quality measurements indicative of fine sediment areas: Tg. Jiu Bîrseşti, Rovinari, Turceni, tomatoes, Jilt, FARCASESTI, Porceni, Timişeni, Dragoteşti, Bumbeşti Jiu Iezureni are shown in Fig. 12.

Ammonia was determined in four points APM Gorj, Hall Rovinari Motru Town Hall, Town Hall Motru UATAA (fig. 13, 14, 15, 16).

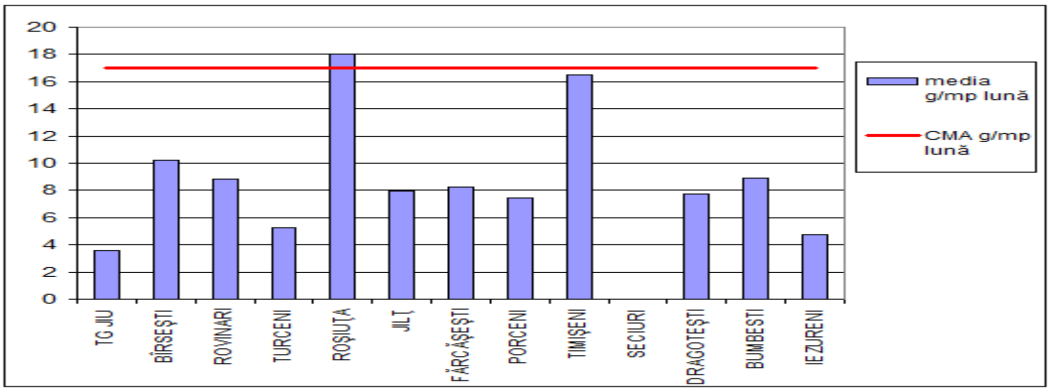

Fig. 12. Monthly averages of fine sediment

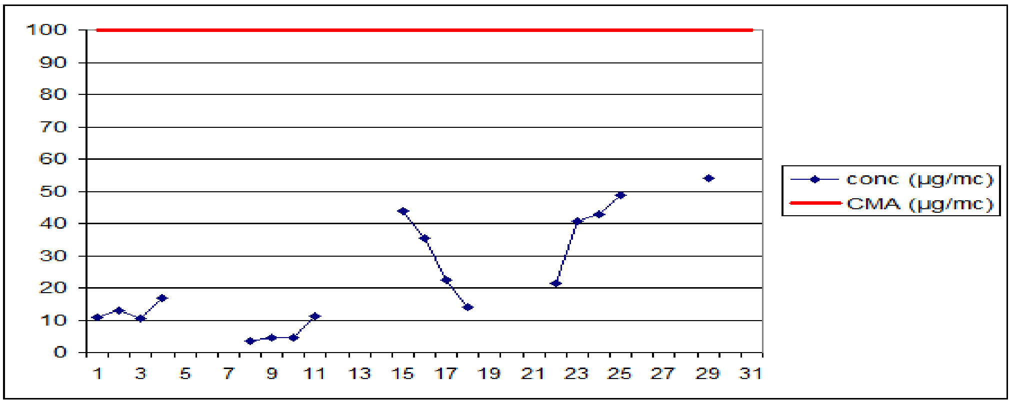

Fig.13. Ammonia NH3 point values APM GORJ

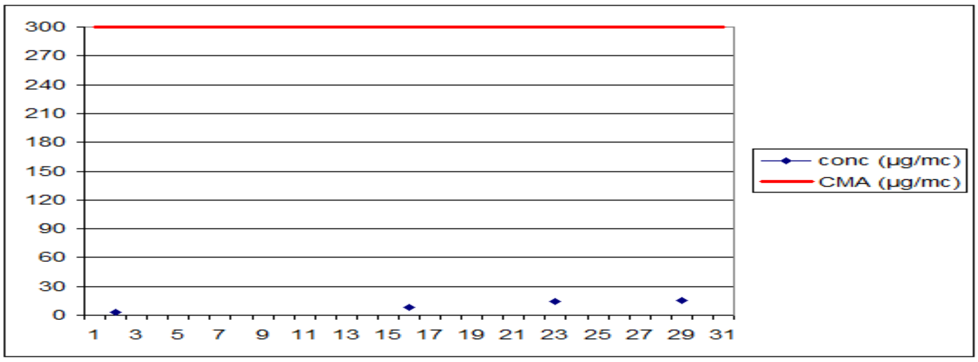

Fig. 14. Ammonia NH3 values in primary point Rovinari

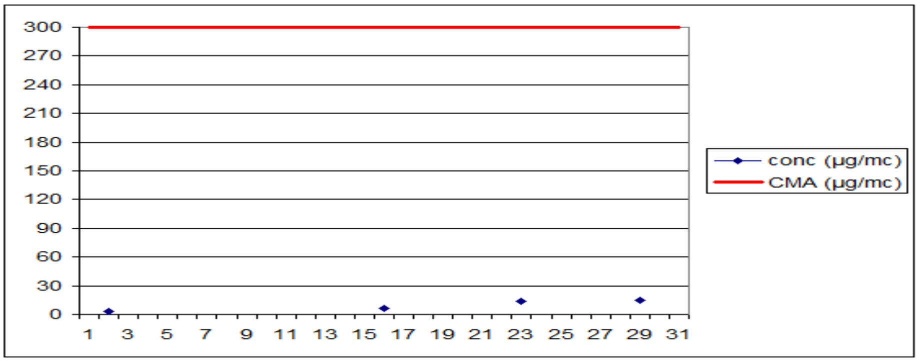

Fig.15. Ammonia NH3 values in primary point Turceni

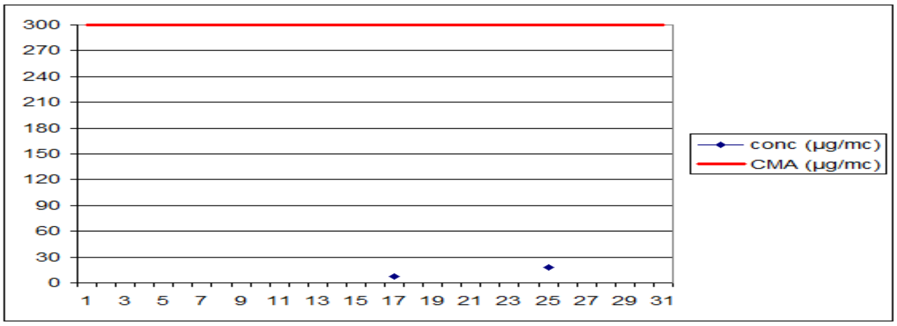

Fig.15. Ammonia NH3 values in primary point UATAA Motru

4. CONCLUSIONS

In april the monitoring station in Rovinari has been reported exceeding SO2 pollutant concentration, possibly due to thermal Rovinari lignite combustion. SO2 concentrations are graphically presented (hourly and daily average values) and shown that no limit values Exceedings.

- For NO2 pollution were not recorded breaches of VL zone and Thresholds. Particulate matter were monitored by gravimetric method and the automatic method demonstradu that there were two daily VL station overruns of Rovinari.
- Ozone was monitored in Tg-Jiu and Rovinari and alue daily maximum was below the target value.
- CO was framed under the limit both in Tg-Jiu and Rovinari.
- Sediment particles were collected from Tg-Jiu, Barsesti, Rovinari, Turceni, Porceni and shown that out of 21 measurements were recorded exceeding the VL 2.
- Of ammonia was monitored APM Gorj point, Hall Rovinari, Turceni and City Hall Motru, neatingadu being under any of the CMA.

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AIR POLLUTANTS AND THE EFFECTS OF ON HUMAN BODY

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Roxana-Gabriela Popa, Uni*versity "Constantin Brâncuşi",* Tg-Jiu, ROMANIA

ABSTRACT: Air pollution can be defined by the presence in the atmosphere of a foreign substance composition of normal or important change in the proportions of its components, which can be harmful and / or directly or indirectly induce changes on health. Direct effects are the changes occurring in the health of the population as a result of exposure to pollutants. Long-term effects are characterized by the appearance of pathological phenomena as a result of prolonged exposure to air pollutants. The negative effects of air pollution on humans is manifested both and the environment and consist of worsening health of people, animals, damage crops, vegetation and forests, the occurrence of changes in climate, etc

KEY WORDS: polluted air , health

1. AIR POLLUTION AND HUMAN HEALTH

Air pollution can be defined by the presence in the atmosphere of a foreign substance composition of normal or important change in the proportions of its components, which can be harmful and / or directly or indirectly induce changes on health.

In general, air pollution is complex type, so that translates the presence of several categories of pollutants that can add up or potentiate the possible injurious to health. In terms of hygiene, air affects health both by its chemical composition and by its physical (temperature, humidity, airflow, radioactivity, pressure).

Action pollutants on the human body translates into acute and chronic effects that can be quantified by modifying specific indicators (mortality, morbidity, etc.). (Figure 1).

Direct effects are the changes occurring in the health of the population as a result of exposure to pollutants. These changes can translate in the order of severity: increased mortality, increased morbidity, or change the appearance of symptoms physio-pathological, physiological changes emergence of direct and / or charging the body with the agent or pollutants.

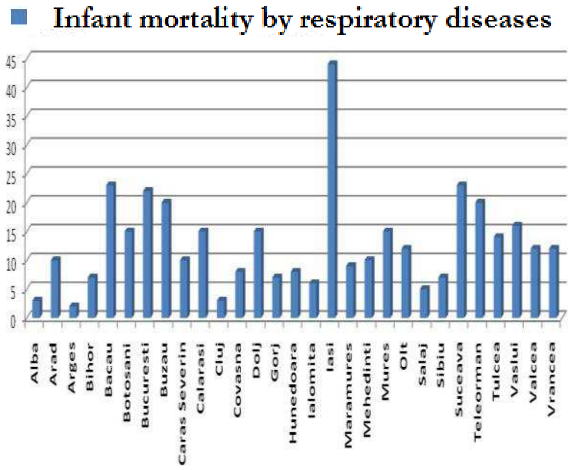

Figure 1. Infant mortality by respiratory diseases (no. of cases), 2014

Long-term effects are characterized by the appearance of pathological phenomena as a result of prolonged exposure to air pollutants.

These effects can result from the accumulation of pollutants in the body, if the cumulative pollutants (Pb, F, etc.) until the load reaches toxic. Long-term effects appear after long periods of exposure may be years or even decades.

Pathological manifestations can take matters specific pollutants (chronic poisoning, allergic reactions, effects carcinogenic, mutagenic and teratogenic) or can be characterized by the appearance of diseases with etymology multiple, the pollutants to be one of the agents etymology cause or exacerbate (acute respiratory illness and chronic anemia, etc.).

If pollutants respiratory system is affected first, and the most vulnerable part of the population category and then child age group> 65 years.

Depending on the aggregate state, pollutants can be:

- gases: carbon dioxide, carbon monoxide, sulfur dioxide, nitrogen oxides, hydrogen sulfide, chlorine, ammonia, ozone
- liquid hydrocarbons and organic solvents vapor or mist
- solid powders of a different nature, in the form of solid particles of various sizes, finely dispersed air
- aerosols of heavy metals, metal oxides, solid sodium chloride

By passing air pollutants, liquid or solid, in the form of finely divided particles, the volume thereof increases several times, the fine particles become part of the atmosphere becomes considerable and remains stable for a long time.Characterization of pollutants may be causing concentration, degree of permanence and their mutual influence.

The degree of persistence of pollutants in the atmosphere is very different, depending on their nature or ability to react and local weather conditions (Table 1)

Table 1. The degree of persistence for various air pollutants

Pollutant	Persisting (persistence)	Self-purification
CO_2	4 years	Through photosynthesis, absorbing water alkaline rocks
CO	2-3 years	By oxidation to CO_2
SO_2	4 days	Oxidation to sulphate, aerosols absorption
NO, NO_2	5 days	Oxidation nitrate
N_2O	1-3 days	Photochemical dissociation, soil biological actions
NH_3	2 days	Oxidation nitrate reaction with SO_2
H_2S	2 days	By oxidation SO_2 and H_2S
hydrocarbons	16 years	oxidation
Freoni (CFC)	100 years	By reducing the chlorinating

Table 2. Maximum allowable concentration for key air pollutants

Pollutant	CMA, mg/m^3	
	immediately	24 h
SO_2	0,75	0,25
H_2S	0,03	0,01
NO_2	0,3	0,1
NH_3	0,3	0,1
Cl_2	0,03	0,01
CO	6	2
Aldehydes	0,035	0,012
Fungicides	0,15	0,05
Suspended particles	0,5	0,15

2. THE EFFECTS OF AIR POLLUTANTS ON HUMAN BODY

The negative effects of air pollution on humans is manifested both and the environment and consist of worsening health of people, animals, damage crops, vegetation and forests, the occurrence of changes in climate, etc.

Direct effects are the changes occurring in the health of the population as a result of exposure to pollutants. These changes can translate in the order of severity: increased mortality, increased morbidity, or change the appearance of symptoms physio-pathological, physiological changes emergence of direct and / or charging the body with the agent or pollutants.

Long-term effects are characterized by the appearance of pathological phenomena as a result of prolonged exposure to air pollutants.

The direct influence of air pollution on public health is to the body changes that occur in people exposed as a result of their contact with various air pollutants.

a. Pollutants irritant

• dust (sediment and particulate) acting airway

Fig. 1. Air pollution with particulate matter (source: www.ecomagazin.ro)

• ash from power plants and coal dust together constitute a contaminant that is solid and aerosol - can irritate the mucous membranes of the eyes and respiratory tract.

• sulfur oxides have a high degree of solubility, cause respiratory irritation leaving them with salivation, spasms and difficulty breathing.

SO_2 - Long-term exposure of the human body at concentrations> 0.1 ppm SO_2, can cause serious damage. (table 3)

b. Pollutants action asphyxiation

• CO (carbon monoxide) is one of the most important air pollutants. It is expected that CO has varying concentrations within the range of 0.1 to 0.2 ppm.

Table 3. The effects of sulfur dioxide on the flora, fauna and human body

Concentration (mg/m^3)	Exposure time (hours)	Effects
2-3	-	-
4-60	-	It affects flora, causing unpleasant olfactory sensations
400-500	1 h	Destroy flora, causing serious respiratory problems
1400-1600	0,5 h	Destroy flora, lethal to humans

c. Pollutants systemic toxic action

Systemic toxic pollutants such as heavy metals exerts its effects on different organs and systems of the body, the effect of the specific substance.

Lead poisoning occurs following conditions: anaemia, afections of brain vessels, hypertension.

Mercury disrupts redox reactions mechanisms at the cellular level and overall metabolism of the human body block as it can accumulate through the food chain.

d. Pollutants action fibrosis

• powders, especially those with high density, persist in the lungs, causing a decrease in lung elasticity, as a reaction to the foreign body to form new tissue around, underpinning the emergence of fibrosis.

e. Pollutants action carcinogen

Polycyclic aromatic hydrocarbons (PAH) are organic pollutants resulting from incomplete combustion of solid and liquid fuels. It focuses on body under prolonged exposure.

Radiation has harmful effects on the human body and depend on the type of radiation, and radiation energy during irradiation.

Depending on the time of occurrence, the effects can be:

- Short-term effects, there is exposure to high doses
- Long-term effects, manifested as malignancy (cancer)
- Genetic effects, manifested in offspring of irradiated parents
- Teratogenic effects occurring in the human embryo

Most human organs sensitive to radioactive pollution are hematopoietic organs (bone marrow), eyes and reproductive organs. (Table 5)

Because of the radiation-which free radicals are produced affects the functions of cells, and sometimes the DNA in the nucleus.

Above the threshold of 0.5 Sv, considered a high dose of radiation, symptoms become visible immediately or in a few days: a weakened immune system, changes in blood cells, internal organs and disorders of the central nervous system.

Not all living organisms are affected equally. Undeveloped species, such as bacteria, resistant to doses of radiation in the thousands of units Gray, while in warm-blooded organisms are destroyed at a dose several Gray units. (Table 6)

Table 4. Action on the human body of heavy metals

Pollutant	The action on the human body
Plumb	It accumulates in the bone, nervous system and hemoglobin biosynthesis etc. -concentrations > 0.1-0.2 mg / d causes mental illness in children

Fluor	- Concentration> 5 mg / d causes stiffness of joints, sprains, fractures, curvature of long bones etc.
Cadmium	- Concentrations> 5d causes kidney disorders, dissolved calcium in the body and cause bone fractures, osteoporosis etc.
Mercury	- Concentrations > 5 mg / d accumulate in the kidneys, brain, hair, red blood cells, causing lesions in the skeletal system, machine vision, kidney, digestive etc.
Arsen	- Concentrations> 5d causes skin disorders, etc.
Pesticide	- Affects the nervous system and enzyme endocrine glands, liver function; carcinogenic effects on progeny etc.

Table 5 The radiation dose and effect on the human body

The radiation dose (Gy)	The effect of irradiation
1 000	Lethal in minutes
100	Lethal within a few hours
10	Lethal within a few days
7	Lethal in 90% of cases
2	The significant increase in cancer cases
1	Temporary sterility

Table 6 The biological effects of radioactivity

Somatic effects contoured	precocious	Erythema, leukopenia
	delayed	Skin cancer, osteosarcoma
Somatic effects	precocious	neurodegenerative disorders
	delayed	Leukemia, thyroid cancer
Genetic effects	first generation	Congenital malformations and hereditary; reducing birth rates
	Succeeding generations	Recessive malformation, decreased immunological capacity

f. Pollutants action allergizing

- mineral or organic powders as gas or volatile substances in insecticides, detergents, plastics, drugs produce acute rhinitis, asthma or skin or ocular manifestations.

4. CONCLUSIONS

The negative effects of air pollution on humans is manifested both and the environment and consist of worsening health of people, animals, damage crops, vegetation and forests, the occurrence of changes in climate, etc

The direct influence of air pollution on public health is to the body changes that occur in people exposed as a result of their contact with various air pollutants.

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THE AUTHORITIES ENVIRONMENTAL PROTECTION

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ABSTRACT: This paper presents environmental protection authorities working in Romania. These authorities are the Ministry of Environment and Climate Change, National Environmental Protection Agency, National Environmental Guard.

KEY WORDS: authority, protection, environment, Romania

1. INTRODUCTION

Ministry of Environment and Climate Change is organized and operates as a specialized body of central public administration, with legal personality, subordinated to the Government.

Ministry of Environment and Climate Change has the following functions:

a) strategy;
b) regulatory and certification;
c) representation;
d) state authority in its areas of activity;
e) administration;
f) the implementation and coordination of financial assistance grants to Romania.
g) monitoring, inspection and control.

Ministry of Environment and Climate Change are carried out directly or through specialized technical bodies, public authorities or institutions which are subordinated ministry coordination or authority, other authorities or companies authorized.

Ministry of Environment and Climate Change Unit to the following:

- National Environmental Protection Agency.
- Danube Delta Biosphere Reserve
- National Environmental Guard

Units under authority:

- Romanian Waters National Administration.
- National Meteorological Administration

2. NATIONAL ENVIRONMENTAL PROTECTION AGENCY

National Environmental Protection Agency was established in 2004 during a period of major institutional reforms in environmental protection.

NEPA is meant to act to ensure a healthy population in harmony with economic and social progress of Romania. The Agency's mission, as well as the eight regional agencies and 42 county agencies, under the direct subordination is to ensure a better environment in Romania for present and future generations and achieving major improvements and continuous air quality, soil and waters.

NEPA fulfills its mission by exercising the following functions:

- strategic environmental planning;
- monitoring of environmental factors;

- authorization of activities with environmental impact;
- implementing environmental legislation and policies at national, regional and local level;
- reporting to the European Environment Agency on the following areas: air quality, climate change, protected areas, soil contamination, water.

2.1. Responsibilities

- providing technical support to substantiate normative documents, strategies and sectoral environmental policies harmonized with the acquis communautaire and based on the concept of sustainable development;
- implementation of environmental legislation;
- coordination of the implementation of environmental policies and strategies at national, regional and local level;
- representation in environmental protection in internal and external relations, in accordance with the mandate given by the Ministry of Environment and Climate Change;
- authorizing the activities with potential environmental impact and ensuring compliance with legal requirements;
- ensure functioning national reference laboratories for air, waste, noise and vibration, and radioactivity;
- Coordinates the implementation of sectoral action plans and national action plan for environmental protection.

3. COUNTY ENVIRONMENTAL PROTECTION AGENCIES

County Environmental Protection Agencies met at county level, the National Environmental Protection Agency's tasks in the areas of implementation and environmental policies, legislation and regulations and coordinates development of action plans at the county level.

4. GNM - General Commissariat

- controls the activities with environmental impact, and apply sanctions provided by the law on environmental protection;
- controls how compliance with the provisions of the regulation on environmental protection, including compliance measures established programs for socio-economic activities and compliance with legal procedures in issuing regulatory acts;
- exercise control on the performance of shares of import-export of products, goods and other materials, with special marketing;
- exercise control of activities of major accident hazards and / or significant transboundary environmental impact, in order to prevent and limit pollution hazards;
- participate in interventions to eliminate or reduce the effects of pollution on major environmental factors and determining their causes and sanctions provided by law;
- controls environmental investments in all phases of execution and access to all documentation;
- proposes the issuing body suspension and / or cancellation of regulatory acts issued by breaching the law;

- establish the facts constituting the offenses and the sanctions applied in environmental protection, notifies the criminal investigation bodies and collaborates with them to establish the facts which, according to environmental legislation, is a crime;
- check complaints on violation of legislation on environmental protection;
- cooperates with other authorities and international environmental bodies and participate in projects and programs undertaken in environmental protection;
- export and transit controls the release of hazardous waste in accordance with international conventions to which Romania is part and import of certain categories of waste allowed to import under the law;
- check the control objectives prior

payment of financial obligations to the Environmental Fund Administration, according to the normative acts on the Environment Fund;

• data available to the public on the state of the environment in accordance with the legislation on public access to environmental information.

5. CONCLUSION

The main authorities in Romania in the environment are: The Ministry of Environment and Climate Change, Environmental Protection Agency and Environmental Guards.

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PROTECTION OF WATERS AND AQUATIC ECOSYSTEMS ACCORDING TO O.U.G. 195/2005 ENVIRONMENTAL PROTECTION

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ABSTRACT: The paper presents the classification of waters and their protection regime.

KEY WORDS: protection, water, ecosystems, law

1. THE CLASSIFICATION OF WATERS SUBJECT TO PROTECTION

In terms of the protection regime and their location, the waters can be:

- international waters, ie the waters to which the Romanian State with other coastal states, those which enter or pass through borders and waters the interests of foreign states were recognized and guaranteed by international agreements;
- territorial waters (inland sea) water contained in that portion of the Romanian shore to sea, whose scope is determined by law in accordance with international conventions (protected under Law no. 17/1990, as amended and supplemented);
- national waters comprising rivers, canals and lakes waterways and river waters and border rivers, the Romanian shore up the border line established by international treaties (subject to the regime established by Law no. 107/1996, with subsequent amendments).

2. THE PROTECTION AND SUSTAINABLE USE

Water Law no. 107/1996, as amended and supplemented, has as main objective the introduction of a protection, conservation, quality improvement and rational use of water sources, indifferent legal status (property) thereof. In this regard, Law no. 107/1996 gives the water a dual status:

- The "determinant factor in maintaining ecological balance" (a renewable natural resource, vulnerable and limited, indispensable for life and society, art. 1, para. 1);
- The "natural heritage" (raw material for productive activities, energy source and way of transport), not "any commercial product", "must be protected, defended and treated as such" (Art. 11).

From an ecological perspective, knowledge, protection, enhancement and sustainable use of water resources are actions of general interest related legal consequences.

In accordance with Art. 4 of Law no. 107/1996, water resources, surface and groundwater are natural monopoly of strategic interest. Establishing use regime, regardless of ownership, is an exclusive right of the Government, the central public authority exercised by the water sector. Waters in public administration are given in the National Administration "Romanian Waters" by the Ministry of Environment and Climate Change, regulation activities navigation and its associated waterways is the Ministry of Transport, through specialized units and atmospheric phase water cycle can only be artificially changed by the Ministry of Environment and Climate Change and those authorized by it under the law.

3. OBLIGATIONS OF NATURAL AND LEGAL PERSONS

Natural and legal persons have the following obligations (art. 58 of the GEO no. 195/2005 on environmental protection):

a. to perform all the works of restoration of natural resources, ensuring migration of aquatic fauna and improvement of water quality, feature within the opinion or approval of the water management and the environmental permit, and to monitor the impact area ;

b. to acquire, in the case of holding ships, floating platforms and drilling rigs with storage facilities and waste treatment, wastewater treatment plants and discharge connections to their bank or floating installations;

c. to equip ports with facilities for the collection, processing, recycling or neutralization of waste oil, domestic or otherwise stored on river or sea vessels, and form teams in case of accidental pollution of waters and coastal areas ;

d. not to discharge wastewater from vessels or floating platforms directly into natural waters and not throw away any waste;

e. do not wash objects, products, packaging, materials that can contaminate surface waters;

f. not discharge into surface water, groundwater and marine wastewater, fecal domestic petroleum substances, priority substances / priority hazardous substances;

g. not to throw and does not settle on the banks in river beds and coastal wetlands and waste of any kind and do not introduce into waters explosives, electric power, narcotic substances priority / hazardous.

4. CONCLUSION

Is prohibited:

- sewage disposal from vessels or floating platforms directly into natural waters
- washing objects, products, packaging, materials that can contaminate surface waters;
- discharges in to surface waters, groundwater and marine sewage, refuse, petroleum substances, priority substances / priority hazardous substances;
-

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CLIMATE CHANGES – CAUSES, EFFECT AND PROVISIONS TO DIMINISH THE IMPACT

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Abstract: This paper present the main problem generated by the climate changes and also present the action to by take to diminish the impact of these changes.

Keywords: climate change, ecosystem, solar activity

Undoubtedly, the all-important event regarding our planet's health and gathering together the world's leaders is represented by the Paris Conference organized under the aegis of United Nations Organization. It is the follow up of a series of meetings at the world's level, the so-called "Earth Meetings", starting with Stockholm in 1972, which accomplished a diagnosis upon the environment, established the first provisions upon preservation of the natural patrimony, at the same time it engendered a series of international and regional bodies and above all it engendered a programme of environmental protection.

In 1992, at Rio de Janeiro, Brazil, a second meeting of international interest took place which assessed the applied provisions. The conclusions were not favourable; they concluded that the anthropic pressures upon the environment increased and a degradation of the natural bio-diversity was registered. As a follow up of this situation in 1997, the protocol at Kyoto was signed; it provided a reduction with 18% of the greenhouse gas emissions until 2020, having as a landmark the year 1990.

In 2002, the conference in Johannesburg took place and Copenhagen in 2009, also with unsatisfactory outcomes; political agreements were concluded mostly. In 1992, Romania signed the Framework Convention of the United Nations upon the climate changes, then ratified through the Law 24/ 1994, through which Romania embarked on stabilizing the greenhouse emissions in the atmosphere.

In 1999, Romania also signed the Protocol at Kyoto, ratified through Law 3/ 2001. Romania embarked on reducing the greenhouse emissions with 18%, in the period 2008-2012, comparatively to the emissions in 1989, the reference level.

The new agreement which will be signed at Paris in 2015 at the Conference of Climate Changes, will be implemented in 2020. The goal of this conference is to sign an intergovernmental agreement under international jurisdiction in order to limit the global warming with 2 degrees until 2100 (a challenge taken on). The agreement will have to be applied starting with 2020. By 2050, the greenhouse emissions will have been reduced with 80-90%. So 2015 with be the year of solutions not of issues.

In December 2014, experts, parliamentary specialists met in Lima to negotiate a text which was to follow the Kyoto protocol and then would be debated at Paris Conference.

The research upon the climate change represents a relatively new domain, yet all the more complex and important; its importance lies in its global character, the frequency of these extreme phenomena manifestation and above all their impact upon different aspects of life itself.

We certainly cannot talk about climate changes when only singular phenomena occurred, but of a rare severity (tornados, hurricanes, extreme draught) whether these extreme phenomena do not occur for a period of at least 30 years. The climate changes are not represented only by the warming process, they are weather manifestations, taking place in different areas of the globe with severe intensity and amplitude, phenomena which cannot be controlled. These climate changes will go on, will amplify, we do not know their exact dimension in the near future and the consequences upon the inhabitants. During the last century the temperature increased with 0.95 degrees, thus determining an accelerated warming, the global rate being 0.7 degrees Celsius. In the second half of this century the severity and its irreversibility may not be denied any more.

On the other hand, the human society has become more vulnerable in front of these natural calamities, the phenomenon having also an ethical effect, the poor countries being subject to at a greater risk comparatively to the wealthier, which, as a matter of fact are the great polluters, as it is the example of USA and China. The fact that, at their last meeting the Chinese Prime Minister and the president of USA, Obama have discussed the problem of climate changes at point 8 on their agenda is hopeful.

The degree of preparations of the societies to face such extreme phenomena is different both educationally speaking and from the infrastructure point of view or the organization. Obama launched the plan "against great menaces of the climate change" and one of the most severe is Carbon emissions. The American plan for clean energy provides the reduction with 32% of the carbon emissions in the electrical plants comparatively to 2005.

The influence of the phenomenon upon the planetary ecosystem is supported by most of the international scientific community. That is why the scientists have to provide answers for the questions:

- Does the climate change? If yes, how quickly and how much it changes?
- What will be the impact of the climate change?
- Which will be their dimension?
- What serious consequences will be?

We are in the middle of the process to understand the phenomenon with multiple causes with global, regional and local implications. From here derives each of us responsibility to contribute to saving our piece of Earth. If there is unity and the scientists take joined action in manging the phenomenon, there is no common answer concerning the fact that the anthropic actions would underlie the climate warming. As a matter of fact, we can state that there is symbiosis between the anthropic activity and the natural causes of the climate changes. Many say it is too late for the health of the Planet which is endangered, but still there is another opinion. Here is what president Obama states “we are the first generation who felt the effects of the climate changes, but we are the only generation who can accomplish something in this area”.

The causes determining these climate changes are natural and also anthropic. The anthropic phenomenon, a major generator of the climate change was exaggeratedly assessed, because there are other factors causing the climate changes. The natural factors has represented the main cause of the climate and geological changes since the planet was formed until now. In all the glacial eras there were periods of global warming alternating with local cooling mare or less severe.

1. The solar activity takes is based on natural laws, its activity increase or decrease the global warming.
2. The glacial blocks favour the recycling of a significant quantity of fresh water in the biosphere. The planetary ocean is part of a complex system conveying the warmth towards different regions of the earth because of the different concentrations of salinity and temperature.
3. The methane is to be found in important quantities underground and especially within the soil and under the waterbed at the level of oceans. It has a greenhouse effect 60 times higher that CO_2. The Black Sea is the unique place in the world where the methane is released continuously.

- The oceans dissolve important quantities of CO_2, another gas with extended greenhouse effect; the concentration of CO_2 increased from 279 ppm before the industrialization period to more than 400 ppm now.

4. We are witnessing an increase of the volcanoes activity under the action of more and more severe dislocations of the tectonic plates. The number of active volcanoes doubled.
5. The number of earthquakes increased a lot. Along with the anthropic factor, a major pollution of the environment takes place.

- The water gas represent 95 % of the greenhouse emissions. The magnetic field has also major influences within the process of global warming.

  Of the anthropic causes we mention:

  Combustion of fossil fuels.

  Global warming represents the dark side of an industrial civilization.
- Change of categories of train use.
- Demographic explosion.
- The pollution process has overcome the ecosystems recycling power.

The climate changes influence the life of every Planet's citizen. Another worrying aspect is determined by the brutal intervention of the man upon the rain forests, the lungs of Terra. Over12 % has been cut; it shelters 50% of the Terra's animals.

There have been three centuries of slow evolution within the society development. 20 century followed with a dynamic evolution. It was the century of all-important discoveries, the atomic bomb discovery which can be disassembled not dis-invented until the Cosmos discovery. This century was also the century of the two World Wars whose repercussions are still to be seen and felt, we should not forget them.

We are witnessing an unknown development and broadening of the human society. The beginning of 21 century brings about new challenges. In 2030, the first human team will step on March. As a follow up, 1 m inhabitants will live on this planet.

Yet the question still exists: "Are we the beneficiaries or the victims of these breakthroughs"? How natural or normal will life be at the end of 21 century?

Unless the human being succeeds in managing the dark side of progress, the externalities, which inevitably occurs in an industrialized civilization, he will become the victim of his own technology, of negligence and of ignorance, paraphrasing Voltaire: "The nature lacked attention one moment and the human was born. A moment is enough for the human not to pay attention and the nature will repair its mistake".

Effects of climate changes

The amplitude and rapidness of this process are more and more obvious.

The rapidity of the climate change is quicker than the adjustment rate of the beings. Large areas are at risk of becoming hard to live in and usefulness for the economic activity. The effects upon plants and animals will determine a migration towards other habitats. The areas conflicts, draught or hunger will lead to this migration.

We are indorsing waves of warmth which have increased in frequency and duration. The period 2002-2011 was the warmest interval with an increase of 1.3 degrees Celsius comparatively to the average rate before industrialization. Increases of 2.5-4 degrees Celsius are to be expected until 2100. The absolute thermic maximum rate of July was 4 4.3 degrees Celsius al the meteorological station Calafat on 24 July 2007. Last century the thermic maximum rate was 41.8 degrees Celsius on 5 July 1916.

The first 7 months of 2015 were the hottest of the last130 years. There are great differences in thermic regime of more than 15 degrees in short intervals. The period 7-25 August was the chilliest record period after 1961. 2015 will probably be the hottest year, the forecast shows the same situation for 2016.

Rainfall regime has suffered major alterations. The annual quantity in 2005 was 10823 l/ square meter, much more over the record value registered last century, 7924l/ m_2 in 1972.

There was an increase of temperature with seasonal variations, July temperatures being registered in September. Other extreme phenomena are registered, too:

- Alteration of the hydrologic regime;
- Increase in frequency and intensity of the extreme phenomena (flood, continuous draught, tornadoes);
- Reduction of biodiversity, some species will disappear, the number of harmful creatures will increase;
- Increase of the level of planetary ocean;
- Effects upon the health of human population;
- Diseases, physiologic changes in plants and animals;
- Acidification of oceans;
- Increase in the CO_2 concentration.

CONCLUSIONS

There are solutions, yet they do not refer only to international agreements and stoppage of deforesting; a new attitude is necessary for adjustment and change; promoting a new pro-ecological lifestyle; finding new forms and methods for social and economic development in order to ensure a balance among the social, economic, technical, scientific, economic and ecological aspects. This does not mean for the economy to reach the 0 moment, but rather developing an economy under the conditions of observing the laws in the environment domain, the economic process being a consequence of the biological one. They exist as two ecosystems overlapping each other. We live in a world dominated by speed –

informational speed. We have to change the two-termed contents, man or nature, in a unique one – man and nature. The mother-Earth offers enough to cover the man's needs, but not the man's greed.

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THE EFFECTS OF GREENHOUSE GAS EMISSIONS UPON THE GLOBAL WARMING PROCESS AND THEIR IMPACT AT THE LEVEL OF GORJ COUNTY

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Abstract: The climate changes represent a characteristic *of our planet's history. The earth has suffered a series* of major alterations of the climate along its history and now we are in the middle of a gradual warming process. This paper present a study about gas emissions at the level of Gorj county.

Keywords: greenhouse, gas, worming, process

The climate changes process of gradual warming process began with the last glacial era, 10. 000 years ago. 100 years ago, the temperature increased two times quicker and its consequences could be very serious.

The gas stratum of Terra is involved in a major phenomenon called „the greenhouse effect" which refers to the disorder of the radiative warm exchange of the earth with the cosmic space.

The Kyoto protocol has nominated the greenhouse gases as: carbon dioxide (CO_2), azote protoxide (N_2O), hydro-fluorine-carbides (HFC), per-fluorine-carbides (PFC) and sulphur hexa-fluorine (SF_6).

Knowing the rates of these emissions represents a useful instrument for the decisional factors for the aim of appreciating the existent situation, creating the necessary basis to frame the environmental policies leading to a decrease evolution of these emissions, in order to observe the duties taken on through Kyoto protocol.

Total annual greenhouse emissions

The quantities of the harmful greenhouse emissions in Gorj County have been assessed on the basis of EEA/EMEP/CORINAIR methodology, with the help of SIM-F2 application and the primary data provided by economic agents and the institutions inquired according to MAPM Orders no. 524/ 2000 (for the period 2000-2010) and no. 3299/ 2012 (for the period 2011-2014).

The anthropic activities with the most important rate in producing the greenhouse emissions are combustion processes. In Gorj County there are two powerful electrical plants, S.E. Turceni and S.E. Rovinari.

The level of the emissions responsible of producing the greenhouse effect diminished in the period 1998-1999, comparatively to the level registered before 1990, as a follow up of, in the first place, diminishing the economic activity at the level of the whole country; but in the interval 2000-2006 at the level of Gorj County, the electrical consumption increased as a consequence of increasing the fossil fuels consumption in the thermos-energetic sector.

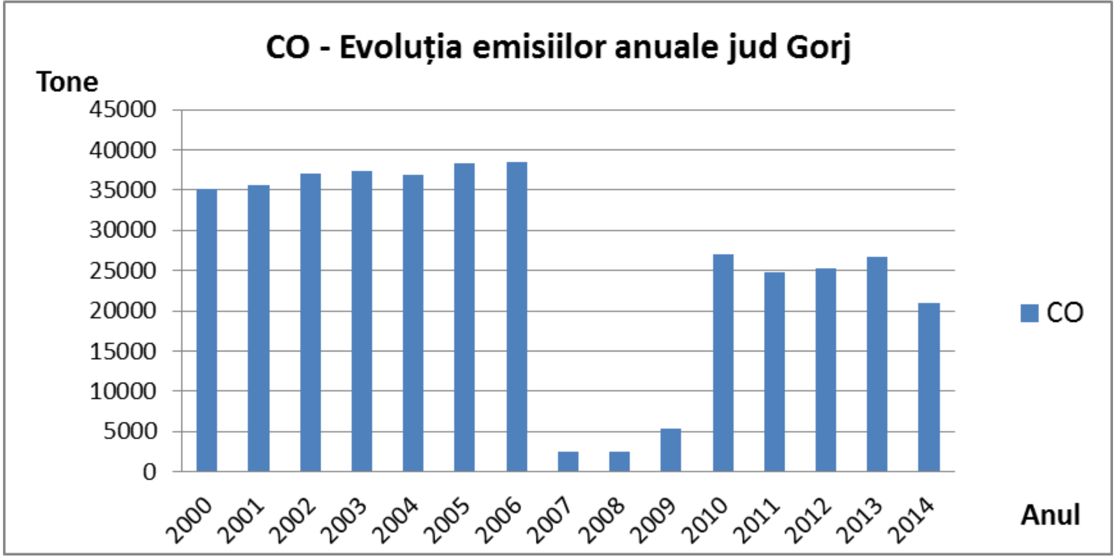
The diminishing in the interval 2007 - 2014 was due to the reductions in the thermos-energetic system and of the fact that the domestic sector was not taken into account.

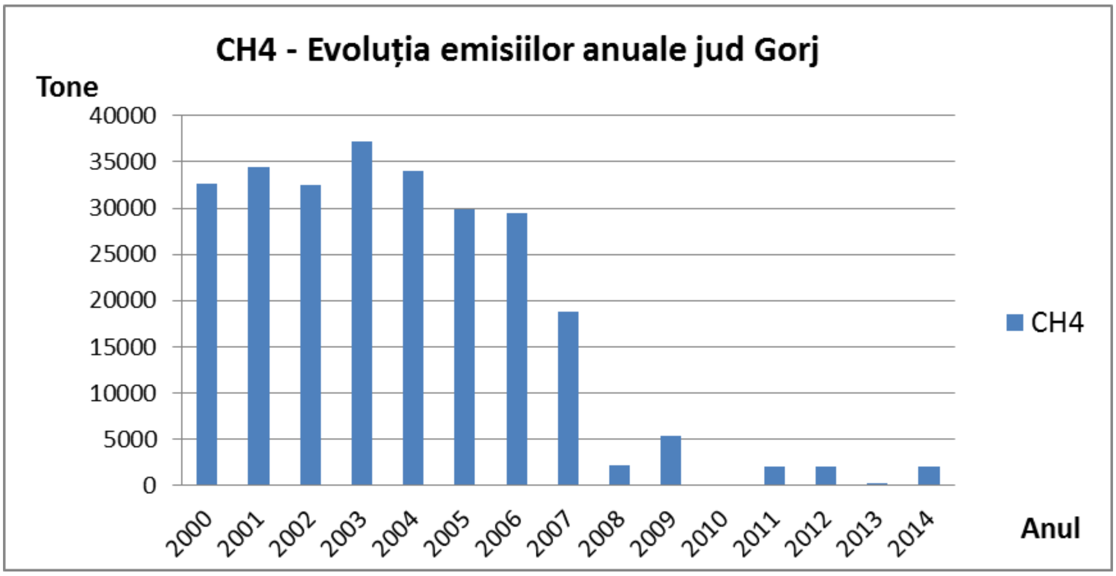
In the following table, the greenhouse emissions are presented for Gorj County, in the period 2000-2014.

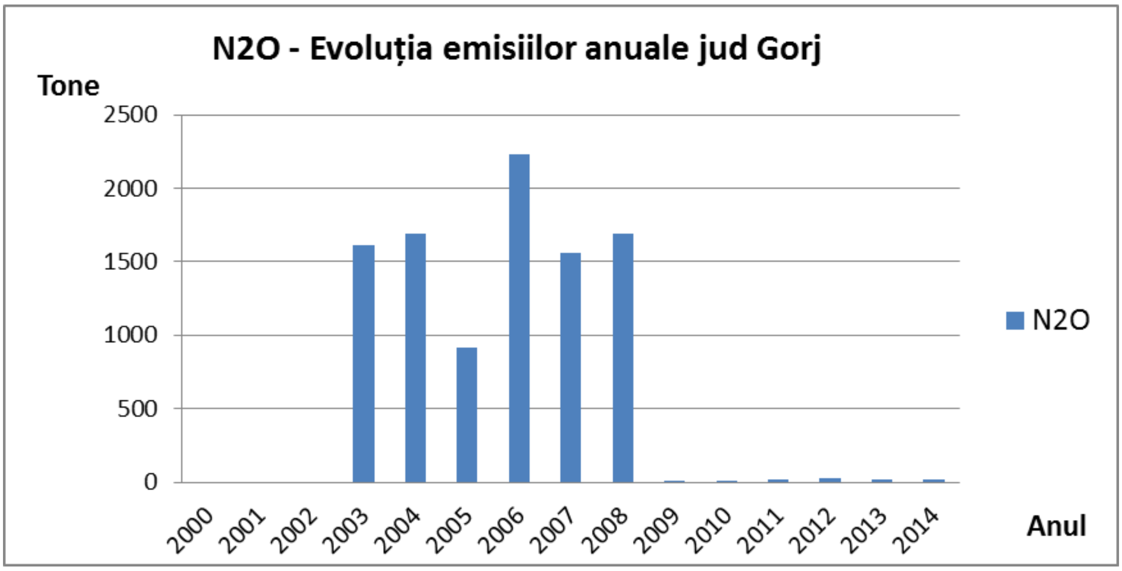
Greenhouse emissions (UM – tone)

Year	CO_2	CO	CH_4	N_2O
2000	11985151	35124	32577	-
2001	11494927	35534	34460	-
2002	12623534	37019	32455	-
2003	14647330	37439	37220	1614
2004	13643306	36930	33974	1694
2005	13278330	38332	29886	912
2006	16249000	38523	29506	2229
2007	13802840	2482	18743	1558
2008	14308310	2509	2182	1695
2009	12315708	5324	5380	13
2010	11927350	27049	103	2,5
2011	13632311	24713	2052	21
2012	14659867	25257	2048	22,05
2013	9621262,03	26627,83	293,94	17,34
2014	9847837,231	21027,24	2017,059	21,5407

Annual evolution of emissions in Gorj County







Total annual emissions of CO_2

This table presents the tendencies of anthropic greenhouse emissions expressed in CO_2 equivalent, transformation accomplished based on the global warming coefficient (GWP). These coefficients refer to the capacity of different gases to contribute to the global warming in a time interval of 100 years.

CO_2 emissions coming from combustions in electrical and transformation industries represent the greater part of CO_2 emissions estimated at the level of Gorj County.

Total emissions with greenhouse effect (tones of CO_2 Equivalent)

Year/polluting	**Co_2 Equivalent**	**CO-CO_2 Equivalent**	**CH_4-CO_2 Equivalent**	**N_2O-Co_2 Equivalent**
2000	11985151	35124	684117	-
2001	11494927	35534	723660	-
2002	12623534	37019	681555	-
2003	14647330	37439	781620	500340
2004	13643306	36930	713454	525140

2005	13278330	38332	627606	282720
2006	16249000	38523	619626	690990
2007	13802840	2482	393603	482980
2008	14308310	2509	45822	525450
2009	12315708	5324	11298	4030
2010	11927350	27049	2163	775
2011	13681800	24713	43087	6370
2012	14709700	25257	43011,15	6835.5
2013	9704636	26627,83	6172,74	5722,22
2014	9917900,321	21027,24	42358,23	6677,617

Total emissions of greenhouse gases per capital.

This table presents the ratio between the total annual emissions with greenhouse effect expressed in CO_2 and the total population.

Total gas emissions with greenhouse effect per capita

	Equivalent CO_2	Population	Indicator
2000	12704000	396823	32,01
2001	12254000	396700	30,89
2002	13342000	396495	33,65
2003	15967000	386890	41,27
2004	14919000	386097	38,64
2005	14227000	384852	36,97
2006	17598000	383557	45,88
2007	14682000	381643	38,47
2008	14882000	378871	39,2
2009	12336000	377718	32,6
2010	11956775	376179	31,78
2011	13681769	334238	40,9
2012	14734972	372719	39,5
2013	9659439,96	370861	26,05
2014	9847837,231	369857	26,62

Romania’s participation to implementing the European scheme of the certificates for the greenhouse emissions

In Gorj County there are 6 societies entering under this decision and which requested and proposed a certificate for GES.

These are: S.E. Turceni, S.E. Rovinari, S.C. UATAA Motru, S.C. Simcor Var S.A., S.C. Macofil S.A., S.C. Petrom S.A., operating areas: Bărbateşti, Bustuchin, Slavuta, Ticleni, Turburea, Bulbuceni.

Implementing schemes for commerce offer the economic agents of the energy and industrial sector the possibility to participate in trading the GES emissions certificates and in case of diminishing the emissions, the company can obtain supplementary profit by selling the certificates surplus.

As a consequence of the anthropic activity, in the last period, we are witnessing a process of global warming, but also extreme weather phenomena: continuous draught, abundant rainfalls, floods, storms which also affected Gorj County.

All these have led to the phenomenon of arid surfaces especially in the southern Oltenia.

Meteorological data in Gorj County

Temperature of air – absolute maximum and minimum annual rate, meteorological stations (degrees Celsius)

No.	Meteorological station	Years of observation	Annual absolute maximum	Date	Annual absolute minimum	Date	Annual average
1.	Polovragi	2009	34,2	24.VII	-16,1	21.XII	10,2
		2010	33,3	14.VIII	-19,9	25.I	9,7
		2011	32,5	09.VII	-14,9	27.I	9,7
		2012	36,9	07.VIII	-20,6	02.II	10,9
		2013	34,3	29.VII	-10,8	10.I	10,5
2.	Târgu Logreşti	2009	34,7	24.VII	-15,4	9,13.I	11,0
		2010	34,4	14,15.VIII	-22,3	21.XII	10,3
		2011	34,0	09.VII	-16,4	01.II	9,7
		2012	37,7	24.VIII	-28,14	09.II	10,4
		2013	36,3	29.VII	-12,8	08.I	10,5
3.	Apa Neagră	2009	35,5	24.VII	-24,2	21.XII	10,8
		2010	35,4	13.VI	-22,4	25.I	10,2
		2011	35,8	09.VII	-19,8	31.I	9,8
		2012	38,4	21.VII	-28,4	09.II	10,5
		2013	38,6	29.VII	-15,0	08.I	10,9
4.	Târgu Jiu	2009	36,5	24.VII	-19,2	21.XII	11,8
		2010	35,5	14,15.VIII	-18,0	25.I	10,9
		2011	35,9	09.VII	-15,1	31.I	10,8
		2012	38,5	24.VIII	-23,1	09.II	10,8
		2013	38,2	29.VII	-10,1	09.I	11,7

Rainfalls – annual, meteorological stations (mm)

No.	Meteorological station	Years of observation	Annual quantity
1.	Polovragi	2009	935,0
		2010	1178,0
		2011	627,7
		2012	886,1
		2013	988,3
2.	Târgu Logreşti	2009	645,2
		2010	807,7
		2011	451,7
		2012	619,1
		2013	725,7
3.	Apa Neagră	2009	1236,6
		2010	1443,6
		2011	598,1
		2012	944,3
		2013	1018,1

4.	Târgu Jiu	2009	802,9
		2010	981,4
		2011	513,0
		2012	713,3
		2013	851,3

All these meteorological process had a direct impact upon the average productions obtained per hectare in different agricultural crops in the period 2000-2015. They had also a negative impact upon different domains of life itself from material damages to losses of human lives.

Actions for mitigating and adjusting to climate change

Although the GHG emissions of the products in the energetic sector diminished comparatively to the year 1989, energy production remains the main source of GHG emissions and consequently this sector needs important investments in order to reduce the GHG emissions and other polluters resulting from energy production SO2, NOx or ashes.

The extended character of the economic activities causing climate changes demand a global approach at the level of economy, of identifying and correlating the development activities and implementing the intra- and inter- sectorial provisions connected to climate changes.

Examples of adjusting actions at the local level:

- Obtaining and utilizing in agriculture the species immune to draught;
- Prevention of incidents in the extreme temperatures periods;
- Asphalt strata durable to extreme temperatures fluctuations;
- Adjusting the building codes to the future climate conditions;
- Revaluating the fresh water resources at the level of hydrographic basins under the conditions of climate changes;
- Foresting with species immune to hydric and thermic stress.

In the period 2005-2007, through successive Government decisions, the polluters at the national level were allowed polluting rights with CO$_2$ for the period 2008-2012. The two electric plants in Gorj County were sub-allowed 3 m tones of CO$_{2-}$/ per year, this quantity to be purchased on the market. This division was not fair and affected Gorj economy; the two producers were to spend thousands of millions of euros in order to achieve the products.

Meanwhile, other producers in the country were super-allowed; they sold the right to pollute.

Re-allocating the fields in the agricultural circuit of the fields released of economic duties remains one of the greatest issue of Gorj County.

The fields which are out of the agricultural circuit, as a consequence of the mining activities are of thousands of hectares, representing an open wound from ecological point of view.

The fact that the stages were not pursued correctly concerning coal uncovering and extraction, the fertile soil being mixed with ballast soil contributed to de-structuring and de-fertilization of the soil, thus the ecological rehabilitation being more difficult.

There is no complete legislation, specialized structures and bodies to deal with this activity.

After analysing the data from the economic agents and by the responsible local factors in charge with these activities emphasize the following conclusions:

Situation of the fields owned by the mining units on 01.01.2012

No.	Unit	Owned surface		
		Total (ha)	Of which	
			agricultural (ha)	sylvan (ha)
1.	Rovinari field	6589,07	4697,48	1891,59
2.	Motru field	2684,88	1949,11	735,77
3.	Berbeşti field	1574,54	1391,74	182,8
4.	Jilţ field	2382,25	1495,85	886,4
5.	Mehedinţi field	656,65	367,25	289,4
TOTAL MINING FIELDS		13887,39	9901,43	3985,96

Some conclusions and necessary provisions:

- Ecological reconstruction process is very slow;
- Important surfaces of ballast coal have not been put in the circuit;
- Ecological reconstruction is performed abnormally and sometimes incomplete without biological re-planting and is difficult at the level of the local communities;
- Though there are regulations and duties addressing to the specialized institutions and to the mining operator, the organizational capacity and executioner for re-building the excavating surfaces lack.

Taking into account this situation, we consider accomplishing a provisions plan leading to accelerating the ecological rehabilitation of the fields in Gorj County is of necessity.

Conclusions

At the level of Gorj County, founding a specialized unit for ecological rehabilitation of the fields released of technological duties is mandatory; ensuring the financial resources; involving the educational and research units within the substantiating and implementing the rehabilitation of environment programs and sustainable development.

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