

THE OPTIMIZATION CHOICE OF MATERIALS BY POINT OF VIEW ECONOMICAL AND TECHNICAL

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ABSTRACT: Problems related to to optimize the choice of the material tools have a special importance on their reliability, but also in costs involved when they use various materials for the execution of them tools. In order to optimize the choice of the material of tools used for cutting sheet by stamping be taken into account the following factors of influence: the reliability of tools (Wear forces, hardening, semiproduct, deviations from the the geometrical shape); the material price from tools; the technological of tools made from respective materials.

KEY WORDS: steel, improved, nitrided, covered by sparks, optimization

1.INTRODUCTION. SCORING MODE

In order to project and realize the stand there have been used as projection data the technical characteristics of the machines and punching devices used in the cutting operations.

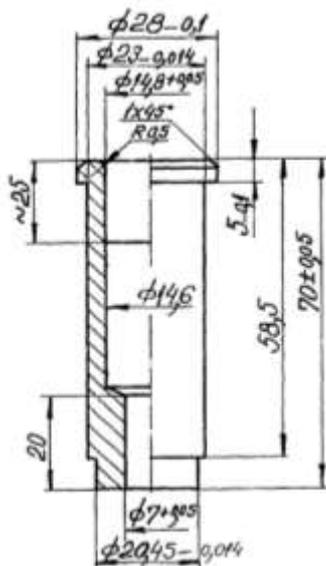


Fig.1 The punch

The chosen tools for the study are presented in the figures 1 and 2. With the help of the value of the necessary force developed in the cutting process and of the efficiency of the movements transmission (trapezoidal belt) the electric power engine of acquisition had been calculated.

On these basis of the calculations a vertical press RM5 type with three-phase engine with 5kw power and a 940 rot/min rotation. The pressing force of this is of 60tf, the course length of 40 mm, the number of double courses per minute being of 75, and the practical hour capacity 4500 pieces.

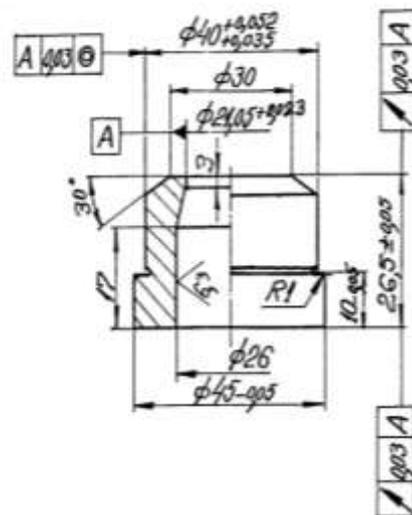


Fig.2 The punch

The used accessories were: peeler feeder, tool holder device, vaseline and oil lubricator, automatic electric for starting and stopping command of the car.

At the stand projection it has been taken in consideration the fact that for researches it is necessary to realize sets of tools from different materials in order to

keep identical the same working conditions: the same charge of the cutting material, humidity, temperature, lubrication, dust, etc.

The experimental results give us information that we can use in this sense. Problems related to the price and the technological of tools we will resolve them having regard to mechanical properties, chemical and materials used in the execution of technological tools.

The optimal choice of technically and economically tooling material was accomplished by giving some scores corresponding to the three factors of influence. For optimize the choice of material from tools, it was envisaged that the reliability of tools followed by the technological respectively the price for tools material. Based upon these considerations have been awarded the following scores: $F=0,4$ – for reliability of tools; $T=0,3$ – for the technological of tools; $P=0,3$ – for material price from tools.

When determining the amount scores for the three factors of influence was considered that the sum of points awarded is equal to the unit. After the granting of these scores are establishment of note with values between 1 and 10 for each material based on the following considerations: wear, strength, hardening, the geometrical shape deviation, the price of material and the technological of tools. The value grades given of tooling materials, treated differently in the viewpoint of wear, the force developed in the process, treated differently in the viewpoint of wear, the force developed in the process, semifinished material hardening and deviation from the geometric shape was established based on data presented in tables and images of tools used in previous chapters. The size of grades given and their rationale is as follows:

- the tool wear from steel improved 205Cr115
- because of particular properties of this material and tool wear amount was quite little existing small traces of seizure that caused us to give note 8;
- the tool wear from covered by sparks steel OSC10– the tools obtained by covering with metallic carbide had best behavior in terms of wear compared to other treated materials used

in experiments, which allowed us to give the note 10;

- the tool wear from steel OSC10 chromate - tool wear made from this material is approaching the value of the minimum observing that the edge has remained without major dislocations of the material in return was done exfoliation of surface on the exterior of the punch and the mark given based on those considerations was 9;

- the tool wear from nitrided steel OSC10 - the value of wear of these materials is fairly small with small dislocations being observed on the contour cutting edge and slight traces of seizure, which has enabled us to give note 8;

- the tool wear from steel improved OSC10 - tool wear made from this material is big enough observing the pinches and dislocations of material as well as a pronounced seizure on external cylindrical surface the tools having a look lumpy, and all of these led us to grant note 6;

- the cutting force for the tool steel improved 205Cr115 – force developed in the cutting process using these tools is somewhere at the middle compared to the other tools which has led us to grant Note 9;

- the cutting force for the covered by sparks steel tool OSC10 - the variation of cutting force from entering into material workpiece and to generate the crack it as well as the maximum amount of force does not differ much from that of a new tool what we allowed him to give note 10;

- the cutting force to the chrome steel tool OSC10 - the cutting force of this material is comparable to that of steel tooling 205Cr115 improved and given marks based on these considerations has been 9;

- the cutting force to the tool steel nitrided OSC10 - the maximum developed force in stamping process is fairly large compared to other tools which imposed to give note 8;

- the cutting force tools for improved steel OSC10 - the force developed by these tools is the largest of all the tools surveyed and therefore I gave note 7;

- the workpiece material hardening caused by the action of improved steel tools 205Cr115 – the tools values due to cold hardening of this

material are environments which imposed the granting Note 8;

- the hardening of the material workpiece caused by the action of tools covered by sparks steel OSC10 - action tools of this material on the plate workpiece in terms of increasing the material strength is fairly small, the maximum value of cold hardening of all materials tools studied is minimal which imposed the granting note 9

- the hardening of workpiece material caused by the action of nitrided steel tools from OSC10- increasing the hardness to the material caused by these tools, it is fairly accentuated the material of workpiece which has lead to the grant note 7;

- the workpiece material hardening caused by the action of tools steel improved OSC10- for these tools there is a great influence on cut cold hardening materials and the maximum of the hardness is the biggest of all the tools under analysis research, the mark given under these conditions being 6

- the deviation from the geometric shape of the steel for tools improved 205Cr115 - the maximum values for these tools are medium deviation and sudden variations thereof are quite small which has lead to the grant of note 8;

- the deviation from the geometric shape of the steel for tools covered by sparks OSC10 - deviation of these tools is the least pronounced of the tools having large variations in this study which has led to the grant of note 10;

- the deviation from the geometric shape of the steel for tools chrome plated OSC10 - and deviation values of the geometrical shape of these tools are quite small comparable to previous of tools which caused us to grant note 10;

- the deviation from the geometric shape for nitrided steel tools OSC10 - tools for these deviations are quite large, which has lead to the grant of note 7;

- the deviation from the geometric shape for improved OSC10 steel tools - these tools have the largest deviation from the geometric shape that has been granted Note 6;

To establish the notes to be given tooling materials in terms of the other two parameters (the material price, the technological tools)

were considered material characteristics. The notes decisions taken and justifications given are as follows:

- the price of steel tools OSC 10 improved - this tool steel is a relatively expensive alloying elements and due to the conditions imposed in its production, so note that I was given, it was 8;

- the price of steel tools from 205Cr115 improved – the material from these tools is very expensive due to the presences of alloying elements and especially the very high percentage of chromium which required the granting of note 6;

- the price of steel tools OSC10 covered by sparks - tools made from these materials (OSC10 carbide and Cr) are quite expensive due to carbides deposited on the surface of the cutting edges so was granted note 7;

- the price of OSC10 nitrided steel tools - was given to note 7 of these tools taking into into account the cost of gas mixtures needed ionizing;

- the price of OSC10 chrome tool steel - the material from these tools is expensive due to the combination of the two materials (OSC10 and Cr) which led us to grant note 7;

- the technological tools of steel OSC10- implementation of the tools of this material causes wear pretty sharp cutting tools and heavy duty machining, and these observations have led to the granting of note 7;

- the technological tools of steel 205Cr115 improved – for implementation of this material is necessary to use cutting tools made of materials with high mechanical characteristics and wear is quite high due to the presence of hydrocarbons groups which resulted in granting note 6;

- the technological tools OSC10 chromed steel - execution of these tools involve the use of complex auxiliary equipment and qualified personnel which required the grant Note 6;

- the technological tools of nitrided steel OSC10 -obtaining these tools is quite difficult because it involves the use of expensive devices and installations and a long-time nitriding process, based on these considerations was established note 5;

- the technological tools of OSC10 coated steel spark — and how to obtain these tools is

The cumulative results in scores and grades given.

Table 1

| Material | The grades given in viewpoint of of the reliability tools | | | | | | The Grades given in viewpoint of the price of materials | | | Grades given in the viewpoint of the technological tools | | | The final note |
|-------------------------|---|-------|---------------|-----------|-------|-------------|---|-------|-------------|--|-------|-------------|----------------|
| | Wear | Force | Hardening sf. | Deviation | Score | Medium note | Note | Score | Medium note | Note | Score | Medium note | |
| OSC 10 improved | 6 | 7 | 6 | 6 | 0,4 | 2,5 | 8 | 0,3 | 2,4 | 7 | 0,3 | 2,1 | 7 |
| 205 Cr 115 improved | 8 | 9 | 8 | 8 | | 3,3 | 6 | | 1,8 | 7 | | 2,1 | 7,2 |
| OSC10 chromate | 9 | 9 | 9 | 10 | | 3,7 | 7 | | 2,1 | 6 | | 1,8 | 7,6 |
| OSC10 covered by sparks | 10 | 10 | 9 | 10 | | 3,9 | 7 | | 2,1 | 6 | | 1,8 | 7,8 |
| OSC10 nitrided | 8 | 8 | 7 | 7 | | 3 | 7 | | 2,1 | 5 | | 1,5 | 6,6 |

difficult due to the use of special equipment and a highly qualified staff and on the basis of these observations was granted note 6;

2.OPTIMIZE THE CHOICE OF MATERIALS FOR TOOLS

Problems related to to optimize the choice of the material tools have a special importance on their reliability, but also in costs involved when they use various materials for the execution of them tools. In order to optimize the choice of the material of tools used for cutting sheet by stamping be taken into account the following factors of influence: the reliability of tools (Wear forces, hardening, semiproduct, deviations from the the geometrical shape); the material price from tools; the technological of tools made from respective materials.

To optimize the choice of materials for tools of technical and economic values must be cumulative the scores and grades given. The notes were previously awarded multiplied by the scores given values for each material and is determined by multiplying the the average marks corresponding to the five treated materials. By summing the values to obtain final grade average marks representing the

principal parameter that offers information on the choice of the optimum material .

The optimum material in technical and economic terms is the value obtained final grade is the highest. The cumulative results in scores, grades, middle grades and final grades obtained in the course the above steps they are presented in Table.1

4. REFERENCES

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