

## IMPROVEMENT FOR AN ASSEMBLY FLOW FOR A GIVEN COMPONENT (1)

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***Abstract:** This study is carried out in a line of assembly of a finite wiring product. The assembly of this finished product is done in two specific sections. For the analysis of the activities in the assembly section, the timing method of the work stations was used. On the basis of the work times obtained and their centralization, the Keizen method was subsequently applied to obtain an improvement in the installation flow. Finally, a reduction in working times was achieved, as well as a more ergonomic arrangement of jobs. This paper is the first in a series of 3 papers to deal with this subject.*

**Keywords:** production flux, quality, improving flux, Kaizen

### INTRODUCTORY CONSIDERATIONS

The main purpose of the study is to apply the Keizen method to continuously improve the flow of a finished wiring product.

In this study, which is carried out in three scientific papers, the finished product will be called wiring X and the Keizen continuous improvement method for the production flow

To begin with, it can be said that manufacturing is the main component of production within the economic society with this specific.

In this respect, the main purpose of manufacturing is to organize the activities in such a way as to ensure that the finished products are obtained in the best conditions.

To that end, a series of technical measures are adopted, specific activities are being carried out and means are taken into account innovations in the field of science and technology.

All these are used by an optimal combination of production means and labor. Finally, a rational, efficient and profitable use of the resources available to the production company studied is ensured.

Manufacturing thus involves activities that involve the execution of products and works.

These activities are done and programmed with the help of work objects and are ensured through the supply activity [1]. All the activities must meet the quality requirements and deadlines initially set in the plan.

### USING THE KAIZEN METHOD IN THE STUDIED MANUFACTURING COMPANY

The Keizen method or continuous improvement method is considered to be one of the most effective ways to improve or optimize a technological stream. The expression "keizen" means in Japanese continuous training, it comes from joining two words, namely "kei" -

meaning continuity or change and "zen" - that is good or better.

The Keizen method was chosen by the production enterprise under study due to the Keizen philosophy that an enterprise can not stay too long in a static position. At the same time, the Keizen method can be applied in the same way as change management, in the sense that the innovative approach must prevail.

However, modernization, respectively adaptation to an active market economy, over-investment, or sudden and spectacular changes in technology processes or production techniques, which often occur with a return on ROI (Return On Investment) very low [2].

The goals pursued by applying the Kaizen method will be determined by a Kaizen team. These goals refer to any factor that influences the production process, such as:

- ❑ the flow of materials,
- ❑ the size of stocks,
- ❑ space ergonomics,
- ❑ visual management, etc.

Achieving these goals is possible if the Kaizen team takes into account the following principles:

- ❑ to highlight actions that produce effects, both the process and its results must be taken into account;
- ❑ in order to avoid problems arising from the process under review, the process should be systematically addressed in its entirety and not just in a particular aspect of it;
- ❑ a non-critical educational approach will allow the review of current issues.

The implementation of the Keizen method also requires a major change in the organizational culture of the firm. Thus, the attitude and conscience of the hired, the top management staff and the new employees must change [3].

Keizen has to become something that all employees do, because they themselves want it, and because they know it's good for both them and the firm, and that's not because it's something coming from the leadership. In other words, Keizen means that if management is not ready to lead by its own example, the Keizen method can not be implemented.

The human factor is the fundamental element that gives substance to the production process of any trading company. Improving the organization of production reveals the necessary presence and decisive contribution of people, both as organizers and as organizers.

Thus, in studying and solving production problems, special attention must be paid to the knowledge of people from the psycho-social point of view, but also to the human problem solving only by human means. In this regard, employees must be treated as subjects and not as objects [4].

Based on these principles, managers can create a favorable psychosocial climate that stimulates, stimulates, mobilizes people to work and achievement, creativity and creativity.

Achieving such a psycho-social climate requires an atmosphere that encourages and recognizes personal initiative, elements that facilitate the achievement of the production program.

Mainly the Kaizen application rules are:

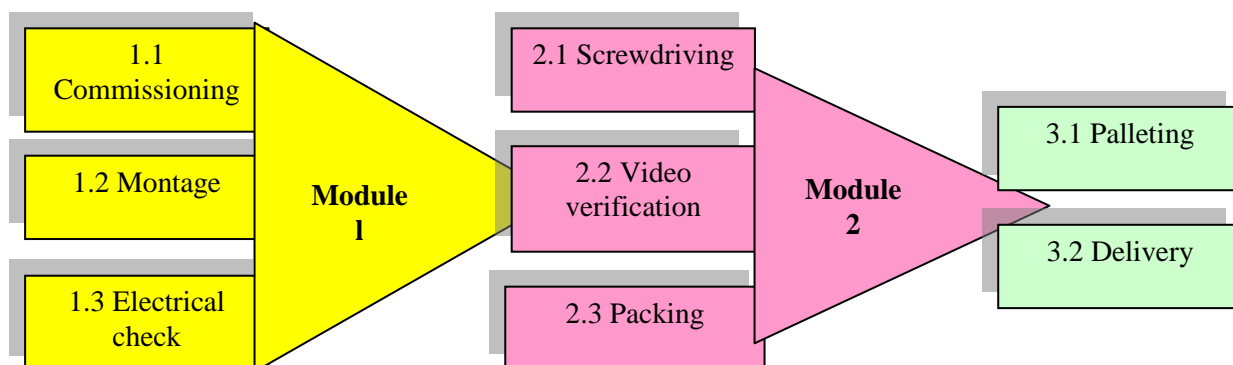
- ❑ corrections must be made as soon as errors have been identified.
- ❑ have to use their own knowledge to solve and eliminate errors.
- ❑ the question "why?" must always be used to find the right answers and to solve the problems that are best.

So the Kaizen method has come to represent a daily activity, a continuous improvement system, used almost in any field. Being a continuous improvement process, Kaizen can be applied to any area of the enterprise.

In the case studied, the Kaizen method will apply in an area where the Kaizen team can better focus its efforts on reaching the main goal, namely continuously improving the flow of a finished wiring product [5].

### **ANALYSIS OF THE TECHNOLOGICAL FLOW FOR FINITE PRODUCT CABLE X**

For the finished product taken into study and referred to as X harness, the technological flow is made up of 3 modules, shown schematically in fig. 1.



*Fig. 1 Technological flow diagram of the X reference*

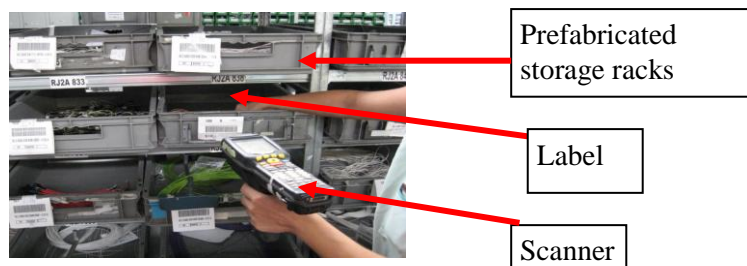
The following notations will also be used:

MB - is carrying section of the modules

ZSB - represents the final assembly section,

Basis - represents standard wiring.

Before the commissioning stage, the modules - and the prefabricated ones - and the materials needed for installation, will be selected for transport on the assembly line - fig. 2, so that they can be assembled later.



**Fig. 2** Choosing and preparing materials for commissionin

Commissioning (1.1) is the operation by which the workstation is fed with the threads and materials necessary to obtain a Basis, according to the existing training list near the workstation - fig. 3.



**Fig. 3** Charge station with yarns and materials

The assembly operation (1.2) is performed in both MB and ZSB. The assembly includes wire stretching, stamping and clipping activities. Thus, in MB, the bases are made by constructing the modules.

In MB, the total of 354 staff is divided as follows: Table 1:

**Table 1** MB staff categories

<b>Nr. crt.</b>	<b>Category of staff</b>	<b>Nr. people</b>
1	Directly productive staff	270
2	Indirectly productive staff	42
3	Foreman	2
4	Group chief	10
5	Reserve	20
6	Preparatory	10
<b>Total</b>		<b>354</b>

The ZSB performs clipping, scraping, and verification activities.

In ZSB, the direct productive staff is 865 people.

The electrical check (1.3) of the harness X is carried out by means of an electric panel located at the end of the strip.

After the first 3 operations of the first module, ie after the final wiring has been checked, it is sent to a stand, where it is screwed, video checked and packaged - in Module 2.

The screwdriving operation (2.1) involves mounting screws on the harness by means of a screwdriver. Thus, a terminal is taken - depending on the X harness, which can be connected to the right or the left terminal - and by means of the machine, the respective harness is screwed in - fig. 4.



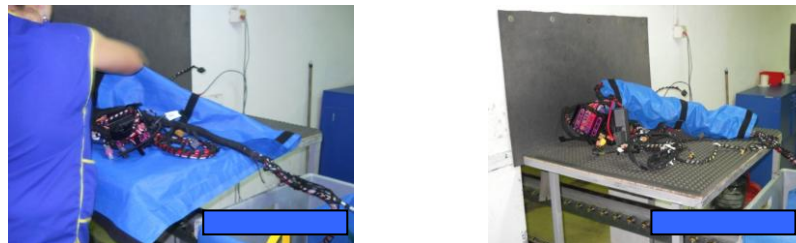
*Fig. 4. Performing the screwdriving operation*

Then proceed to the video verification (2.2), which involves checking the X harness with an instrument that checks the body wiring fuses. The confirmation or invalidation of the correct wiring harness installation must appear on the screen of the appliance - fig. 5.



*Fig. 5. Perform video verification*

The wrapping operation (2.3) is the last activity in module no. 2. Through this activity - fig. 6 - in a special way, the X harness is packed with a special bag, so that it can be sent to the last module of the technological flow, module no. 3



*Fig. 6. Performing the wrapping operation*

The first operation of the third module is palletting (3.1). This operation involves the packing of a fixed number of finished X wiring into a repack, which is a large box of wood.

Finally, the last operation in Module 3 and the technology flow is delivery. This operation is to load the repositions ordered by the customer and move them to the client.

## INITIAL RESULTS OBTAINED IN THE TECHNOLOGICAL FLOW ANALYSIS FOR FINITE PRODUCT CABLAGE X

For the case of the studied X harness, following this technological flow, the following data are finally obtained – table 2.

*Table 2. Obtained results*

<i>Nr. crt.</i>	<i>Indicator</i>	<i>UM</i>	<i>Values</i>
1	Nr. X products ordered and made / day	[piece/day]	1.236
2	Time worked	[min]	450
3	Product cost / worker	[euro/worker]	550

## PERSPECTIVES OF RESEARCH

In the next scientific work of this series of 3 papers, based on the results determined by the analysis of the passage of this technological flow, it is proposed to continue to achieve the following objectives:

- will analyze the workstations within the MB module;
- the production times within the MB module line will be determined;
- will analyze the jobs in the ZSB final assembly section;
- the production times within the final assembly line ZSB will be determined.

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