

OPTIMIZATION OF PRODUCTION PROCESSES WITH THE HELP OF KANBAN METHOD

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Abstract: The materials' weight in the production cost, as compared to the salaries, increased in the last years from 2:1 to 3:1. As a consequence, the production control focuses on a more economical management of this element, all the more so as it carries along restrictions and disturbances external to the manufacturing. Kanban is a method applied to the materials transfer, among various working positions, in JIT system. It provides (ensures) the order control of the performed activities and stocks. Within the framework of this article one will try a presentation (description) of this method, of its performance, of the advantages and of the limits of this method.

Key words: materials, Kanban, activity control, production, Just in Time.

1. INTRODUCTION

At the operational level, Kanban technique was developed by the Just in Time system, which allows for an efficient and decentralized ordering of the activities at the bias point, but which can hardly be considered a complex organization at the production level [1].

In practice there are many types of kanbans:

- Production Kanban – programs the parts production;
- Conveying Kanban – which authorizes the parts moving;
- Order Kanban – appoints the storage area;
- Materials Kanban – used to request materials to the post below;
- Supplying Kanban – it is used between the company and the supplier;

2. DEFINITION OF THE METHOD AND IDENTIFICATION OF ITS MAIN ELEMENTS

The main elements of a Kanban system are:

- Kanban label
- Label board
- Kanban curl
- Constituents shelf

Kanban label – contains the following information:

- Component name
- Component's code
- The quantity of components in the box (case)
- The sections among which the conveying (transport) is performed [1].

The selection of the kanbans' number must be as correct as possible because:

- Too many Kanbans – too many unfinished components and too long manufacturing cycles terminate

- Little Kanbans – low production and vulnerability to the request's and the manufacturing process' variations
Kanban cards are of two types, but these two types cannot be used simultaneously in the manufacturing processes:
- Supplying Kanban
- Manufacturing Kanban

Supplying Kanbans contain information concerning the place from where the products came from and which is their destination and they run (move on) between the client and the supplier.
Manufacturing Kanbans move about into the company (factory) and contains information regarding two consecutive processes

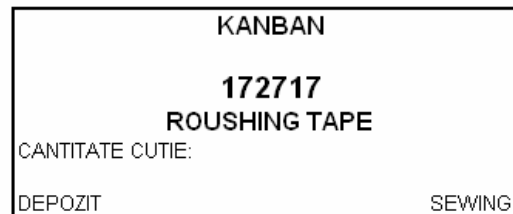


Fig.1 Kanban label

Label board – is a columnar shelf, and on each column are deposited Kanban labels. Each column belongs to a certain constituent and is divided into three areas of different colors. These areas have the following signification:

- The green area – as long as the labels are in this area it means that the kanban shelf should not be provided, and the manipulators in the storage must wait before bringing new components
- The yellow area – agrees to (complies with) a flexibility area and if the labels reached this area, the storage (deposit) must prepare a new supply
- The red area – represents the area of rush supply, seeing the risk of arresting production and this way the customer's ordering couldn't be fulfilled on time.

A kanban board is presented in the following figure [1].

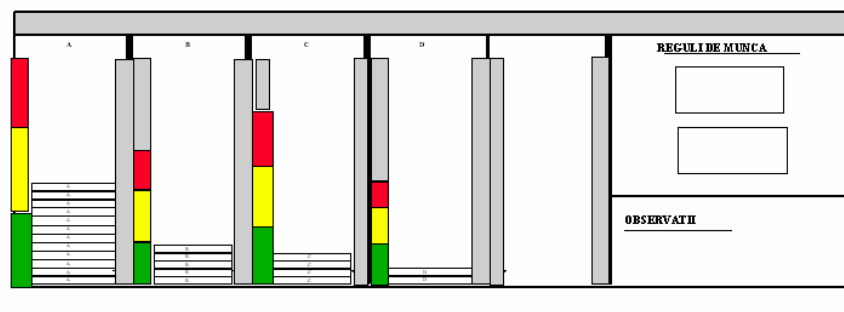


Fig.2 Kanban board

Kanban curl – Kanban curl makes the connection between two departments of a company (factory). The route a Kanban label follows is the following:

- A label is attached to each box
- When the components box was emptied the label will be put in the labels board. The labels are consecutively arranged inside of it.
- Each label represents an order for the storage (deposit).

Kanban shelf – represents the place where component boxes are being arranged. This shelf is divided into many cases and in front of each case one will put a label with the name and code of the bench-mark. The shelf must be built so that it allows only the storage of the quantity, which corresponds to the green area on the label board [2].

In the following figure it is presented a Kanban shelf model.

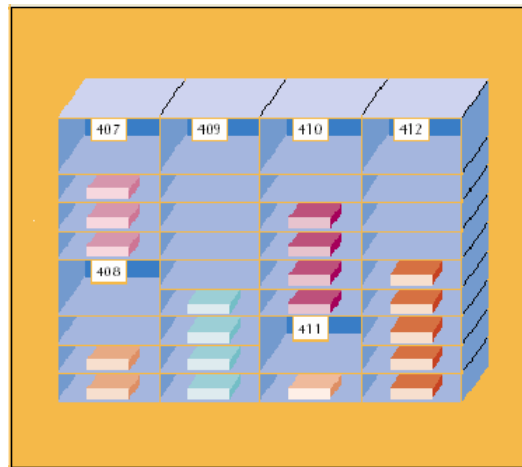


Fig.3 Kanban shelf

3. CALCULATION OF THE KANBANS' NUMBER SPECIFIC TO EACH AREA ON THE KANBAN BOARD

Kanban is a method applied to the materials transfer, among different working positions, in JIT system. It assures the order control of the developed activities and stocks.

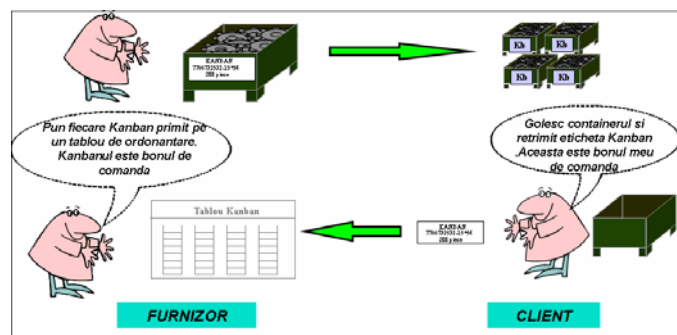


Fig 4 Kanban system

In JIT system, the Kanban card (*Kanban cards*) is the working tool that authorizes the materials transfer during the production, on successively working stages. A kanban must contain minimum the following information: data about the product, the material condition, the container products quantity, the containers' destination. One can also find other information such as: the piece drawing, the lot containers' number, the information related to the pieces' route (line/direction) in the unit of production, the information related to the pieces' packing and treatment [3].

Kanbans are equally allocated in the case of balanced systems. One allocates many kanbans in slow processes or with a higher work load and one reduces the number of kanbans at the working positions that are not charged at their capacity.

The number of kanbans is calculated with the following relation:

$$N = (d \times L + S_s) / C$$

where:

- N = the number of kanbans or containers

- d = the average request on a period
- L = the manufacturing time
- S_s = the emergency stock
- C = the container's size

For each link of the production process one establishes [3]:

- *Acquisition / collection / gathering of data concerning the flux that is to be organized*: the flux characteristics, the characteristics of the above post (supplier) and of the below post (customer), the characteristics of the above-below posts' bound.
- *Definition of the working parameters of the JIT production system (manufacturing)*: the capacity and the number of equipments, the capacity of containers (the conveying lot), the size of the minimum production lot that authorizes the execution (performance), the size of the adjusting buffer stock.
- *Planning and programming*: load distribution, defining the Kanban content, defining Kanbans circulation rules.

The main functions of the Kanban are:

- Gives intelligence of materials delivery,
- Gives intelligence of production,
- Prevents additional production and excessive transport,
- Is used as a working control attached to the respective products,
- Prevents the manufacturing of fault products through the identification of the product that generates bad pieces,
- Emphasizes the existing problems and assures the stock control [4].

4. CONCLUSION

A Kanban system can function only if the following rules are abided:

- *Labeling*. In a kanban curl, all containers containing pieces will be labeled so that, at all tides, one knows the situation of the pieces in the container.
- *Production*. One will not fabricate or transport without order. It is the consequence of the main principle: renewing of the actual "consumption" in customer section.
- *Priorities*. The launch orders of manufacturing are the exact (accurate) reflection of the customer section "consumption" the observation (abidance) of the manufacturing regulation being compulsory.
- *The size of the manufacturing lot*. The size of the manufacturing lot will be respected. This size is determined so that the manufacturing lot be the optimum (best / most favorable).
- *Abnormalities*. All abnormalities (flat tyre (car key), lack of workers, quality, etc.), are the object of a particular labeling.

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