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Content:

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METHODOLOGY FOR IMPLEMENTING KANBAN SYSTEM – CASE STUDY COMPANY ZINES, SKOPJE, MACEDONIA

Tome Jolevski, Zekirija Zekiri[1], Ivo Kuzmanov

Abstract: *Kanban* *is a scheduling system for lean manufacturing and just-in-time manufacturing (JIT). The system takes its name from the cards that track production within a factory. A goal of the kanban system is to limit the buildup of excess inventory at any point in production. Limits on the number of items waiting at supply points are established and then reduced as inefficiencies are identified and removed. Whenever a limit is exceeded, this points to an inefficiency that should be addressed.*

How KANBAN would be implemented and would function after the introduction into a production enterprise in the Republic of Macedonia is presented with spreadsheets and graphic representations for the company ZINES DOOEL.

Key words: *Kanban system, manufacturing, material flow*

1. INTRODUCTION

Kanban became an effective tool to support running a production system as a whole, and an excellent way to promote improvement. Problem areas are highlighted by measuring lead time and cycle time of the full process and process steps. A goal of the kanban system is to limit the buildup of excess inventory at any point in production. Limits on the number of items waiting at supply points are established and then reduced as inefficiencies are identified and removed. Whenever a limit is exceeded, this points to an inefficiency that should be addressed. One of the main benefits of kanban is to establish an upper limit to work in process inventory to avoid overcapacity.

Kanban aligns inventory levels with actual consumption. A signal tells a supplier to produce and deliver a new shipment when material is consumed. These signals are tracked through the replenishment cycle, bringing visibility to the supplier, consumer, and buyer. Kanban uses the rate of demand to control the rate of production, passing demand from the end customer up through the chain of customer-store processes.

Corresponding author: Zekirija Zekiri: Msc. Mechanical engineering, University Mother Tereza – Skopje, zekirijaz@asuc.edu.mk

2. PROCEDURES OF IMPLEMENTING KANBAN – CASE STUDY COMPANY ZINES

In the next section will be presented a methodology for implementation of the KANBAN system in a furniture production company ZINES, which is existing on the Macedonian market since 2004. Zines DOOEL produces upholstered furniture made of leather, fabric or artificial leather, with different combinations of colors and sizes. More than 10 years their products successfully meet the needs of the European market.

In order to demonstrate the methodology of applying KANBAN in the production cycle of the enterprise of this type, the implementation procedure has been elaborated in seven main phases and more detailed which are contained in the separate phases.

2.1 COLLECTING AND PROCESSING OF DATA

In this phase, data collection and processing is carried out to define the existing situation in the company. This stage allows to calculate the factual-based KANBAN scale rather than wishes. It is very important at this phase to insist on obtaining objective and largely accurate results regardless of whether we liked it or not. This is because otherwise the entire project can be doomed due to the serious impact of such data on the next stages of implementation. The well-known method called VSM (Value-Stream-Mapping) can be used to represent visually and clearly the activities that add value throughout the company.

The production process in company Zines consists of 8 stages: Cutting-Leveling-Tailoring, Montage, Curbing, Sticking on the sponge, Cutting/Sewing, Upholstery, Packing and Storage.

The following important information are on the focus of the first phase of collecting and processing data:

- Information about the process (description of the process, the cycle time of the process, percentage of the blemish);
- Information about the time needed to change and set-up;
- Information about time units in which the process is inactive (planned and unplanned delays, defects, etc.)

This is obtained as a result of monitoring the relevant indicators and the results need to be documented in appropriate forms. Documentation is essential for the project and is done in order to simplify the use of the data contained therein and to compare the situation with a future state.

2.1.1 INDICATOR: THE CYCLE TIME OF THE PROCESS

The cycle time respresent the time needed for making one series. There are several ways to determine the cycle time. Determining the cycle time:

     i.   With detailed recordings in tables

     ii.   By analyzing the standard times

     iii.   Tracking only certain series

     iv.   Pragmatic methods

Affected by: Preparation time, synchronization, maintenance, training of operators.

Affects: Delivery times, flexibility and capacity optimization.

Visualization:
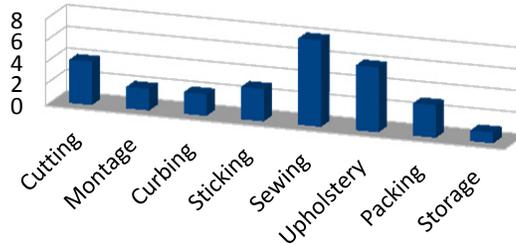
Fig. 1 The cycle time for the production of PURE 300x230

The goal is to take appropriate action, to decrease the values for the cycle time as much as possible and to reduce the variation between the longest and the shortest cycle for the product. One of the possible actions for improving this indicator is precisely the introduction of the KANBAN system.

2.1.2 INDICATOR: PREPARATION TIME

Preparation time represents the time for preparation of one machine for one product.

Source: Preparation time is obtained from the following sources: Working orders and time norms.

Affected by: Working methods and training of operators.

Affects: Production time, delivery time, flexibility, optimization of capacity.

Visualization:

Product preparation time
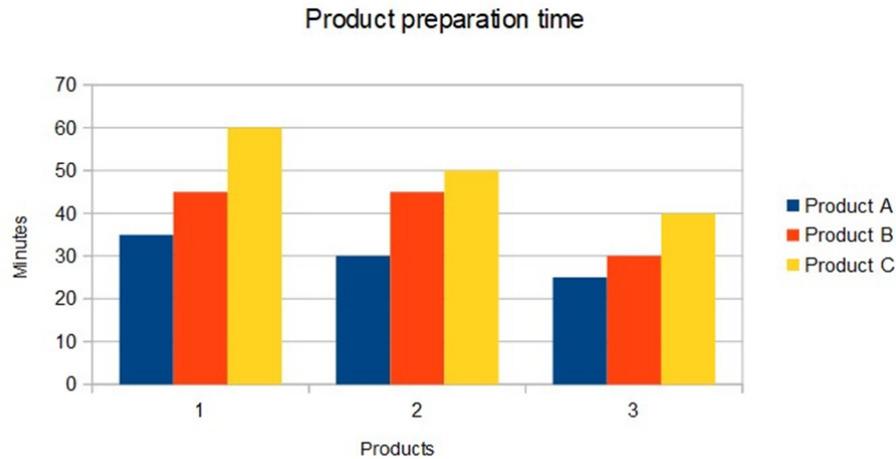
Fig. 2 Visualization for preparatory time for three different products

From the visualization it can be noticed how much preparation time is needed to prepare the series. Therefore, the desire is to make it as shorter as possible by undertaking appropriate actions. The following table shows the form for entering the results of the monitoring of the indicators shown above.

Table 1 Form for entering the results from the monitoring of indicators for PURE 300x230

Serial number	1
ID number of the section	00946
Name of the section	PURE 300x230
Number of species types in the series	22
% of drawback for the process	/
Production time	29 hours
Preparation time	4 hours

2.2 CALCULATION THE NUMBER OF KANBAN

At this phase is determined the number of KANBANs. The formula for estimating the desired number of KANBANs will include different factors. So mainly when determining the

number of KANBAN the information from the first phase is used, which are then translated into formulas which calculate the available active time, the time of planned and unplanned delays, the coefficient of drawback, etc.

2.3 DESIGNING THE KANBAN

Once the number of KANBAN is defined, the next one is the design phase which includes the designing of information holder – KANBAN card. The purpose of this phase is to design KANBAN which can successfully signalize: process, percentage of the blemish):

- When to start producing parts
- When you need to make a change and setup
- When to stop the production

Recommendations that has to be followed at this stage are:

- Signals should be simple and visual
- The signal should prompt an unequivocal reaction
- Unnecessary repetitions of the same signal in multiple places should be avoided.
- Signals should be easy to be managed

2.4 TRAINING OF ALL INVOLVED

In this phase is carried out the training of all involved in the project for introduction of the KANBAN system. It is very important to note that one of the most common mistakes made by people in charge of conducting training is that when they try to make KANBAN experts from the involved persons. On the contrary, during the training the involved should be familiar with the information enough to fit into this whole puzzle.

2.5 LAUNCHING OF THE KANBAN SYSTEM

Once the KANBAN card, system and training is completed, the KANBAN system can be started. Before doing this, it is necessary to make final checks from the aspect of:

- Are all signs throughout the drive set?
- Are the rules of KANBAN placed in a visible place?
- Is visual management established?
- Is training successful? (through trial KANBAN cycle)
- Are all materials and machines ready for startup?

After completing all checks, the system is ready to start. Most commonly problems occurred when starting the KANBAN system are:

- Operators are not sure whether the KANBAN is started
- Operators do not follow signals
- Operators cheat with the signals.

In the first period of introduction the KANBAN system, such errors need to be documented in order to be able to develop an action plan for their overcoming.

2.6 MAINAINING OF THE KANBAN SYSTEM

Once all the problems of the start have been overcome and it can be concluded that the KANBAN system is functioning, the monitoring and auditing of the situation should begin, immediately. When the project team is determining, it should be determined from persons responsible for this function.

This stage is very important to locate errors in the functioning of the KANBAN system and immediately fix them in order to maintain the integrity of it. Otherwise, if it does not work, it can lower the morale of all involved and the system to be doomed to failure.

The results of the maintenance and audit of the system are entering the next phase, improving the system.

2.7 IMPROVEMENT OF THE KANBAN SYSTEM

Improvement occurs as a result of the maintenance and auditing of the KANBAN system. Of course, this includes the suggestions from the operators themselves and others involved. The improvement of the system is most often in the direction of greater reduction of the quantity of materials through the processes, reduction of the time for changes and adjustment, reduction of the time when the machines are inactive due to delays, defects, etc.

In the direction of system improvement, there are several tools and techniques that influence the factors outlined above.

3. CONCLUSION

From the foregoing, it can be concluded that the KANBAN system is one of the tools that can be used to manage the work, on a personal or organizational level.

KANBAN panels show how the work moves from left to right, each column represents the stage of the entire process, or rather the system that is visualized from the board. The team pulls the cards from one column to the other on the right to show progress and coordinate their efforts with others. The KANBAN system can be used in the work of knowledge or in the production process.

How it would be implemented and would function after the introduction into a production enterprise in the Republic of Macedonia is presented with spreadsheets and graphic representations for the company ZINES DOOEL.

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