

## SOME ASPECTS REGARDING THE IMPLEMENTATION OF THE PULL KANBAN SYSTEM ON A SHOCK ABSORBERS ASSEMBLY LINE

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**Abstract:** Kanban is often seen as a central element of Lean manufacturing and perhaps is the most used product application system. Kanban is a part of the Just-In-Time along with Kaizen and 5W. Kanban is the essence of the concept that a supplier or a products deposit must distribute the components in place and at the time the production needs them so that there are no stocks in the production area.

The paper shows some analysis elements regarding the implementation and the advantages of the implementation on a shock absorbers assembly line. The implementation of the pull Kanban concept must go through four different stages. Each of these stages having more steps to be followed.

### 1. INTRODUCTION

Kanban is a material-flow control method, based on the replenishment of only those quantities that have already been consumed.

Kanban can also be defined as a requirement-based production system because of the fact that the producer only produces what is required and when it is required. It is a continue system for supplying components, parts in such a way that workers / vendors (supermarket; regional warehouse) have what they need where they need it and when they need it.

For the required part types to reach the desired place, at the desired time, in the necessary quantity the communication of the process steps needs to be in place. As transmission medium for this information the use of the Kanban cards has been implemented. These cards were transmitted from the client to the supplier and the other way around.

The basic principle [2] is that the supplier produces and delivers to his client only products that were ordered by the clients through the Kanban structure. This significantly improves the information flow between the supplier and his client (fig. 1).

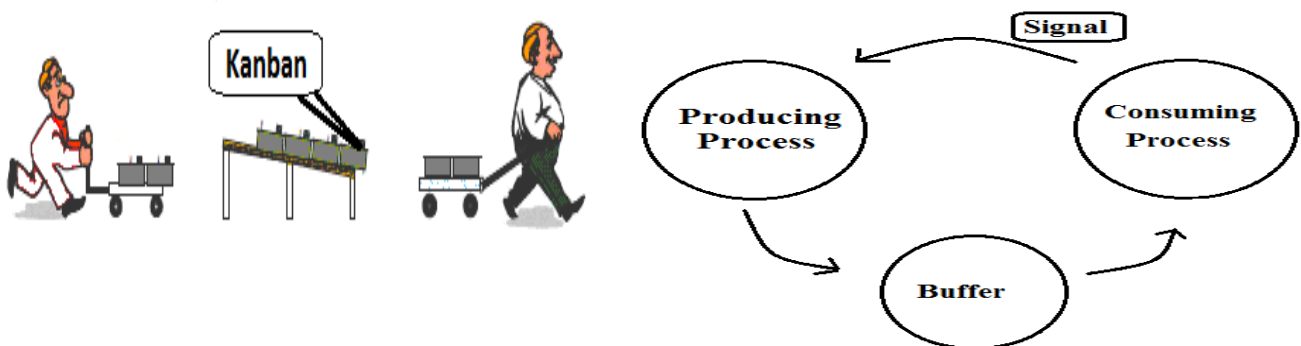


Fig.1. Coordination of material, information and actions

*Operating principles for Kanban:*

- honoring the contract terms is assured through the Kanban structure

- the client obliges himself to transmit all his requirements towards the suppliers based on his consumption

- the supplier does not produce or deliver products to his client unless requested Kanban operating routines:

> Labeling – in a Kanban control cycle all containers with parts will be labeled so that in each moment you can have a clear overview of the situation (quantity, part number);

> Production – nothing is produced or transported without an order;

> Priorities – the production orders are a clear reflection of the exact consumption of a certain line/department;

> Production lot size will be respected – this size will be calculated based on the optimum lot size.

*Benefits of the Kanban system (fig. 2):*

- Inventory reduction;
- Reductions of waste and faulty products;
- Production flexibility;
- Production increase;
- Reduction of total cost through:
  - over-production of extra goods is prevented;
  - development of the flexible working stations;
  - waste and faulty products reduction;
  - reduction of waiting-times and logistic costs;
  - reduction of the stock level and of additional costs;
  - resource savings through production planning- reduction of inventory costs.

Limits of the Kanban system:

- vulnerable to demand fluctuations;
- vulnerable to process changes and eventually to defections of the equipment;
- inefficient in case of irregular orders or special, unforeseen orders;
- vulnerable in case of stock shortages for raw materials and changes in their delivery dates.

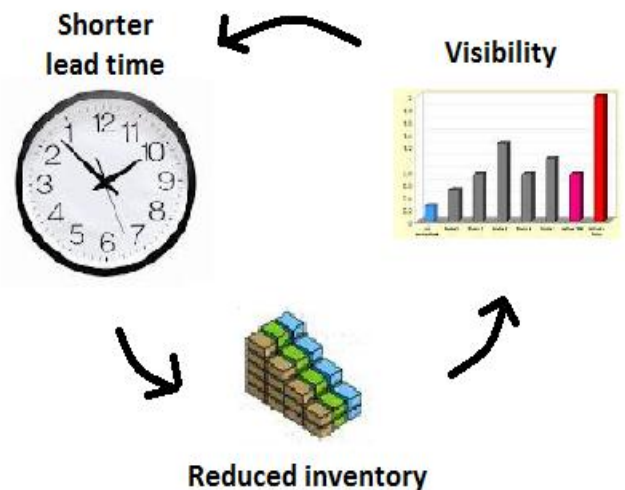
Kanban pull system can be used to ensure that intermediate stocks held in the supply chain are better managed, usually smaller. Where the supply response cannot be quick enough to meet actual demand fluctuations, causing significant lost sales, then stock building may be deemed as appropriate which can be achieved by issuing more Kanban.

## 2. ANALYSIS ELEMENTS REGARDING THE IMPLEMENTATION OF THE KANBAN PULL SYSTEM ON THE SHOCK ABSORBERS PROCESSING / ASSEMBLY LINE

To make things simple they can think about a simple queue: units of work are input in one end, through many steps of the process, and the results yield from the other. But the pulling process must follow three main principles:

- at a time, there should be a limited amount of work in the system (restricted by maximum Work-in-progress, WIP)

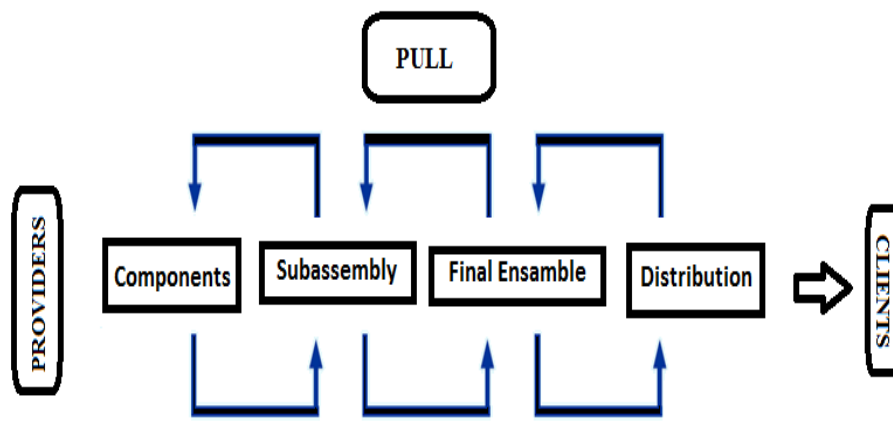
- if the max WIP is reached, the additional work must wait until one of the processing works complete. Then it can be pulled in the system to process.



**Fig.2. Benefits of the Kanban system**

- the process and its policy must be visualized; this requirement is often made by a card-board.

On the processing/montage line [3] for shock absorbers the implementation of the Kanban “pull” system is taken into account. This is an essential part of the “Lean manufacturing” concept with major implications on the production system as well as on the involved personnel because it will involve significant changes to the mentality of the operating personnel and as well as on the organizational culture. Only the desired materials / part types, in the desired quantities and at the desired moment in time (Just-in-Time principle) are pulled at the working station. The solution is a simplification of the communication through a notification on the necessary part types and quantities.



**Fig. 3 Kanban – PULL system**

The “pull” system (fig. 3) reacts to the demand - it does not anticipate it - supplying the necessary quantity of a certain material at the right place at the right time. In the “pull” systems materials are “pulled” to the production line. When the material stock has dropped below a certain minimum limit (and only then) the supplier is being requested to bring material. The request is performed through placing an order based on a Kanban card which is being transported with each lot of part types.

Implementing this system means that once it is operational the production supervision is only performed at the final control phase as the system needs to operate on its own without any interventions from the outside.

## **2.1 ADVANTAGES OF THE IMPLEMENTATION ON THE PROCESSING/MONTAGE LINE:**

- it is a simple and comprehensible process;
- supplies actual and precise information's;
- small costs regarding transport information;
- quick reaction to change possible;
- limits the overcapacity;
- avoids over-production;
- minimizes faulty products;
- product control can be maintained.

To be able to anticipate the clients demands changes must be made to the production structures and processes which until this point have been characterized through:

- very high stock;
- extensive production times;

- highly costly production planning and tracing;
- decreased safety in deliveries;
- low flexibility;
- low motivation among employees, unsatisfied customers;
- pushing deadlines, high losses.

For preventing these shortcomings the implementation of the new concept for production organisation will take into account:

- a decreased level of stocks;
- decreased production lead times;
- higher safety for deliveries;
- decrease in losses;
- improved flexibility.
- low costs for production planning and tracing;
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- motivated employees, satisfied customers;
- motivated employees, satisfied customers.

## 2.2 PRODUCTION EQUILIBRIUM

Production equilibrium and production flow, which anticipate and quantify the market demands, can be achieved by having the orders placed by clients as a starting point, through obtaining the optimal combination of products in an optimum time interval.

The implementation of the Kanban concept must go through four different stages. Each of these stages having more steps to be followed: defining the project target and clients expectations (fig. 4).

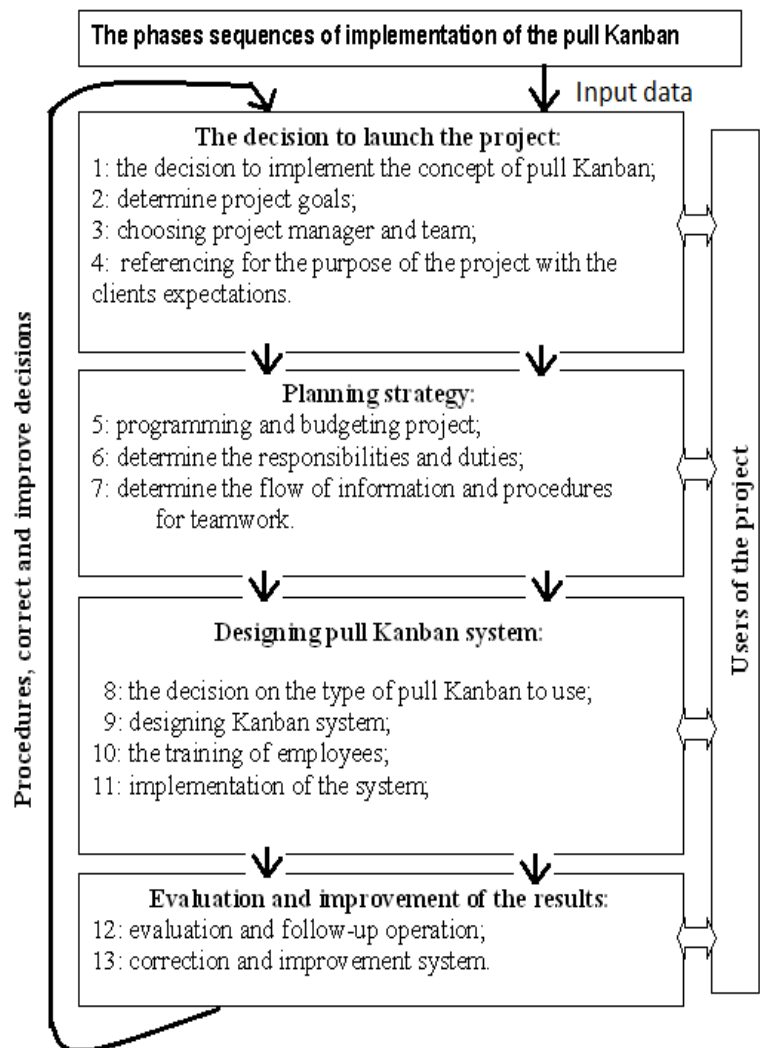
## 2.3 LEVELS OF PLANNING AND CONTROL IN CASE OF KANBAN PULL SYSTEM

In case of Kanban pull system, significant complications may arise from:

- confusion of the roles of different levels of planning and control;
- confusion with planning controls;
- choosing a planning system and/or a planning process.

Planning and control process can be simplified by dividing on 3 levels:

Level 1: business plan;



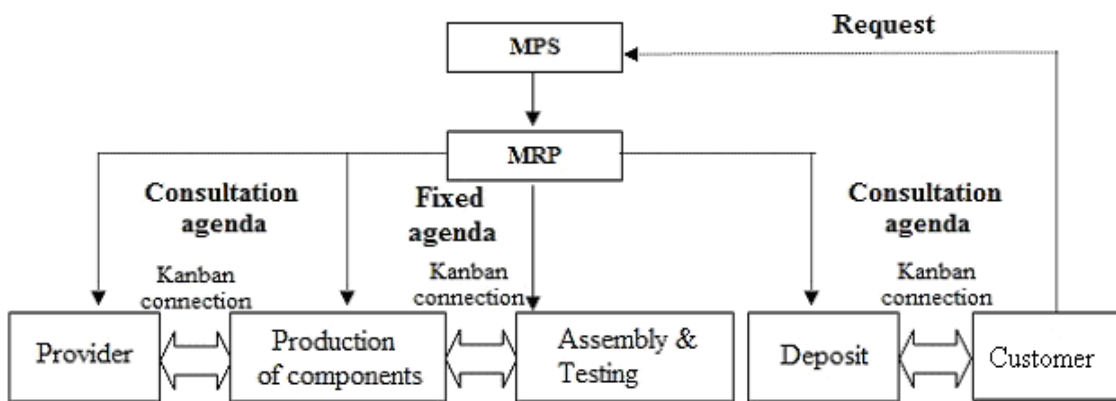
**Fig. 4 The different stages of the implementation**

Level 2: Operational plan and sales -Production planning, The general outline of the production capacity, MPR (Material Requirement Planning), etc.;

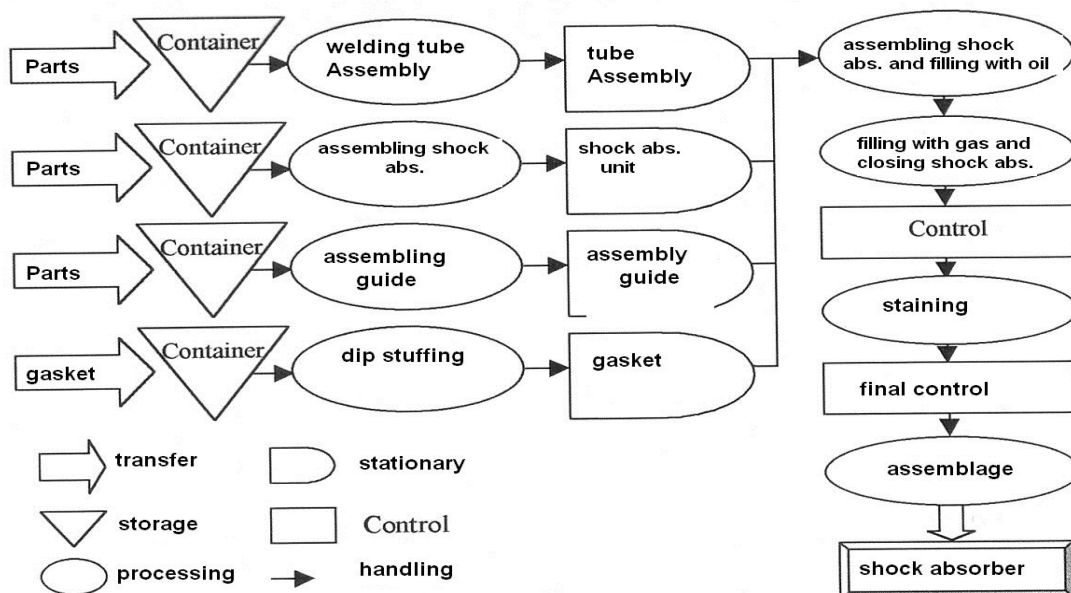
Level 3: Control the landing - Input/Output Control, Kanban, etc.)

2-level systems, such as MRP, planned "outputs". Kanban system is, according to many, the type of system that control plane.

Is commonplace to have an agenda of indicators produced by a system of level 2 (MRP) and an redial Kanban, for specifying immediate requirements. The diagram in figure 5 illustrates this interaction. Here is the that customer sends an advisory agenda that is processed by MPS (Material Planning System) and MRP, to produce a company's agenda, for assembly and testing process. This command generates production planning (structure Kanban). The level of stocks in the warehouse is under control, the customer may withdraw the merchandise in stock, on the basis of daily planning using Kanban link. Dotted lines to the warehouse, making parts and suppliers are advisory planning, indicating the capacity requirements and due dates for deliveries, which will be drawn at the bottom of the assembly and testing flow by the Kanban bindings. In the event that is not a proper synchronization between MPS and the customer shall be generate conflicting requirements. In this case how to resolve these typical problems are MPS shortcuts which do not coincide with those set out in the planning of the customer.



**Fig. 5 Planning and control process**



**Fig. 6 The line redeployment**

Through the line redeployment (fig. 6) is carried out a stream of material much better by subtracting intermediate times with transport and handling parts. For the supply of items on the line will be designated a worker will have to meet a well-established timetable. Will be complied with the principle of "bus", which is specific to the Kanban system relying on the "taxi" which is used currently.

*Periodic strategic reviews:*

Exceptional or fluctuating requirements may end up "kills" Kanban system, if they cannot be predicted. It is so well documented designed capacity so that the strategy could be revised if an fluctuating demand appears and that not only within the volume, but also in the mix. Even systems sales and operational planning must be so designed such that they can trigger this review.

### **3. CONCLUSIONS**

The Romanian Business environment is in a perpetual change and therefore imposes a adaptation to the market demands. The globalization of the market means an increase in competition on the local market, each company in Romania, must be aware of the fact that sooner or later, the only option for being able to survive on the market is to become more competitive

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