International Journal of Enhanced Research in Science, Technology & Engineering
ISSN: 2319-7463, Vol. 5 Issue 3, March-2016

Implementation Process of Hybrid production control System in Existing Manufacturing Environment

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ABSTRACT

It is widely accepted that the industry has been increasingly exposed to international trade. With this exposure comes the need to compete with countries in the global economy that have lower operating expenses, and also the need to cope with an ever increasing demand for high product variety, low volume demand and shorter lead times. Today's manufacturing reality is characterized by a constantly increasing complexity of production systems. The growing complexity of products, shorter product lifecycles, and mass customization are some of the driving factors behind this change. This development imposes high demands on the production control strategy. To achieve high delivery performance, quality, and flexibility at lowest cost possible in complex production systems, it is essential to have the right production control System in place. As a rule of thumb, it can be stated that the more complex a production system becomes, the larger is the impact of operational performance and thus the competiveness of the company. For the better controlling of work in process and improved productivity, there are not any single control system for real manufacturing systems. All the better control systems needs in blending the advantage of individual system or model. The individually developed systems have distinct benefit but if these may be blended together, a better model can be developed. In this research paper described the implantation procedure of Hybrid control system of conwip and kanban production control system with case of process industry.

Keywords: Kanban, Conwip, Production system

1. INTRODUCTION

Push and Pull systems are basic characteristics in production system. By dividing the concept of push and pull in their exact implementations, we observed that the effective realistic systems can design only by blends of the “pure push” and “pure pull” systems. Because in the pure push system, issue of work based on demand, while a pure pull system, the issue of work based on the system status[1]. A Push system does not accept any information from the internal system. System issues a job in the process by an external and fixed demand. The time of issue is not changed in accordance with internal position of the system. Thus, if a machine or a processing station fails and is down for some time, raw materials or parts start to pile up till the machine or system is repaired or in other words push system’s planning based on the calculation and forecasting of external demand and it is not depend on the internal condition. But in a pull system issues a raw materials or parts on the shop floor on the basis of signal developed by the line or internal system. Basic distinction between push and pull system is that push system are inherently make-to-order while pull systems are make-to-stock. A push system is propelled by orders, but not by the system status. Best example of this system is a MRP system, which issues parts or raw materials into the production line according to orders. Most real-world systems such as the CONWIP system are mixture of these pull- push systems. In this kind of system, inventory is controlled through a system of cards. The number of cards accessible works out the greatest allowable inventory for a particular workstation or system of workstations. In such a system the production rate is determined by how the completed items of the last workstation are demanded by the customer.

In this system when the completed items are removed from the system the cards affiliated with these units are released. The issued cards enable the last position to procure additional material from the upstream position for next production. Upon procurement or issue of raw material from the upstream work station and issue of the cards, the upstream position is obtaining its own raw material from upstream station[2]. This method of card release and material procurement is repeated throughout the system until the raw material of the first position is got. Since product action is depend on the condition of the next position, the entire production line may halt due to the breakdown of an upstream station. A Pull system is described in figure 2. The projectiles in the design drawing respectively mention to the movement of the goods. In this production system the raw material is issue in the process on the basis of estimated demand not on the actual condition of production line.

Figure 1. General Push system

This process of issue raw material can cause difficulties if the downstream station is not in working condition. If the downstream position is offline, the WIP will increase until the position is in working again. By the diagram we can showed that when the external demand is generated then the raw material issue in the production line.

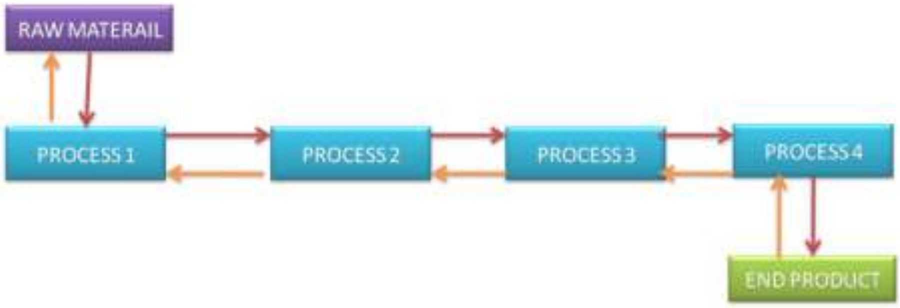

Figure 2: General Pull system

2. NECESSITY OF HYBRID SYSTEM

Productive production control system is that which produce the right parts, at the right time at a comparable cost. These systems are often referred to as Just–In–Time, KANBAN or Nil Inventory. In KANBAN system uses card sets to firmly command Work-In-Process between each two of workstations. Total system Work–In-Process is restricted to the summation of the number of cards in each card set. Production happens at a workstation only if raw material is accessible and the material has a card authorizing production[3][4]. Each set of KANBAN card between workstations authorizes material to be dragged into the upstream workstation for processing and consignment to the downstream workstations. KANBAN is not applicable to numerous production environments basically KANBAN is intrinsically a system for repetitive manufacturing. It will not work in a shop controlled by job instructions

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After the KANBAN, a new production system is introduced, called CONWIP. CONWIP seems to share the advantages of KANBAN while being applicable to a wider kind of production environments. A CONWIP system values a lone global set of cards to command total Work–In–Process. Material enters the system only when demand happens and raw material obtains a business card authorizing entry, the card authorizes the material to move through the system to complete production. When the products depart the system, the card is issued, permitting the new material to go in the system. In this system, the Work–In–Process is not controlled at individual workstation. The total Work–In–Process in the system however is constant. The CONWIP has some appealing characteristics but furthermore some important limitations with esteem to implementation. Among CONWIP's are its ease and its robustness in considering with processing time doubt or bobbing bottlenecks. Limitations encompass the adversity of coordinating components going into assemblies and the difficulty of treating move and processing sizes distinctly from stage to stage. Conclusion of the mechanism to command the flow of components through the manufacturing system is one of the most important decisions. Material flow command is to locations the troubles of when and how much to authorize components to be processed at each stage in order to accomplish a particular customer service level, while minimizes work–in–process [5]. Adversities in the command arise due to production and demand variability.

A good control system is one that meets high throughput or service with very little inventory. Regardless of its affirmative points, kanban & conwip control is not a perfect means to control a system. Kanban control benefits the levels of buffer inventories in the system to regulate output. When a buffer reaches its preset greatest level, the upstream machine is notified to halt making that part type. In the conwip, if the system is strongly utilized or there is a bottleneck in the line, the buffers towards the upstream end of a conwip line will have rather high levels. By mentioning the diverse studies it has been noted that there are numerous contradictions in diverse model and superiority of any one system. it means that there is not any lone form or system which is superior. Thus, best way appears to utilize a hybrid control policy, where the conwip command is supplemented with kanban. The present work aspires to develop system that possesses the benefits of kanban & conwip systems and furthermore can be used in a wide variety of complex manufacturing environment.

3. IMPLEMENTATION PROCESS OF HYBRID SYSTEM

There are two main pre-requisites for implementing hybrid system:

(i) A inventory control system and (ii) A cellular organization

In addition to these pre-requisites, hybrid system implementation requires that: (iii) The cells involved in the implementation have the ability for rough cut capacity and lead time planning, and (iv) The inventory control system can produce dispatch lists for each cell, sequenced according to release authorization times for jobs at that cell, and indicating the next cell for each job.

Implementation of hybrid system in a factory consists of four main phases. These are: (i) pre- hybrid system assessment,

(ii) design of the hybrid system
(iii) launch of the hybrid system implementation, and
(iv) post- implementation evaluation. We discuss each of these phases below.

There are five rudimentary steps that are necessary to implement hybrid scheduling for a method. By the following steps we applied the hybrid system in any organization.

The five steps to applying hybrid system:

1. Assemblage of data from shop floor
2. Calculate the kanban & conwip dimensions for implementation of forms
3. Conceive the kanban & conwip card
4. Start the hybrid implementation
5. Review the hybrid system

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A. Assemblage of data from shop floor

The first step is to assemble the facts and figures that is necessary to help we make conclusions founded on the facts not forecasts. Then this facts and figures will permit we to calculate kanban that support clientele demand. We start the method by documenting current state. Before we can implement the hybrid, we should glimpse where we are with inventory and operating parameters 'right now'. We have to be honest and look at where administration as it is at that instant, it is not as we desire it to be. The data is collected, we can investigate it to condense and understand 'current state'.

B. Calculate the kanban & conwip dimensions for implementation of forms

We will calculate the kanban & conwip canister dimensions based on present situation, not on future designs or desires. Then the primary computed results use the output obligations, method productivity rate, planed downtime with changeover times and s cancel rates to assess the replacement gap of system. The replacement gap is the least significant batch size was production can run and still hold the clientele provided. This tells we how long it will take to produce adjusted production requirements.

C. Conceive the kanban & conwip card

One time we calculate the amounts required to support the production obligations, we can conceive the hybrid system .the conceive will display we how to apply the hybrid in wer facility. In alignment to implementation, we will need to do the following:

- select the signaling means for the hybrid
- evolve the directions for procedure of the hybrid
- conceive a visual management design for the hybrid

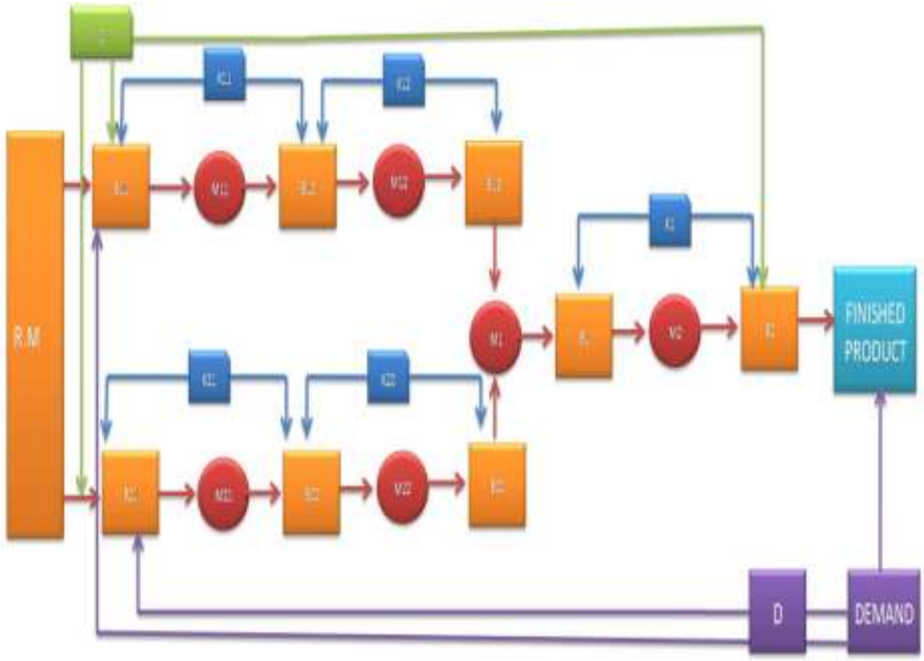

Figure 3: Card Implementation in Hybrid system

D. Start the hybrid implementation

Once every person is taught, make certain all of the visual administration parts are in place. Have the pointers set up, command points assessed, then the rules accomplished and in place before we begin the system. This will help we avoid disarray. Foresee problems, because every new method will show its faults, but take action to correct those difficulties when we first apply to hybrid system. This stage is when we will develop a arranging transition plan.

E. Review the hybrid system

After the hybrid system begins, we should then audit the system. This is the step that most often gets overlooked and outcomes in a failed start-up. When we design the system make certain we recognise the individual. This individual will watch how the arranging signals are managed and if the customer is staying provided. When the auditor discovers a problem, then corrective action needs to be taken directly to sustain the integrity of the hybrid conceive

CONCLUSION

Now a day's manufacturing organizations are emphasis on lower inventory with implementation with good production control system. A good production control system is one that meets high throughput or service demands with very little inventory. Despite its positive points, Kanban & Conwip control is not a perfect mechanism to control a system. Kanban control uses the levels of buffer inventories in the system to regulate production. When a buffer reaches its preset maximum level, the upstream machine is told to stop producing that part type. In the conwip, if the system is very heavily utilized or there is a bottleneck in the line, the buffers towards the upstream end of a conwip line will have quite high levels. By referring the various studies it has been noted that there are many contradictions in various model and superiority of any one system. It means that there is not any single model or system which is superior. Therefore, best way seems to utilize a Hybrid control policy, where the conwip control is supplemented with kanban with other basic control systems. By application of implementation process we can apply the hybrid approach in existing system.

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