PI18 - Integrated System Design For Order Release At Machining Department PT. ABC

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INTEGRATED SYSTEM DESIGN FOR ORDER RELEASE AT MACHINING DEPARTMENT PT. ABC

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ABSTRACT

Manufacturing companies in Indonesia must be prepared in order to meet customer satisfaction. At PT. ABC, one of the manufacturing company in Bandung, before run the production process the completeness of equipment must be ready. However the real conditions not all need can be met because checks need be performed manually. It triggers the delay due date. The other problem is the sequence of job causingthe lateness, and there is no information of order status. Based on that problem need a system that could integrate for checking processess needs using integrated data system to ensure the readiness of order release, sequence the job using Kusiak Algorithm and job status by using RFID technology and Andon system. By implement the system, the problem causing job lateness can be reduce.

Keywords*: Order release, sequence method, Andon.*

1. INTRODUCTION

1.1. Background

Shop floor control is a set of activities in the production control process that takes into account the company's release order, monitor and control the progress of the order through the work station and get information about the status of an order. In modern way, this activity use computer-automated method. [Groover, 2008, p.19].

The functions of shop floor control is to carry out activities as planned, reported the results of operations, and improve or revise the plans to achieve the desired results. [Fogarty, 1991, p. 448].

The purpose of shop floor control is to arrange activities according to the plan, to report the result of operation and improve the plan to fit and get the desired result. [Fogarty, 1991, p. 448].

Generally, a company will start the process of production after planner scheduled the order. But in PT. ABC, which receiving a lot of order with varying types,there are several things that must be prepared before run the production process to make production process smooth, among of them are tools readiness, NCOD, material readiness and machine readiness.But in fact, there is an order which released the completeness are not met. Most of the problems occur when the production processrun, such as machine breakdown, incomplete material, incomplete tools and incomplete NCOD. These issues cannot be separated from human error factor, this is because the process of checking the completeness of the production is still done manually. When this problem occurs, the work being done should be on hold or paused. With so many orders and the problems frequently happen, it can lead bottleneck and orders lost may occur, this resulted in delays in order fulfilment of orders in accordance with the due date.

To handle unexpected situation, the order release planning should be able to get the actual order status information and production data to avoid orders accumulation at the work station. Status information about an order should be updated every time, status information is used to monitor the progress of manufacturing activity, set priorities for flow shop scheduling in response to changes in the status of job orders; maintain and control work in process, as well as providing output data for capacity control purposes [Spencer, 1989, p.309].

An example of the problems that lead to delays that occur in the order of PT. ABC, showed at table 1.

Order execution system at PT. ABC is First In First Out system. This system may

result in a delay of the completion of the order. Things that cause delays, among other orders are due to the workload of each machine is less balanced, incompatibility actual job execution with characteristics of the company

Problems that occur must be quickly handleby the Production Control Department. In the face of these problems to Production Planning rescheduling. Production Control Department performance monitoring and measurement execution order by way of examination of the latest status of each order.Production Planning section also uses the order status information to check availability of machine.Status of the machine used to design load plan or schedule production and also make the process of rescheduling. During this time the order status data in the PT. ABC yet accurate. Data on the order status monitoring system and data on the current status of your order is often different from the production floor.

Table 1. Order Problems Data

No	Machine	Part Number	Problems
1	6VAT	212-11105-131/2	Switched program for right part with the left part
2	T100-W	D5744368220401/501	T63 broken, switch to T100W, overload at HF-NCOD
3	DR-2	D5744368220401/501	Overloadat T100-W switch to DR-2. HF NCPR.
4	MPM	WIP	Unscheduled WIP parts at load plan, switch to other machine.

In this research will make a system that could provide readiness status of tools, NCOD and materials to help planners decide the order to be released. This system should also be able to help the readiness status of the order release accurately, sequence the job orders to meet due date, monitoring system with data visualization for information on the system easily processed and understood. The aim of this system is to prevent against the problems that have been mentioned,

1.2. Research Purpose

To build a integrated system to help the readiness status of the order release accurately, sequence the job orders to meet due date, monitoring system with data visualization for information on the system easily processed and understood.

1.3. Research Boundary

The boundary of this research is production characteristic are flow shop and non preemption and there is no backlog from previous period.

2. THEORETICAL BACKGROUND

2.1. Production Activity Control / Shop Floor Control

Production Activity Control/PAC or often called the shop-floor control is an activity that serves to carry out activities as planned, reported results of operations, and improve or revise plans required to achieve the desired results [Fogarty, 1991, p. 448]. This activity is a realization of the production planning stage.

Production Activity Control defied by five section, as follow: [Bauer, et.al., 1994, p 33-45]

1. Scheduler, responsible to develop production schedule on factory level;
2. Dispatcher, responsible to control work flow in production cell in real time;
3. Monitor, responsible to observe the status of the cell and provide informationrelevant to the scheduler, dispatcher, and higher level plan system;
4. Mover, responsible for managing the movement of materials between work stations;
5. Producer, responsible to control job sequence on every work station.

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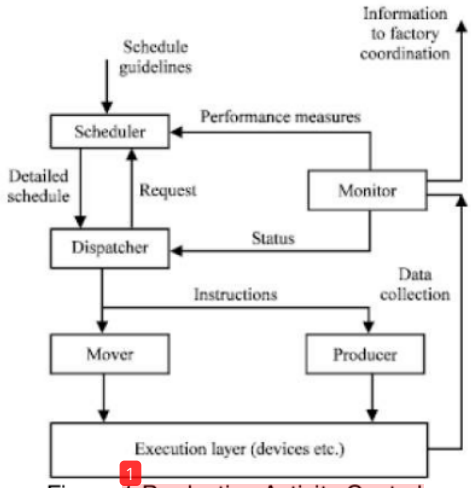

Figure 1.Production Activity Control Architecture

2.2 Data Base Management System (DBMS)

DBMS is a collection of programs that are used to define, organize, and process the database, while the database itself is a structure for the purpose of data storage. DBMS is a tool that serves to build the structure. Today many programs DBMS, such as MySQL, Oracle, Interbase / Firebird, IBM DB2, and many other.

2.3 Priority Dispatching Rules Method

Priority dispatching rules is a kind of heuristic method in which the ready time of each machine is determined such that the successive rise. Product selection decisions can be made that will be processed when the machine is ready to accept the product (machine idle). In dispatching technique used priority rules to select one operation among operations in conflict on machine m * at each stage.

2.4 Monitor

Monitors are at all levels in a manufacturing activity, ranging of strategic planning, up to the level of the PAC. In PAC, the functionmonitors provide the necessary information to the scheduler and dispatcher.According to Higgins (1988) in Bauer, et. al (1994, 41-44), three main activities of the monitor are: data capture, the data analysis, and decision support.

Data capture functions must be performed reliably, quickly, and accurately without reducing the daily work performed by humans and machines. The data collected can be used to make decisions at a higher level in the PAC architecture, include: the status of processing time, and job status part, failure data, rework the data, and the data work station.

The function of data analysisis to understand the data coming from the data capture system. Data analysis is very important because it takes time and effort to filter out the important information from the many available information on the production floor. Function analysis of the data monitors divide into sub-sub monitor [Joyce, 1986], namely:

1. Production monitors, responsible to monitor the status of work progress and status of resources on the production floor;
2. Materials monitor, responsible to track raw material consumption in the process each work station;
3. Quality monitoring, focusing on the data that is associated with quality, and aims to detect potential problems.

The main function of decision support on the monitor is to provide intelligent advice and information for scheduling and dispatching functions in the PAC in real-time. Monitor the flow of information is as follows: data capture systems collect data from the production floor, then translated into information by data analysis system (data analysis), and can be used as decision support (decision support) for PAC activities accordingly.

2.5 Visual Management

Visual Management is a system for the improvement of the organization that can be used in virtually all types of organizations to focus on what is important and to improve the performance of attention on all sides. [Liff and Posey, 2004]. Using a visual management visual aids to improve communication and processes and continuous improvement [Ho and Cimil, 1996]. Visual Management makes abnormal events visible so that corrective action can be taken [Imai, 1997] and improves communication by making information easily accessible in a production setting [Liker et al., 1995]. Some examples of visual

management is the concept of 5S, poka-yoke (mistake proofing) and also andon.

3. RESEARCH METHOD

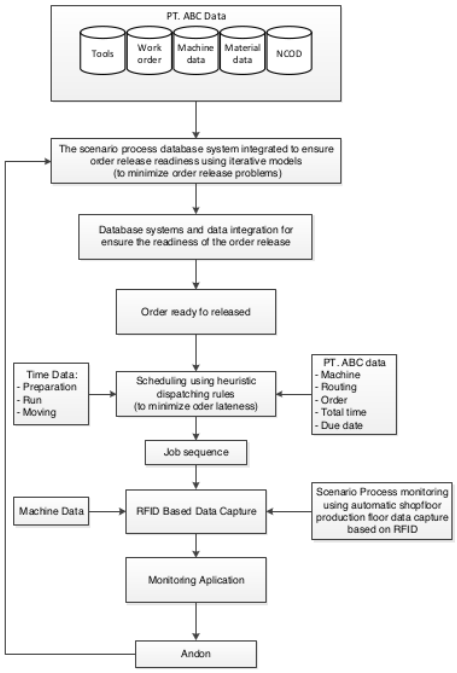

Figure 2. Conceptual Model

The integration of systems built using iterative development system method. Model of the development of this system is dynamic in the sense that each phase of the system development process can be repeated if there is a deficiency or error. System integration was created using PHP programming language and MySQL database is used.

The rule of job sequencing is following the Kusiak Algorithm as follow:

Step 1: Set K = 1, I = n

Step 2: For each operation, store the shortest processing time and corresponding machine number.

Step 3: short the resulting list, including the triplets "operation number/processing time/machine number" in increasing value of processing time.

Step 4: For each entry in the shortest list:

If machine number is 1, then

(i) Set the corresponding operation number in position k,

(ii) Set k = k + 1

else

(i) Set the corresponding operation number in position k,

(ii) Set I = I – 1

end

step 5: stop if the entire list of operations has been exhausted.

The improved monitoring system by changing the collection process becomes automatic. Changes in the method done with the help of RFID technology. In addition, the system also comes with an andon as a media for displaying production information status in real-time

4. RESULT AND DISCUSSION

By used integrated system, users on the materials, tools, and NCOD will input information about the date and time that can be met in preparing the required completeness. With information of date and time information from system will help the planner to determine which orders will be scheduled or sequenced.

This system was designed with the aim to reduce problems caused by the lack of necessity for the production process. With this system help operator from materials, tools and NCOD, for record the status.

The advantages of this system are give information of readiness status of tools, material, machine and NCOD; help planner for make a decision which job can be released and sequence of job.

In this research, job sequencing designed to reduce job completion time in order to minimize lateness with regards of machine readiness.This is done in order to avoid long waiting time, which is due to orders already released but the machine is not ready to be used.

The algorithm to be used to solve problems at PT. ABC is Kusiak algorithm, which use Earliest Due Date as priority dispatching rules and use Shortest Total time as second rule.

Makespan from propose sequencing reduce from 189.7 hour to 122 houror decrease 35.68%. This result because of the

algorithm will balance the load of the machine

In this research, the proposed monitoring system is designed to capture the data and inform the order status through data visualization. The monitoring status application use Auto-ID based, and used RFID as Auto-ID media for capturing the data to determine order status. This system equipped by visual management called Andon to avoid human error.

Andon used as media communication between related departments for handling the unexpected event. Andon shows information about release order status and throughput.

5. CONCLUSION

1. Integrated order release system created will integrate information about the readiness of materials, tools, NCOD and machine that will assist planners in selecting orders to be ready to be released.
2. By using Kusiak algorithm and align with actual condition at company, can be balance the machine load and minimize idle time.
3. Integration of monitoring system designed to release the order planning system can detect delay time order by comparing actual with planned time.
4. Andondesigned for purpose of information tool for production planning department to determine available time machine and can be used measuring the performance of the production floor.

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