Lead Time Reduction in Planning & Procurement

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Abstract:

A Lead time is the latency between the initiation and execution of a process. In terms of Supply Chain Management lead time can also be defined as the time from the moment the customer places an order to moment it is ready for delivery. In manufacturing sector lead time includes the time required to ship the parts to the supplier. In project management lead time is the time it takes to complete a task or a set of interdependent tasks. In this paper, we interpret the causes for excess lead time and suggest practical, inexpensive strategies and procedures for reducing it. Our recommendations are based on detailed study of many manufacturing industries. Interpreting the differences between work in process, flow time variance and lead time, we systematically review potential methods for lead time reduction by reducing lead time or flow time variance.

Key Points : Enclosures, Panels, Boilers, CFD, Economizers.

1. INTRODUCTION

We will be shouldering the responsibilities of executive of tomorrow so it is to understand methods, plans, various techniques that are essential to operate the effectively and efficiently. For this purpose we must have the knowledge of PPC. This is also true that this subject intervene into many departments of industrial organization, their relations with these departments are explained in first few topics. This basic objective of creating the manufacturing organization is to make the products. Thus the production is the nucleus or the center of entire business operations. It must be emphasized, however, that on signal system of forecasting, planning and control is suited to all industrial enterprises, no matter how well it may meet the needs of this on that special company. PPC functions look after the manufacturing activities.

PPC comprise the planning, routing, dispatching in the manufacturing process so that the movement of material, performance of machines and operation of labor however are subdivided and are directed and

coordinated as to quantity, quality, time and place.

Planning and control are two basic and interrelated managerial functions. They are so interrelated that they can be and often are considered as being one function. Planning is the preparation activity while control is the post-operation function. Both of them are so closely related that they are treated as Siamese twins. Planning sets the objectives, goals, targets on the basis of available resources with their given constraints. Control is the integral part of effective planning. Similarly control involves assessment of the performance, such assessment can be made effectively only when some standard of are set in advance. Planning involves setting up to such standard. The controlling is made by comparing the actual performance with these present standard and deviations are ascertained and analyzed.

2. Overview

Production is an organized activity of converting raw materials into useful products but before starting that work of actual production, production planning is done in order to anticipated possible difficulties and decide in advance as to how the production should be carried out in the best and economical way. Since mere planning of production is not only sufficient, hence management takes all possible steps to see that project or plan chalked by the planning department are properly adhered to and the standards set are attained in order to achieve it, control over production is exercised. The aim of production control is to produce the products of right quality, in right quantity at the right time by using the best and least expensive methods.

PPC thus defines as the process of planning the production in advance, setting the exact route of each item give “production order” to shops and lastly to follows up of progress of produces according to order. The principles of PPC gives in the statement, “First plan your work, then work your plan”. There are few other department associated with PPC are personnel department, manpower planning, costing department etc. Design department is important one as “The design is the problem of anticipating or trying to do what will be required in future and improving what is being already produced.

2.1 PRODUCTION PLANNING

Production planning is deciding how to go about producing a particular product. This includes deciding what product to produce, when to produce it, what resources are required for producing it, scheduling these resources for production

- To determine capacity of all manufacturing departments and to plan systematically coordinated and related production activities within the scope of the enterprise to meet sales requirements.
- To translate orders received from sales department into orders on the works department and to ensure steady plans of production activities.
- To find ways and means through which product manufacturing requirements such as materials and their necessary constituents such may be available in right quality and quantity at the right time.

- To coordinate a number of different department groups so that a fine balance of activities may be maintained.
- To promote fuller utilization of plants.
- To assist labor towards right and greater earnings.
- To train staff in the effective performance of their duties.

4. PRODUCTION CONTROL

- Production control is the task of predicting, planning and scheduling work, taking into account manpower, materials availability and other capacity restrictions, and cost so as to achieve proper quality and quantity at the time it is needed.
- Issuing the necessary orders to the concerned personnel, so that the production plans may be put into action.
- To arrange necessary items like materials, machines, tools, jigs, fixtures and manpower in quantity and quality at a time as planned.
- To see that orders (instructions) are followed so that goods with required quality and quantity may be manufactured and delivered at the promised time.
- The resources are used in the best possible manner in such a way that the cost of production is minimized and delivery date is maintained.
- Proper co-ordination of the operations of various sections/departments responsible
- To ensure regular and timely supply of raw material at the desired place and of prescribed quality and quantity to avoid delays in production.

3. Literature Review

In this section we are shedding lights on the different works done and their methodologies adopted by various people in order to improve lead timein their respective industries. Before doing the analysis, we have also studied different research papers related to this context.

- Planning and Scheduling in the Automotive Industry: A Comparison of Industrial Practice at German and Japanese Makers Thomas Staeblein, Katsuki Aoki (July 2014) discussed that providing customization of products is an important way of attracting customers, but it can increase the complexity of planning and scheduling processes in the order fulfilment system. In order to improve this understanding, they compared the order fulfilment system of German and Japanese auto makers as a sample of industrial practice. However, contrary to common perception, planning and scheduling processes differ much less between auto makers even in the light of regional differences concerning order fulfilment, different levels of product variety and mixed-model line manufacturing practice. The implications on the design and management of planning and scheduling functions vary between makers in our case study, but do not follow the traditional theoretical path. There are two limitations that need to be acknowledged regarding the present paper. The first limitation concerns the cross-disciplinary nature of this research.

- Florin Buruiana, MihaelaBanuintroduced Value Stream Map is used as an improving method to progress in implementing 'lean thinking' and as a leading formula in the improvement activities. As an improvement tool, VSM simplifies the measurement of times without added-value, so the calculation of lean coefficients is much easier and it is possible to improve the operative actions with strategic results.
- G Saranya, Mr. S.B. Nithyananthhave implemented value stream mapping (VSM) is helpful in lean implementation and to develop the road map to tackle improvement areas to bridge the gap between the existing state and the proposed state of a manufacturing firm. In This paper they compares the current state and future state of a manufacturing firm and witnessed 20 % reduction in TAKT time, 22.5 % reduction in processing time, 4.8 % reduction in lead time, 20 % improvement in production, 9 % improvement in machine utilization, 7 % improvement in man power utilization, objective improvement in workers skill level, and no change in the product and semi-finished product inventory level.
- Emil and Mihai present a strategy used to create an image about the informational and material flows of products and services. Value Stream Mapping is not a project that covers a specific period of time; instead it is a working methodology to differentiate activities that add value compared with the non-value added, and is addressing to all employees, to the management, suppliers and customers. Value Stream Mapping methodology cannot be used by itself, that is why for obtaining this improvement are necessary other methods like Kaizen, 5 S, Total Productive Maintenance, Setup reduction and others
- Value Stream Mapping to Reduce The Lead-Time Of Product Development Process: Satish Tyagi, AlokChoudhary, XianmingCai, Kai Yang (Nov 2014) have analyzed that product development (PD) is a broad field of endeavor dealing with the planning, design, creation, and marketing of a new product. The main focus of this paper is to exploit lean thinking concepts in order to manage, improve and develop the product faster while improving or at least maintaining the level of performance and quality. This research discusses the objective and associated problems with product development process for a case study unit of a Gas Turbine manufacturer. All the proposed changes will result in the reduction of lead time for the design stage reducing thus the overall PD lead time by 50%. Investigation of the human element factor in analyzing the performance of future state process is clearly a topic for future search.
- According to Jafri MohdRohani et.al. In this article identify and eliminate waste by using some lean techniques change over time and 5s and decreased lead time from 8.5 days to 6 days and value-added time decrease from 68 minutes to 37 minutes. Tomas Rohacet,al.(2015) to demonstration with value stream mapping on the plastic product of healthcare to applying lean tools are 5-why &

Ishikawa chart, and reduce the lead time and inventory control.

5. ORGANISATION WORK FLOW

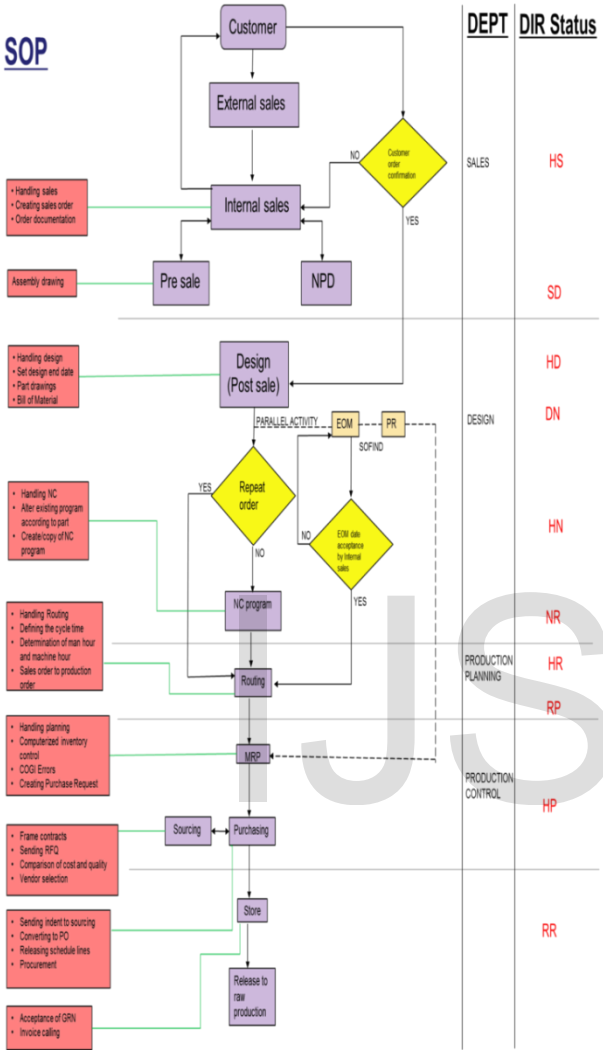

Fig. 1 : Standard Operational Procedure

6. SIX SIGMA METHODOLOGIES

6.1 Introduction.

Six Sigma is a methodology for pursuing continuous improvement in customer satisfaction and profit. It is a management philosophy attempting to improve effectiveness and efficiency.

- Six Sigma's aim is to eliminate waste and inefficiency, thereby increasing customer satisfaction by delivering what the customer is expecting.
- Six Sigma follows a structured methodology and has defined roles for the participants.
- Six Sigma is a data driven methodology and requires accurate data collection for the processes being analyzed.
- Six Sigma is about putting results on Financial Statements.
- Six Sigma is a business-driven, multi-dimensional structured approach for:
    - Improving Processes o
    - Lowering Defects
    - Reducing process variability
    - Reducing costs
    - Increasing customer satisfaction
    - Increased profits

6.2 SIX SIGMA METHODOLOGIES

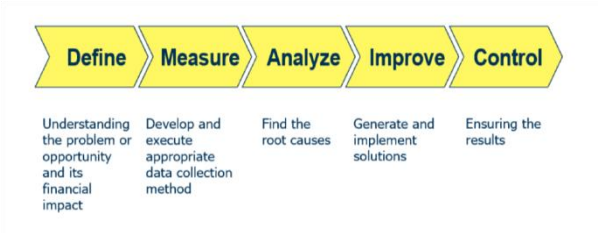

Fig.2 : Operational Process flow

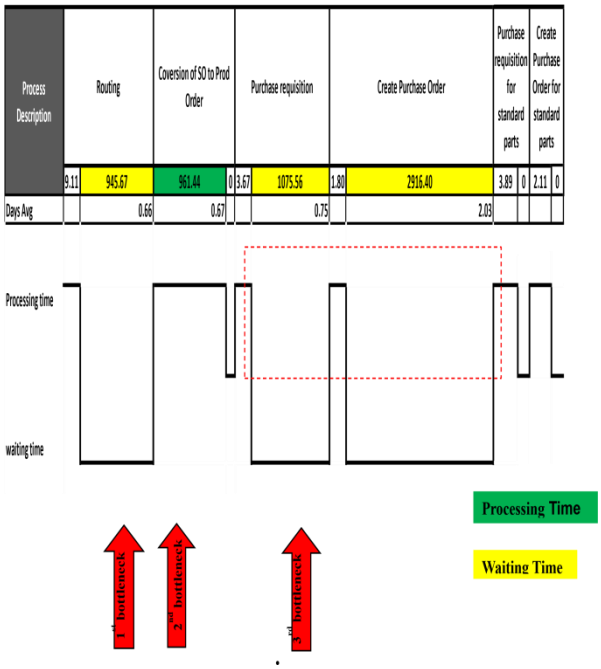

Fig. 3 : Value Stream Mapping Graph of WPPG

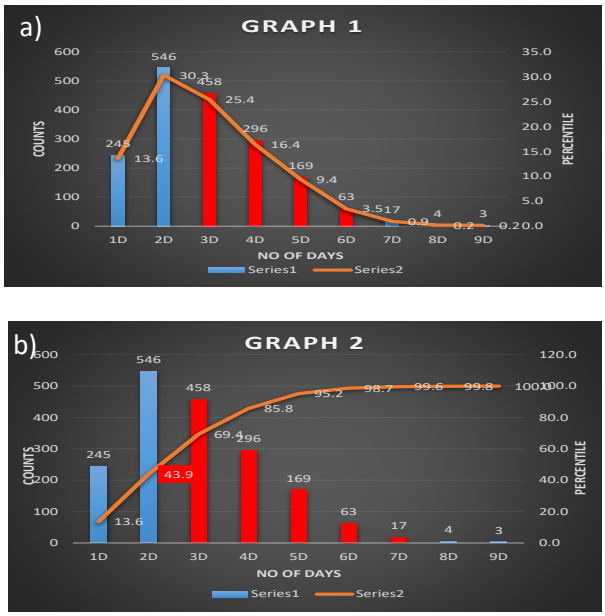

Fig. 4 (a & b) : Pareto Analysis for Production Planning

7. PARITO ANALYSIS

Pareto analysis is a statistical technique in decision making used for the selection of a limited number of tasks that produce significant overall effect.

- Targeted values for Production planning is 2 days and Production control is 18 days.
- "OUTLIERS" are those which are beyond the targeted values.
- By considering data from DEC-16 to FEB-17, Pareto graph are shown.

Table. 1 : Order Details and Days taken in Production Planning

PP						
NO OF DAYS	COUNTS				Percentile	
	dec	jan	feb	total		
1D	34	40	171	245	13.6	13.6
2D	222	116	208	546	30.3	43.9
3D	177	130	151	458	25.4	69.4
4D	132	99	65	296	16.4	85.8
5D	49	56	64	169	9.4	95.2
6D	15	42	6	63	3.5	98.7
7D	8	7	2	17	0.9	99.6
8D	0	3	1	4	0.2	99.8
9D	3	0	0	3	0.2	100.0
				1801		

- In graph 1 by considering Average time for production planning as 2 days, outliers are highlighted in Red Columns.
- From graph 2 about 43.9% of orders (Dec-16 to Feb-17) are processed within average time i.e. 2 days

8. CONCLUSION

- At the conclusion of the design phase, you should know who the customer or end-user is, their resistance issues, and requirements.
- You should also have a clear understanding of goals and the scope of the project including budget, time constraints, and deadlines.
- Reduction in time makes a big difference in production management.

9. REFERENCES

1. Emil, Mihai, Ionela Roxana "Value Stream Mapping - A Lean Production Methodology", The Annals of the "ŞtefanCel Mare" University of Suceava. Fascicle of The Faculty of Economics and Public Administration Vol. 11, No. 1(13), 2011.
2. G. Saranya, Mr. S.B. Nithyananth, "Improvement of Crankshaft Assembly Supply Chain Using Lean Techniques-A Case Study", International Journal Of Modern Engineering Research (Ijmer), Vol.2, Issue.2, Mar-Apr 2012 Pp-403-406.
3. Nitin Pandhia* And Sanjeev Verma," Value Stream Mapping In An Automotive Industry", International Journal Of Current Engineering And Technology, Vol.2, No.3 (Sept. 2012)
4. Anjard Ron, "process mapping: a valuable tool for construction management and other professionals." Facilities, Vol.16, No.3/4, pp.79-81, 1998
5. Aguiar, M.W.C and Wetson R.H.,"CIM-OSA and stochastic time Petri nets for behavioral modeling and model handling in CIM system design and building", proceeding of the institution of mechanical engineering, Vol207, Part B: Journal of engineering manufacturing, , pp. 147-85, 1993
6. X Lina etal, Condition-based spare parts supply, Reliability Engineering & System SafetyVolume 168, December 2017, pp. 240-248.
7. [2] CatarinaTeixeira, Isabel Lopes, andManuel Figuiredo, Multi-criteria Classifi-cation for Spare Parts Management: A Case Study ProcediaManufacturing Volume 11, 2017, pp. 1560-1567.
8. [3] R.H.Teuntera, AA Syntetos andM..Z Babai, Stock keeping unit fill rate speci-fication, European Journal of Operational Research Volume 259, Issue 3, 16 June 2017, pp. 917-925.
9. [4] U.C.Moharana andS.P.Sarmah, Determination of optimal order-up to level quantities for dependent spare parts using data mining, Computers & Indus-trial Engineering Volume 95, May2016, pp. 27-40.
10. Lee Wang, Wang S.P, and Chen W.C, "Forward and backward stocking policies for a two-level supply chain with consignment stock agreement and stock-dependent demand" European Journal of OperationalResearch Vol-ume 256, Issue 3, 1 February 2017, pp. 830-840.
11. [7] Hu, Qiwei et al, "OR in Spare Parts Management: A Review", European Journal ofOperational Research Volume 266, Issue 2, 16 April 2018, pp.395-414.
12. [8] Alireza Sheikh-Zadeh and Manuel D.Rossetti, Classification methods for problem size reduction in spare part provisioningEconomics Volume, Janu-ary 2020, pp. 99-114.