

Review on Cycle Time Reduction in Manufacturing Industries

Hiten Patel¹, Sanjay C. Shah²

Abstract: Manufacturing Organizations faces a Problem in reduction of cost and efficiency Challenges in their manufacturing Operations. To stand up in today's Globalization world, Manufacturers need to find ways to reduce Production time and cost in order to improve operating performance and Product quality. Manufacturing Time based challenge is an organized way focusing on reduction of total throughput time in manufacturing firm. Reduce time has a cascading influence on value and worth. As cycle times are reduced, output increases equally. If reduction in cycle time is fifty percent and work in process inventory is twice turns causes output to increase from twenty to seventy percent. As output increases, resource capacity is freed. Two major effects take place: expenses turn down, and the manufacturing firm becomes capable of producing considerably more output with fewer assets: a successful arrangement.

Keywords: Cycle Time, Internal and External Activity, bottleneck, Product Development Cycle time, Cycle Time Reduction, Throughput Time

INTRODUCTION

The shift from conventional mass production to batch production has accelerated in recent years. In response to continuously varying customer requirements, products are being manufactured in small batches, each with custom features. This trend is pervasive in both commercial and defense markets and has severe implications to the operations of a manufacturing enterprise. The diverse product mix being manufactured in a common facility greatly complicates both production planning and scheduling. Additional pressures on these functions are imposed by severe on-time delivery and minimal cycle time requirements placed upon manufacturers by the competitive market.

CYCLE TIME

The time required at each station for the performance of the work is known as cycle time. Cycle time is normally larger than the service time. The cycle time at a station is the time interval between the completion or the starting of work on successive items, and, therefore includes both productive and non productive work as well as any idle time.

Thus,

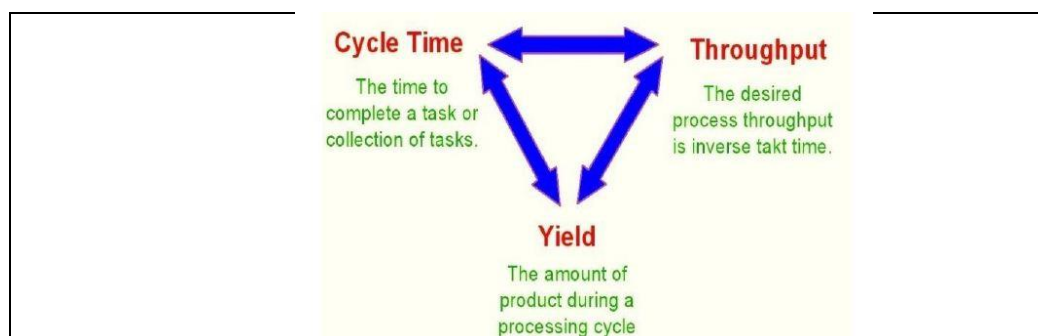
$$\text{Cycle Time} = \text{Service Time} + \text{Idle Time}$$

$$\text{Cycle Time, } C = \frac{\text{Useful Production Time Per Day}}{\text{Output Per Day}}$$

$$C = \frac{T}{Q}$$

The cycle time depends on the total output required and the available time for production Suppose T = Useful production time available per day and Q = Daily output required in number of units

Then,



Advantages of Reduced Cycle Time

1. More responsive to changing customer demands.
2. Quicker time to market with new products.
3. Save money by reducing WIP (Work in progress)
4. Increase yield
5. Quicker feedback for the process development and process capability improvement programs.
6. Additional savings through incremental improvements:
 - a. Improved employee productivity, which means savings if fewer employees are needed or increased factory output if consistent with factory goals.
 - b. Improved equipment utilization by being smarter about maintenance, set ups, production tests, balance, etc.
 - c. Reduced non productive tests and process control measurements.

Methods to Improve Cycle Time

1. Reduce WIP
 - 1.1 Decrease input until WIP drops to desired value.
 - 1.2 Increased line speed (the number of moves or turns per day) until WIP drops to desired value
 - a. Adding labor
 - b. Adding overtime
 - c. Reducing wasted time
2. Reduce the number of process steps
3. Reduce the lot size.
4. Reduce non value added operations like working on control wafers, measurements, unnecessary meetings, etc.
5. Fine tuning.

CYCLE TIME REDUCTION

Cycle time reduction is one of the most important elements of successful manufacturing today. More and more customers are demanding that manufacturers quickly respond to their wants and needs, deliver perfect quality products on time. This trend, which will continue, has led companies to focus more attention on their order-to-delivery cycle time.

Order-to-delivery cycle time reduction is often a good place to start in the overall effort to improve operations because it can often be done without heavy capital investment. Clearly, long cycle times cause high inventories, higher cost, and poor customer service. As a result, many manufacturers are streamlining internal and external supply operations to reduce overall order-to-cash cycle time. Some have even undertaken initiatives to extensively redesign and streamline the entire supply chain process.

A major consequence of this trend is that top management are revisiting their existing strategies and operational tactics. That in turn has led many to pursue new initiatives and directions, including:

Demand Management - Using improved sales forecasting processes and sales and operations planning processes to give top management a better handle on demand and supply.

Cross-functional Integration - Redesigning order-to-delivery process and other key processes to connect all processes across the factory.

Lean Manufacturing - Radically redesigning information flow and material flow processes with dramatically shorter cycle times, lower costs, minimum inventory, and near perfect delivery performance.

Supply Chain Management - Implementing supply chain planning, execution, and event-level alert systems, sometimes in conjunction with other modern information technology. As customers up the ante by insisting orders be promptly delivered and at a precise time, reducing cycle time becomes the pivotal point in a supplier order-to delivery performance rating. A shorter order-to-delivery cycle time also has other implications, including reduced inventories, lower costs, and more effective use of resources. In addition, experience has shown that production throughput can improve dramatically once the order-to-delivery cycle time is substantially reduced. An added set of benefits affects the bottom line in lower operating expenses, dramatically decreased requirements for working capital, and increased profit margins.

REASONS FOR LONGER CYCLE TIME

Many different processes, not just the manufacturing process, contribute to long cycle times. While all the delay may appear on the factory floor in the form of waiting (often more than 95% of the order-to-delivery cycle time consists of waiting), the causes for those waits stem from various processes both internal and external to manufacturing. When order-to-delivery problems are properly diagnosed, management almost always finds that one or more problems have contributed to the delay

RESEARCH ARTICLE REVIEW

Mushtaq Patel, Praveen Singh Sisodiya, Sajid Qureshi, Dr. Vivek Bansod presented a research work on Reduction in process cycle time in manufacturing or automobile industry. In particular, the manufacturing system is a flow shop that produces a single product. This research paper is able to present insights into how the manufacturing layout parameters (like process time, work in process, and assignment of an inspection station) influence manufacturing system functioning (like total Process cycle time and throughput). An especially significant result is that increasing process cycle time at one work unit can reduce both total process cycle time and throughput. This research thesis key contribution is to describe a number of cycle time reduction challenges and demonstrate the ways and methods that help to meet them.

CONCLUSION

"This paper presented a research work on Reduction in process cycle time in manufacturing industry. This research paper is able to present insights into how the manufacturing layout parameters (like process time, work in process, and assignment of an inspection station) influence manufacturing system functioning (like total Process cycle time and throughput). An especially significant result is that increasing process cycle time at one work unit can reduce both total process cycle time and throughput. One of the most noteworthy accomplishments in keeping the price of products low is the gradual shortening of the production cycle. The longer an article is in the process of manufacture and the more it is moved about, the greater its ultimate cost. (Henry Ford 1926). This research thesis key contribution is to describe a number of cycle time reduction challenges and demonstrate the ways and by using time study and scapes approach that help to meet them."

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