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A study of delays in meeting of delivery dates of IMPT UK Ltd.

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BACKGROUND

Precision Moulds & Tools (PMT) specializes in high-precision plastic injection mould tools, primarily for high-end exacting applications including the medical and connector markets. With extensive experience accumulated over its 20 years existence, the Company is recognized as a turnkey solutions provider offering a total service from initial concepts through design and production to mould validation and mould samples. In 2001 the Company embarked on a major expansion plan that included the building of a fully climate controlled plant in Sri Lanka named **International Precision Moulds & Tools (IPMT).**

RESEARCH PROBLEM

International **P**recision **M**oulds and **T**ools **(IPMT)** Pvt Ltd get most of their orders via the **P**recision **M**oulds and **T**ools **(PMT)** Pvt Ltd. Moreover, IPMT is not capable of fully implementing tool validation. Precision Moulds **(PMT)** offers full tool validation on new tooling up to **F**actory **A**cceptance **T**est (**FAT**) stage. Therefore IPMT sends the completed moulds to UK - PMT for validation and sampling before delivery to the customer. The delivery date is determined by the customer's requirement and availability of the capacity of IPMT and PMT as tool making is make - to- order. The Delivery date is not an unachievable target. However, when IPMT runs with its full capacity and building more than five tools simultaneously and while maintaining **5 micron** accuracy level, the probability of getting a late delivery is very high.

RESEARCH OBJECTIVES

To identifying the root causes for late delivery, to minimizing controllable factors affecting root causes and to eliminating costs due to late delivery

RESEARCH METHODOLOGY

After several brainstorming sessions it was clear that the root cause was poor scheduling. The general job-shop scheduling problem may be described as a series of jobs, each of which requiring a number of operations in a pre-defined order on a number of machines. A team of engineers can predict accurately the time duration and job sequences.

Each job i (i = 1, 2 ... n) consists of an ordered set of operations and each operation has four identifiers (i, j, k, p). Namely, i = job number, j = the sequence number of the operation, i.e. 1, 2, 3..., k = the number of the machine required to perform the operation, p = the length of the operation.

The regular measures of performance used are usually average or maximum flow time. Each job is assumed available for its first operation at time zero; thus the flow time for each job is the time when it completes its last operation. The general job-shop problem consisting of ***n*** jobs and ***m*** machines using the following five heuristic scheduling rules:

(i) FIFO (First in First Out), (ii) SPT (Shortest Processing Time), (iii) LWR (Least Work Remaining), (iv) LPT (Longest Processing Time) and (v) MWR (Most Work Remaining).

The problem can be initially analyzed under the non-interactive mode for the different scheduling rules. The initial results indicated that the best rule was minimizing the maximum flow time. The objective is to minimize this measure of performance. Else, computerized visual interactive simulation can be applied in the long run.

FINDINGS

The time taken to complete a job varies. Therefore, there was no proper scheduling process or coordination process of the production. However, aggregate planning can be done as a team of engineers can predict accurately the time consumption and job sequences with 90% probability. And the sub-processes running in parallel to the main process required inter-coordination among those processes, or else the main process would be blocked. Thus, the scheduling was done using scheduling rules as well as considering the priority of the job. In this scenario most of the time MWR (Most Work Remaining) rule was applied for jobs having the shortest delivery periods. From the results of scheduling and Kanban shinning board system, each operator could identify the next step and the priority level of job and job sequences. Sound controlling of scheduling and coordinating of parallel process leads to moving the job without waiting on the rack. Also the bottleneck section did not starve or get underutilized and the non-bottleneck section did not block the flow of work. Overall this way of scheduling leads to minimizing of cycle time. The cumulative impact was superior meeting of delivery targets.

CONCLUSION

Achieving an acceptable service level had become a huge problem for IPMT as its delivery dates go way beyond its target dates. To achieve the latter, the company struggles and works under high pressure conditions. This pressure leads to a high defect rate. Defects lead to further delay of the delivery dates. Those unfavorable factors collectively had a spiral impact on delivery dates.

Delaying delivery does not originate out of one cause. It is the cumulative result of many little and insignificant elements such as inefficient labour management, poorly planned job shop handling, badly coordinated parallel processes, inappropriate housekeeping and high defect rates.

However, achieving delivery dates is not a mirage to IPMT. To fulfill theses targets, essentially there is no need to spend a lot of money. It costs nothing. “Failing to plan is planning to fail”. Thus, the scheduling needs to be regularized. And coordinating of the core plan and sub-plans can be done without any extra effort. It would be more effective applying the Kanban shinning board system. And the concept of “Quality is not an act but a habit” should be inculcated in the minds of the operators; and it might create a defect free organization.

REFERENCES

Berk, J.H. 2011. Delivery Performance Improvement. Berk and Associates, Upland, California

Goldratt, E.M and Cox,J. 1986. The Goal. Penguin. St. Paul, Minnesota

Hopp,W.J and Spearman , M.L. 2011. Factory Physics. (Third Edition). Waveland Press, Inc. Long Grove, Illinois. United States of America.

http://courses.washington.edu

http://ieor.berkeley.edu

http://www.informs-sim.org

http://www.jhberkandassociates.com

http://www.jstor.org

http://www.math.ovgu.de

http://www.math.uni-magdeburg.de

http://www.mit.edu

http://www.om-db.wi.tum.de

http://www.researchgate.net

http://www.rspq.org

http://www2.warwick.ac.uk

https://docs.oracle.com