WORLDWIDE BUSINESS SOLUTIONS

OPTIMISED PRODUCTION TECHNOLOGY (OPT)

'A LOOK AT THE THEORY OF CONSTRAINTS'

Apart, from MRP other concepts and systems have been developed which also recognise the importance of planning to known capacity constraints, rather than overloading part of the production system and failing to meet the plan. The best-known practice uses the Theory of Constraints (TOC), which has been developed to focus attention on the capacity constraint or bottleneck parts of the operation. By identifying the location of constraints, working to remove them, then looking for the next constraint, an operation is always focusing on the part that critically determines the pace of the output.

The approach, which uses this idea, is called optimised production technology (OPT). The original marketing of the software product was originally by Eliyahu Goldratt.

OPT is a computer based technique and tool which helps to schedule production systems to the pace dictated by the most heavily loaded resources, that is, the Bottlenecks. If the rate of activity in any part of the system exceeds that of the bottlenecks, then items are being produced that cannot be used. If the rate of working falls below the pace at the bottleneck, then the entire system is under-utilised.

There are principles underlying optimised production technology, which demonstrate this focus on bottlenecks.

OPT Principles

1. Balance flow, not capacity.

2. The level of utilisation of a non-bottleneck is determined by some other constraint in the system, not by its own capacity.

3. Utilisation and activation of a resource are not the same.

4. An hour lost as a bottleneck is an hour forever out of the system.

5. An hour saved at a non-bottleneck is a mirage.

6. Bottlenecks govern both throughput and inventory in the system.

7. The transfer batch may not, and many times should not, equal the process batch.

8. The process batch should be variable, not fixed.

9. Lead times are the result of a schedule and cannot be predetermined

10.Schedules should be established by looking at all constraints simultaneously.

OPT should not be viewed as a replacement to MRP; nor is it impossible to run both together. However, the philosophy of OPT outlines show a definite conflict with the way that many businesses run their MRP systems in practice. While MRP as a concept does not prescribe fixed lead times or fixed batch sizes, many operations run MRP with these elements fixed for simplicity. However, as demand, supply, and the process within a manufacturing operation all present unplanned variations on a dynamic basis, bottlenecks therefore are dynamic, changing their location and their severity. For this reason, lead times are rarely constant over time. Similarly, if bottlenecks determine schedules, batch sizes may alter throughout the plant depending on whether a work centre is a bottleneck or not.

OPT uses the terminology of 'drum, buffer, rope' to explain its planning and control approach. Using OPT the bottleneck work centre becomes a drum, beating the pace for the rest of the factory. This drumbeat determines the schedules in non-bottleneck environments, pulling through work (the rope) in line with the bottleneck capacity, not the capacity of the work centre. A bottleneck should never be allowed to be working at less than full capacity; therefore, inventory buffers should be placed before it to ensure it never runs out of work.

Some of the arguments for using OPT in MRP environments are that it helps to focus on critical constraints and that it reduces the need for very detailed planning of non bottleneck areas, therefore cutting down computational time in MRP.

The differences between JIT, MRP and TOC can be seen in table 1.

Table 1

System	JIT	MRP/MRP2/ERP	TOC (Theory of Constraints)
SYSTEM	Pull System	Push System	Push system downstream from constraint, Pull system upstream from the constraint
Capacity Scheduling	-	Infinite Scheduling	Finite Scheduling
Environment assumption	Stable	-	Stable
Reaction on change	Very sensitive	Quick reaction because of infinite scheduling	Optimised to max throughput
Transfer Batch	Focuses on Batch size of 1	Set to the process batch size	Optimised to max throughput
Improvement	Set-up improvement everywhere	Changes the scheduling	Set-up times change when throughput can be improved
Focus on	Quality	Customer services and dependability	Bottlenecks
Inventory status	Reducing inventory till zero	Inventory is no problem, but less the better	With no bottlenecks there will be no inventory
Production Pace	Set by master production schedule	Set by master production schedule	Set by the beat of the drum buffer rope system

For More Information Please Contact: Joseph Turnbull

Worldwide Business Solutions: www.wwbsgroup.com

The London Office

31, Candover Close

Harmondsworth

Middlesex, UB7 0BD

Tel: +44 (0) 208 7599631

Fax: +44 (0) 208 7599632

turnbull.j@wwbsgroup.com