Optimized Production Technology (OPT)

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**DEFINITION**

Optimized production technology is a proprietary scheduling system using, computer software which was originally developed by Dr. Eliyahu Galodratt and colleagues who recognized that one of the most complex problems facing manufacturing organizations was that of shopfloor scheduling.

The system is based on the concept that there are two fundamental manufacturing phenomena:

- **Dependent events.** All processes rely upon the completion of preceding operations.
- **Statistical fluctuations.** Process times fluctuate around an average.

The effect of these phenomena is that the capacity of a plant must be unbalanced and therefore bottlenecks are inevitable.

As defined by Johnson, the OPT method of scheduling dictates that material should only be launched on to the shopfloor at the rate at which it is consumed by the bottleneck.

Furthermore, a time buffer of work should protect the production in the bottleneck.

This means, that work scheduled for day three arrives on day one, creating a buffer of two days as protection against disruption in operations before the bottleneck.

**AIM OF OPT**

The aim of OPT is to schedule bottleneck capacity in an efficient way. This schedule is the master for the demand placed on other capacities.

**MAIN FEATURES OF OPT**

The main features of OPT are described by Fax as follows:

- **Balance flow not capacity.**
- The level of utilization of any part of the system, which is not a bottleneck, is
dependent on other constraints in the system, not the potential of the worker.

- The utilization and activation of a resource are not synonymous.
- An hour lost at the bottleneck is an hour lost for the total system.
- An hour saved at a non-bottleneck is just a mirage.
- Bottlenecks govern both throughput and inventories.
- The transfer batch may not, and many times should not be equal to the process batch.
- The process batch should be variable, not fixed.
- Schedules should be established by looking at all the constraints simultaneously.
- Lead times are the results of the schedule and cannot be predetermined.

DEVELOPING OPT

The steps used to develop OPT consist of the following:

- **Preparation.** Measuring performance, project planning and identifying hardware and software requirements.
- **Plant analysis.** Analyzing the manufacturing processes and how they are managed.
- **Bottleneck analysis.** (A bottleneck is defined as a resource ‘where capacity is equal to or less than the demand being placed upon it’.) This is conducted by analyzing work in progress and shortages vs. excesses (potential bottlenecks are those resources which appear on the shortage list but not the excess list).
- **Computer modeling.** This is the process of developing the engineering network and instructing the OPT scheduler how to interpret details concerning the manufacture of products such as dependent set-ups, critical material, fixed batch quantities, maximum batch quantities, consumable tools, rework and uninterruptible processes. Data will be fed into the model concerning routines, bills of material and customer demand.
- **Data definition.** Establishing what data is required to be fed into the system.
- **Defining outputs.** The output will be a master production schedule (MPS), which is achieved by constraint capacity planning. This provides the basis for the process of demand management using the OPT software to carry out the scheduling - the OPT identifies the relevant demand and controls the build accordingly.

OPERATING OPT

OPT is operated through OPT software which has been developed to control complex manufacturing processes. The software will model the process and produce the schedules in the shape of material and capacity plans using the OPT bottleneck forward-loading techniques. The shopfloor control system will then monitor progress against the schedule and initiate any action to overcome shortfalls.

BENEFITS

The benefits claimed for OPT are that it will schedule finite resources in order to achieve maximum factory effectiveness.

The scheduling system:

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- Addresses the **key problem of bottlenecks**.
- **Improves profitability** by simultaneously **increasing throughput**.
- **Reduces inventory and operating expenses**.

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