

# Glossary

## for

### Sales and Operations Planning, Sales Forecasting and Master Scheduling

Definitions are from books on these subjects  
by Tom Wallace and Bob Stahl

**ABC Classification** — The grouping of items based on their importance. “A” items are the most important; “B’s” are less so; and “C” items are the least important of all. This stratification can be applied to items in inventory, products, product families, customers, and more. ABC classification is based on Pareto’s Law, the 20/80 rule, which states that 20 percent of the items in a group will have 80 percent of the impact.

**Abnormal Demand** — Demand not in the forecast, frequently from a customer with whom the company has not been doing business.

**Accessory** — A product that has benefit when used in conjunction with another product. For example, a docking station for a laptop computer is an accessory. Not to be confused with an option; an automatic transmission for a car is an option. See: **Supply Item**.

**Aggregate Forecast** — See: **Volume Forecast**.

**Aligned Resources** — Resources that match up very closely with the product families. For example, all of the production for Family A is done in Department 1 and Department 1 makes no product for any other family; similarly for Family B and Department 2, and so on. Determining future capacity requirements for aligned resources is simpler than for matrix resources. See: **Matrix Resources**.

**Assemble-to-Order** — See: **Finish-to-Order**.

**Available-to-Promise (ATP)** — The uncommitted portion of a company’s current inventory (On-Hand Balance) and future inventory, as expressed by the Master Production Schedule. ATP is a tool for promising customer orders.

**Bias** — The amount of forecast error build-up over time, plus or minus. This is a measure of overforecasting or underforecasting. See: **Sum of Deviations**.

**Bill of Resources** — A listing of the important resources required to produce and deliver a given product or product family. Used in **Resource Requirements Planning** and **Rough-Cut Capacity Planning**.

**Blow-down** — The act of deriving detailed, mix forecasts from aggregate, volume forecast. See: **Roll-up**.

**Buffer** — See: **Supermarket**.

**Build-to-Order** — Term popularized by Dell Computer; it has a similar meaning to **Finish-to-Order** and **Assemble-to-Order**. See: **Finish-to-Order**.

**Business Plan** — The financial plan for the business, extending out three to five fiscal years into the future. The first year of the plan is typically the annual budget and is expressed in substantial detail, the future years are less so.

**Capable-to-Promise** — An advanced form of **Available-to-Promise (ATP)**. ATP looks at future production as specified by the master production schedule. Capable-to-Promise goes further; it also looks at what could be produced, out of available

material and capacity, even though not formally scheduled. This capability is sometimes found in advanced planning systems (APS). The latter include the traditional **Capacity Requirements Planning** process and the newer Finite Capacity Planning/Scheduling, which not only recognize specific overloads but make recommendations for overcoming them.

**Capacity Planning** — The process of determining how much capacity will be required to produce in the future. Capacity Planning can occur at an aggregate level (see **Resource Requirements Planning**) or at a detailed level. Tools employed for the latter include the traditional **Capacity Requirements Planning** process and the newer Finite Capacity Planning/Scheduling, which not only recognizes specific overloads but makes recommendations for overcoming them.

**Capacity Requirements Planning (CRP)** — The process of determining the amount of labor and/or machine resources required to accomplish the tasks of production, and making plans to provide these resources. Open production orders as well as planned orders in the MRP system are input to CRP, which translates these orders into hours of work by work center by time period. In earlier years, the computer portion of CRP was called infinite loading, a misnomer. This technique is used primarily in complex job shops.

**Collaborative Planning, Forecasting, and Replenishment (CPFR)** — A process involving participants in the supply chain centering on jointly managed planning and forecasting, with the goal of achieving very high efficiencies in replenishment. CPFR has been referred to as “second generation **Efficient Consumer Response**.”

**Control Chart** — A graphic comparison of process performance data with predetermined computed control limits. The primary use of control charts is to detect assignable causes of variation in the process as opposed to random variations.

**Control Limit** — A statistically determined line on a control chart (upper control limit or lower control limit). If a value occurs outside of this limit, the process is deemed to be out of control.

**Demand Management** — The functions of sales forecasting, customer order entry, customer order promising, determining distribution center requirements, interplant orders, and service and supply item requirements. **Available-to-Promise** and **Abnormal Demand** control play a large role in effective Demand Management.

**Demand Manager** — A job function charged with coordinating the **Demand Management** process. Frequently the Demand Manager will operate the statistical forecasting system and work closely with other marketing and salespeople in the Demand Planning phase of **Executive S&OP**. Other activities for the Demand Manager might include making decisions regarding **abnormal demand**, working closely with the Master Scheduler on product availability issues, and being a key player in other aspects of the monthly **Executive S&OP** process. This may or may not be a full-time position.

**Demand Plan** — The forecast, customer orders, and other anticipated demands such as interplant, export, and samples. See: **Sales Plan**.

**Demand/Supply Strategies** — A statement for each product family that defines how the company “meets the customer” with that product, its objectives in terms of customer service levels, and targets for finished inventory or order backlog levels. For example, Family A is **Make-to-Stock** (i.e., it is shipped to customers from finished goods inventory), its target line fill is 99.5 percent, and its target finished inventory level is ten days’ supply.

**Demand Time Fence** — That period of time in the near future inside of which the unsold forecast is ignored in the **Master Schedule**. In many companies, the Demand Time Fence is set at or near the finishing lead time for the product. The logic is that the unsold forecast can’t be produced due to insufficient time and thus should be ignored. See: **Planning Time Fence**.

**Design-to-Order** — An order fulfillment strategy that calls for detailed design of the product to begin after receipt of the customer order. This is frequently used in companies that make complex, highly-engineered, “one-of-a-kind” products. See: **Finish-to-Order, Make-to-Order, Make-to-Stock**.

**Detailed Forecast** — See: **Mix Forecast**.

**Distribution Requirements Planning (DRP)** — A technique that employs the logic of MRP to replenish inventories at remote locations such as distribution centers, consignment inventories, customer warehouses, and so forth. The planned orders created by DRP become input to the **Master Schedule**.

**Efficient Consumer Response (ECR)** — An approach in which the retailer, distributor, and supplier trading partners work closely together to eliminate excess costs from the supply chain, with the goal of enhancing the efficiency of product introductions, merchandising, promotions, and replenishment.

**End Item** — An individual finished product.

**Engineered Cycle Time** — In **Lean Manufacturing**, the capacity of the resource expressed in the time required to produce one item. An engineered cycle time of 20 means that the resource is capable of producing one item every 20 seconds. See: **Takt Time**.

**Enterprise Resource Planning (ERP)** — An enterprise-wide set of management tools with the ability to link customers and suppliers into a complete supply chain, employing proven business processes for decision-making, and providing for high degrees of cross-functional coordination among Sales, Marketing, Manufacturing, Operations, Logistics, Purchasing, Finance, New Product Development, and Human Resources. Enterprise Resource Planning is a direct outgrowth and extension of Manufacturing Resource Planning and, as such, includes all of those capabilities. ERP is more powerful than MRP II in that it: a) applies a single set of resource planning tools across the entire enterprise, b) provides real time (or near real time) integration of sales, operating, and financial data, and c) extends resource planning approaches to the extended supply chain of customers and suppliers.

**EPE Interval** — In **Lean Manufacturing**, this is the minimum time between production runs of each part produced in a process. (EPEI = Every Part Every Interval.) The EPEI calculation determines the maximum frequency at which each item can be run without creating problems because of the amount of set-up time required.

**Exec Meeting** — The culminating step in the monthly **Executive S&OP** cycle. It is a decision-making meeting, attended by the President/General Manager, his or her staff, and other key individuals.

**Executive S&OP** — The executive portion of the overall Sales & Operations Planning set of processes. Its mission is to balance demand and supply at the aggregate level and to align operational planning with financial planning. It is a cross-functional decision-making process involving the General Manager of the business and his or her staff, along with managers and other support people. Executive S&OP includes the functions of **Demand Planning**, **Supply Planning**, the **Pre-Meeting**, and the **Exec Meeting**, occurring on a monthly cycle and displaying information in both units and dollars. Used properly, Executive S&OP enables the company's managers to view the business holistically, provides them with a window into the future, and serves as the forum for discussing relevant policy and strategy. See: **Sales & Operations Planning**.

**Family** — See: **Product Family**.

**Final Assembly Schedule (FAS)** — See: **Finishing Schedule**.

**Financial Interface** — A process of tying financial information and operating information together. It is the process by which businesses are able to operate with one and only one set of numbers, rather than using data in operational functions that differ from that used in the financial side of the business.

**Financial Planning** — The process of developing dollarized projections for revenues, costs, cash flow, other asset changes, and so forth.

**Finish-to-Order** — An order fulfillment strategy where the customer order is completed shortly after receipt. The key components used in the finishing or final assembly process are planned, and possibly stocked, based on sales forecasts. Receipt of a customer order initiates the finishing of the customized product. This strategy is useful where a large number of end products, most often due to a high degree of optionality within the product, can be finished quickly from available components. Syn: **Assemble-to-Order**, **Build-to-Order**.

**Finishing Schedule** — The schedule that defines the operations required to complete the product, from the level where its components are stocked (or Master Scheduled) to the end item level. The schedule also assigns the resources (equipment, manpower) to be utilized, and specifies timing.

**Forecast** — See: **Sales Forecast**.

**Forecast Consumption** — The process of replacing uncertain future demand (the forecast) with known future demand (primarily customer orders).

**Forecast Error** — The amount that the forecast deviates from actual sales. Measures of forecast error include **Mean Absolute Deviation (MAD)** and **Sum of Deviations (SOD)**. See: **Variability**.

**Forecast Frequency** — How often the forecast is fully reviewed and updated. A monthly frequency is common.

**Forecast Horizon** — The amount of time into the future that the forecast covers.

**Forecast Interval** — The size or “width” of the time period being forecasted. The most commonly used intervals are weekly or monthly.

**Hedge** — In two-level Master Scheduling, a quantity of stock used to protect against uncertainty in demand. The hedge is similar to safety stock, except that a hedge in this context has the dimension of timing as well as amount. Sometimes called Rolling Hedge Mix.

**Heijunka** — A Japanese word that means “balancing.” A Heijunka mechanism in **Lean Manufacturing** balances the amount of workload with the capacity to do it, normally in very small time increments. It typically involves sequencing orders in a repetitive pattern.

**Independent Demand** — Demand for an item is considered independent when unrelated to the demand for other items. Demand for finished goods and service parts are examples of independent demand.

**Just-in-Time** — The forerunner of **Lean Manufacturing**.

**Kanban** — A method used in **Lean Manufacturing** in which consuming (downstream) operations pull from feeding (upstream) operations. Feeding operations are authorized to produce only after receiving a Kanban card (or other trigger) from the consuming operation. In Japanese, loosely translated it means card or signal. Syn: demand pull.

**Lean Manufacturing** — A powerful approach to production that emphasizes the minimization of the amount of all the resources (including time) used in the various activities of the enterprise. It involves identifying and eliminating nonvalue-adding activities in design, production, **Supply Chain Management**, and customer relations.

**Load Profile** — See: **Bill of Resources**.

**Line Fill Rate** — The percentage of order lines shipped on time and complete. See: **Order Fill Rate**.

**Lower Control Limit** — Control limit for points below the central line in a control chart. See: **Control Limit**.

**Make-to-Order** — An order fulfillment strategy where the product is made after receipt of a customer's order. The final product is usually a combination of standard items and items custom designed to meet the requirements called out in the customer order. See: **Design-to-Order, Finish-to-Order, Make-to-Stock**.

**Make-to-Stock** — An order fulfillment strategy where products are finished before receipt of customer orders. Customer orders are typically filled from existing finished goods inventory. See: **Design-to-Order, Finish-to-Order, Make-to-Order**.

**Manufacturing Resource Planning (MRP II)** — See: **Enterprise Resource Planning**.

**Master Production Schedule (MPS)** — Future scheduled production, as represented by the (normally) bottom row on the **Master Schedule** display. These are the production orders from which customer orders are promised and which the plant(s) will be expected to produce.

**Master Schedule** — The tool that balances demand and supply at the product level, as opposed to **Executive S&OP**, which balances demand and supply at the aggregated **Product Family** level. It is the source of customer order promising, via its **Available-to-Promise** capability, and contains the anticipated build schedule for the plant(s) in the form of the Master Production Schedule.

**Master Scheduling Policy** — A document authorized by top management that defines roles and responsibilities. It directs the Master Scheduler and other on both the demand and supply sides of the business regarding who owes what to whom. It spells out who is empowered to make decisions under what circumstances and in which time zones.

**Material Requirements Planning (MRP)** — The first step in the evolution of ERP. This set of techniques uses bills of material, inventory data, and the **Master Production Schedule** to calculate requirements for materials. It makes recommendations to release replenishment orders. Further, since it is time phased, it makes recommendations to reschedule open orders when due dates and need dates are not in phase. Originally seen as merely a better way to order inventory, today it is thought of primarily as a priority planning technique (i.e., a method for establishing and maintaining valid due dates on orders). See: **Manufacturing Resource Planning, Enterprise Resource Planning**.

**Matrix Resources** — Resources that do not match up with the product families. For example, Department 1 makes products in Families A, C, D, and G. Determining future capacity requirements for matrix resources is somewhat more complex than for aligned resources. See: **Aligned Resources**.

**Mean** — The arithmetic average of a group of values.

**Mean Absolute Deviation (MAD)** — The average of the absolute values of the deviations of observed values from some expected value. MAD can be calculated based on observations and the arithmetic mean of those observations.

**Mix** — The details. Individual products, customer orders, pieces of equipment, as opposed to aggregate groupings. See: **Volume**.

**Mix Forecast** — A forecast by individual products. Sometimes called the detailed forecast. It is used for short-term scheduling for plants and suppliers (and may be required for certain long lead time, unique purchased items).

**Mixed Model Scheduling** — A production and scheduling approach that interweaves different products within the same production line up. The opposite of "batch build," i.e., building all of the same product together, the mixed model approach runs different products one after another through the same resource. Advantages include better customer service, lower finished inventories, and higher schedule stability for suppliers.

**On-Hand Balance** — The amount physically in stock, irrespective of booked customer orders.

**Operational Takt Time** — See: **Takt Time**.

**Operations Plan** — The agreed-upon rates and volumes of production or procurement to support the **Sales Plan (Demand Plan, Sales Forecast)** and to reach the inventory or order backlog targets. The Operations Plan, upon authorization at the **Exec Meeting**, becomes the “marching orders” for the Master Scheduler, who must set the Master Production Schedule in congruence with the Operations Plan. Syn: **Production Plan**.

**Order Fill Rate** — The percentage of customer orders shipped on time and complete as opposed to the total number of orders. Order fill is a more stringent measure of customer delivery performance than line fill. For example, if only one item out of twenty on a customer order is unavailable, then that order counts for zero in the order fill calculation. The line fill percentage in this example would be 95 percent. See: **Line Fill Rate**.

**Pacemaker** — The point at which work is scheduled in a **Lean Manufacturing** environment. Components produced upstream of the pacemaker are pulled to the pacemaker finishing schedule. Work flows to processes downstream of the pacemaker on a first-in first-out basis.

**Planning Bill of Material** — An artificial grouping of items in a bill-of-material format used to facilitate forecasting and Master Scheduling.

**Planning Time Fence (PTF)** — The period of time inside of which detailed planning must be present in the **Master Schedule**. Normally, the Planning Time Fence approximates the cumulative lead time of the product plus 25 to 50 percent. Sometimes called the Critical Time Fence. Most Master Scheduling software will not alter the Master Production Schedule within the PTF, only outside of it.

**Plant Scheduling** — The process of creating the detailed schedules needed by the plant(s). Plant schedules can include the **Finishing Schedules**, fabrication schedules, and so forth.

**Postponement** — An approach that calls for waiting to add options into the product until after the customer order is received and then finishing the product very quickly. See: **Finish-to-Order**.

**Pre-Meeting** — The preliminary session prior to the **Exec Meeting**. In it, key people from Sales & Marketing, Operations, Finance, and New Product Development come together to develop the recommendations to be made at the Executive S&OP session.

**Product Family** — The basic planning element for **Executive S&OP**, where the focus is on families and subfamilies (volume), not individual items (mix).

**Product Subfamily** — A planning element sometimes used in **Executive S&OP** that provides a more detailed view than product families, but not at the extreme detail of individual products. Product Family A, for example, might contain three subfamilies — A1, A2, A3 — and each of those might contain a dozen or so individual products. See: **Product Family**.

**Production Forecast** — A forecast of demand for a module or option in a **finish-to-order** environment. Since this demand is of the dependent variety, it is calculated via explosion of the parent’s **available-to-promise**.

**Production Plan** — See: **Operations Plan**.

**Projected Available Balance** — The inventory balance projected out into the future. It is the running sum of on-hand inventory, minus requirements, plus scheduled receipts and (usually) planned orders.

**Pull** — The process of flowing production from upstream (feeder) processes to downstream (finishing) processes in which nothing is produced by the feeder until the downstream “customer” signals a need.

**Resource** — Those things that add value to products in their production and/or delivery.

**Resource Planning** — A generalized term applied to **Manufacturing Resource Planning**, **Business Resource Planning**, and **Enterprise Resource Planning**.

**Resource Requirements Planning** — The process by which the **Operations Plan in Executive S&OP** can be converted into future capacity requirements. Frequently the Operations Plan, expressed in units of product, is “translated” into standard hours of workload (which is a common unit of measure for production operations). Resource Requirements Planning can be used at the departmental level, or for subsets of departments, down to individual pieces of equipment or specific skill levels for production associates. This process can also be carried out for material requirements from suppliers, for warehouse space, and for non-production operations such as product design and drafting. A similar process, called **Rough-Cut Capacity Planning**, operates at the mix level in conjunction with the **Master Schedule**.

**Roll-up** — The act of creating an aggregate, **volume forecast** by summing up the detailed, **mix forecast**. See: **Blow-down**.

**Rough-Cut Capacity Planning**. See: **Resource Requirements Planning**.

**Running Sum of Forecast Error (RSFE)** — The cumulative sum of forecast error, plus or minus, over time. As such, it is a measure of bias. Also called Sum of Deviations (SOD).

**Safety Stock** — An amount of inventory held to protect against fluctuations in demand and/or supply.

**Safety Time** — A technique in MRP whereby material is planned to arrive ahead of the requirement date. This difference between the requirement date and the planned in-stock date is safety time.

**Sales & Operations Planning (S&OP)** — A set of business processes — **Executive S&OP**, **Master Scheduling**, **Distribution Planning**, **Plant and Supplier Scheduling**, and so forth — that helps companies keep demand and supply in balance, align units and dollars, and link volume planning with detailed mix schedules and plans. It does that by first focusing on aggregate volumes — product families and groups — so that mix issues — individual products and customer orders — can be handled more readily. The **Executive S&OP** component of Sales & Operations Planning links the company’s Strategic Plans and **Business Plan** to its detailed processes — the order entry, **Master Scheduling**, **Plant Scheduling**, and purchasing tools it uses to run the business on a week-to-week, day-to-day, and hour-to-hour basis. See: **Executive S&OP**.

**Sales Forecast** — A projection of estimated future demand.

**Sales Plan** — The details backing up the **Sales Forecast**. It represents Sales & Marketing management’s commitment to take all reasonable steps necessary to achieve the forecasted level of actual customer orders.

**Service Part** — An item used in the repair or maintenance of equipment. Also called spares or repair parts.

**Stockkeeping Unit (SKU)** — An individual finished product. In the more rigorous use of the term, it refers to a specific, individual product in a given location. Thus, product #1234 at the Los Angeles warehouse is a different SKU from the same product at the Chicago warehouse.

**Subfamily** — See: **Product Subfamily**.

**Suicide Quadrant** — Forecasting in great detail, far into the future.

**Sum of Deviations (SOD)** — See: **Running Sum of Forecast Error**.

**Supermarket** — Within **Lean Manufacturing**, this is a set amount of inventory (finished goods or work-in-process) that allows **Pull** processes to function when demand is not totally linear.

**Supplier Scheduling** — A purchasing approach that provides suppliers with schedules rather than individual hard copy purchase orders. Normally a supplier scheduling system will include a contract and a daily or weekly schedule for each participating supplier extending for some time into the future. Syn: vendor scheduling.

**Supply Chain** — The organizations and processes involved from the initial raw materials through manufacturing and distribution to the ultimate acquisition of the finished product by the end consumer.

**Supply Chain Management** — The planning, organizing, and controlling of supply chain activities.

**Supply Item** — An item that is consumed in the operation of a product. Printer cartridges are a supply item See: **Accessory**.

**Supply Planning** — The function of setting planned rates of production (both in-house and outsourced) to satisfy the **Demand Plan** and to meet inventory and order backlog targets. Frequently, **Resource Requirements Planning** is used to support this.

**Takt Time** — In **Lean Manufacturing**, Takt Time sets the basic rate of production. It communicates the frequency of demand and thus the frequency at which products must be produced at the **Pacemaker**. Takt Time is derived from the **Sales Plan**, while Operational Takt Time is derived from the **Operations Plan**, reflecting inventory draw down or build up, plant shutdowns, and other factors. Thus, these values can be thought of as the demand for capacity, i.e., what the resource will be required to produce. **Engineered Cycle Time** refers to the supply of capacity, i.e., what the resource is capable of producing.

**Time Fence** — A point in the future that delineates one time zone from another. See: **Time Zones**.

**Time Phasing** — The process of expressing future demand and supply by time period.

**Time Zones** — Periods within which changes are managed in certain ways, reflecting the realities of the operating environment. For example, in many plants, achieving a 30 percent increase in output might be impossible within three days; difficult and costly, but attainable, within three months; and very practical within three years.

**Two-Level Master Scheduling** — A Master Scheduling approach where an end product type or category (not a specific product) is Master Scheduled along with selected key options, features, attachments, and common parts.

**Upper Control Limit** — Control limit for points above the central line in a control chart. See: **Control Limit**.

**Variability** — In the larger sense, this is the amount that individual elements in a time series deviate from the average. In some cases, variability is random and inherent in the process being observed. See: **Forecast Error**.

**Vendor Managed Inventories** — A process that places the replenishment decision-making in the hands of the supplier. It's the supplier's job to ensure that the customer does not run out of stock and to keep the inventories at the agreed-upon levels.

**Volume** — The big picture. Sales and production rates for aggregate groupings — product families, production departments, etc. — as opposed to individual products, customer orders, and work centers. See: **Mix**.

**Volume Forecast** — A forecast by product groupings such as families, classes, and so forth. Also called the aggregate forecast or the product group forecast, it is used for sales planning, for **Capacity Planning** at the plants and suppliers, and for financial analyses and projections.

**Waterfall Chart** — A graphical chart that displays time-phased demand variations of forecast-to-actual for the purpose of identifying bias in the forecast.