

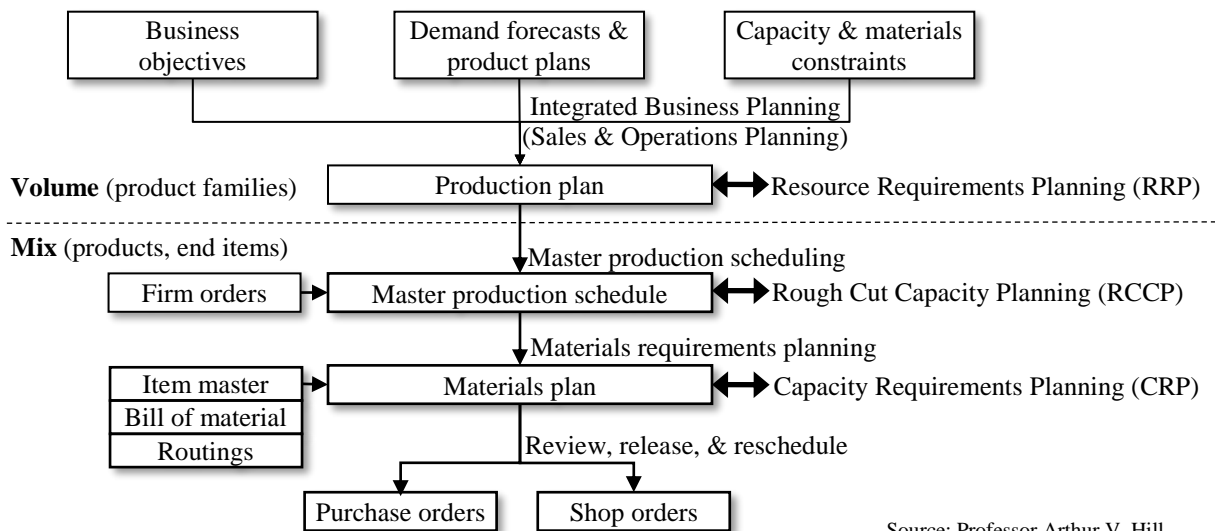
This is an entry in the newly published *Encyclopedia of Operations Management – 2018 Edition* by Professor Arthur V. Hill. This book is available as an eBook from [Amazon Kindle](https://www.amazon.com/dp/B078888888) and in hardcopy format from [www.ClamshellBeachPress.com](http://www.ClamshellBeachPress.com).

**Master Production Schedule (MPS)** – A high-level plan for a few key items used to determine the materials plans for all end items; also known as the master schedule.

**Overview** – The MPS is “top management’s handle on the business,” because the MPS includes a limited number of items. Therefore, the MPS process should focus on the narrow part of the *bill of material (BOM)*, which suggests that master scheduling should be done for end items for an assembly BOM, for major components for the modular BOM, and for raw materials for a disassembly BOM. (See the *BOM* entry for more detail.)

**Manufacturing planning process** – As shown in the figure below, the manufacturing planning process starts with *Integrated Business Planning (IBP)* (aka *Sales & Operations Planning (S&OP)* and *Sales, Inventory, & Operations Planning (SiOP)*) to reconcile business objectives, demand forecasts, product plans (e.g., *product lifecycle management (PLM)*), with capacity and materials constraints to create the production plan. *Resource Requirements Planning (RRP)* evaluates the production plan to make sure that sufficient resources (labor and machines) are available. RRP is a high-level evaluation process that only considers aggregate volume by product families in an aggregate measure such as sales dollars or shop hours and does not consider specific products, items, or resources. The MPS is then created from the production plan and then the materials plan is created from the MPS (based on the item master and BOM). Manufacturing and purchase orders are released based on the materials plan. More details are below.

**The manufacturing planning process**



Source: Professor Arthur V. Hill

**Master production schedule** – Once the production plan is complete, the master scheduling process combines the production plan, firm customer orders, and managerial insight to create the MPS. *Rough Cut Capacity Planning (RCCP)* evaluates the master schedule to make sure that sufficient capacity is available. RCCP is more detailed than RRP, but only considers the small set of end items in the master production schedule. Many firms consider major assemblies to be *make-to-stock (MTS)* end items. Although the MPS is based on forecast (demand plan) information, it is a plan rather than a forecast because it considers capacity limitations and attempts to level the load. Even though the MPS has the word “schedule” in it, it should not be confused with a detailed schedule.

**Materials plan** – Once the MPS is complete, the *Materials Requirements Planning (MRP)* process converts the MPS into a materials plan, which defines quantities and dates for every production and purchase order for every item. MRP uses a gross-to-net process to subtract on-hand and on-order

quantities and a back scheduling process to account for planned leadtimes. [Capacity Requirements Planning \(CRP\)](#) then evaluates the materials plan to make sure that sufficient capacity is available. CRP is more detailed than RCCP and considers the capacity requirements for every operation in the routing for every production order in the materials plan. Although this capacity check is more detailed than the others, it is still fairly rough because it uses daily [time buckets](#) and uses planned leadtimes based on average queue times. Advanced Planning and Scheduling (APS) systems can be used to conduct even more detailed scheduling.

**Order releases** – Once the materials plan is complete, buyer/planners review the materials plan and determine which manufacturing orders to release (send) to the factory and which purchase orders to release to suppliers. The planners and buyers may also reschedule [open orders](#) (orders already in the factory or already with suppliers) to change the due dates (pull in or push out) or the quantities (increase or decrease).

**Final assembly schedule** – The [Final Assembly Schedule \(FAS\)](#) is a short-term schedule created in response to customer orders. The *push-pull boundary* is between the items in the MPS and in the FAS.

**Safety stock** – [Safety stock](#) should be positioned at the same level as the MPS so that it is balanced between materials. In other words, a safety stock of zero units of item A and ten units of item B is of little value to protect against demand uncertainty if the end item BOM requires one unit of each. However, safety stock of individual items might also be needed to protect against yield losses and uncertain external demand (i.e., [service parts](#)).

**Capacity planning** – As shown in the figure above, the MPS determines the overall volume and is often done in dollars or some other aggregate units for product families. In contrast, planning at the MPS level (and below) is done in date-quantity detail for specific items and therefore determines the mix (Wallace & Stahl 2003). The capacity planning tools used in this process (RRP, RCCP, and CRP) should be called capacity reporting tools because they only report how much capacity is required for a proposed plan. Many firms do not have the information systems resources (or need) to use all of these tools.

**Inventory planning** – All of the above plans (the production plan, master production schedule, and materials plan) have a companion inventory plan. If the planned production exceeds the planned demand, planned inventory will increase. Conversely, if planned production is less than the planned demand, planned inventory will decrease.

See [assemble-to-order \(ATO\)](#), [Available-to-Promise \(ATP\)](#), [bill of material \(BOM\)](#), [bill of resources](#), [Capacity Requirements Planning \(CRP\)](#), [chase strategy](#), [Final Assembly Schedule \(FAS\)](#), [firm order](#), [Integrated Business Planning \(IBP\)](#), [leadtime](#), [level strategy](#), [Materials Requirements Planning \(MRP\)](#), [on-hand inventory](#), [on-order inventory](#), [planned order](#), [planning horizon](#), [Product Data Management \(PDM\)](#), [production planning](#), [push-pull boundary](#), [Rough Cut Capacity Planning \(RCCP\)](#), [schedule attainment](#), [scheduling](#), [time fence](#), [VAT analysis](#).