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Same Difference?

Exploring the subtleties of time-phased order point and material requirements planning

This department answers technical questions regarding problems in production and inventory control. Readers are invited to contact Louis Malucci, CPIM, or Karen Lovecchio, Ph.D., at the APICS National Research Committee, Center for Integrated Manufacturing Studies, Rochester Institute of Technology, P.O. Box 9887, Rochester, New York, 14623; (585) 475-2098; via fax at (585) 475-5240; or at apics@rit.edu.

Reader H.P. from Singapore asks: "What is the difference between time-phased order point (TPOP) and material requirements planning (MRP)?"

This is a very understandable question. In fact, the *APICS Dictionary 11th Edition* even describes TPOP as "MRP-like." The definition goes on to say that TPOP is a "time-planning logic for independent demand items, where gross requirements come from a forecast, not via explosion." It also explains that the technique can be used to plan distribution center inventories and service (repair) parts, because MRP logic can readily handle items with dependent demand, independent demand, or a combination of both.

To understand the difference between TPOP and MRP, we first must consider reorder point. Reorder point is based on a statistical analysis of past use on a part-by-part basis. An extension of that analysis, TPOP takes into consideration time periods of "lumpy demand" that may come from unusual orders or seasonal fluctuations, rather than statistical averages that assume even demand through all periods. Simply stated, order point looks back at history while MRP looks ahead to the future.

MRP is based on what is known today, such as existing customer orders, and, in most cases, includes a

forecast of future orders, usually based on input from a master schedule. Demand for individual parts in an MRP system stems from the demand for its parent in a multilayered structuring of assemblies.

For example, if we used 1,200 of a given part per year, reorder point assumes that we used 100 per month and will use 100 per month in the future. If we had 800 parts in stock, we could assume we would run out in 8 months. So we would need to replace them in 8 months, taking into consideration vendor lead time. If the required lead was 9 months, it would be necessary to plan accordingly.

So, what's wrong with this picture? As most stock prospectuses state, "Past history may not be an indication of future performance." TPOP may be a valid method of determining replenishment quantities and the timing of scheduled receipts in an environment of independent demand, such as distribution center inventories. Or it can be valid when planning service parts or after-market replacement parts to customers.

And another thing

MRP is also based on dependent demand, where the demand for a given stockkeeping unit is based on the demand for its parent assembly; that parent, in turn, is based on its parent assembly, and up the tree to the final deliverable finished goods product. These final assemblies have designated due dates, whether they are shipments to a customer or to be put into stock for future orders. The demand for the final product is exploded through the bills of material, level by level. At each level, the

demand is netted after considering the on-hand balance and scheduled receipts, again, for that period. And at each level, the newly scheduled receipt is time phased to include both the vendors' lead time and the time it takes to assemble the parts once all of them are available.

An order to manufacture 100 cars would require analysis first of how many of the major subassemblies, such as engines, are in stock. If there are 50 in stock, and an existing order for 25 is due in that period, 25 more need to be ordered. Logic then compares how many are in stock and how many are due in that period.

TPOP takes into consideration time periods of "lumpy demand" that may come from unusual orders or seasonal fluctuations.

Thus, demand for each component is calculated not based on historical usage, but on actual existing orders and forecasted demand, and is at each level time phased to include assembly time and component vendor lead time requirements.

In addition, MRP has evolved into a totally integrated system, integrating major subsystems, such as master planning, shop floor activity, purchasing, and financial systems. With a single stroke of a computer key, many systems are updated, each crediting or debiting purchase status, open order statuses, accounts payable, general ledger, and the MRP plan itself.

Lot sizing rules, such as minimums and maximums, still apply in both TPOP and MRP methodologies. ■