

WHITEPAPER

BEST PRACTICES IN DEMAND & INVENTORY PLANNING

For Chemical Companies



ABOUT

In support of its present and future customers, Aptean sponsored this white paper to help chemical manufacturers understand how supply chain functions such as demand and inventory planning can positively impact their overall operations and bottom line.

INTRODUCTION

It's a classic scenario in chemical manufacturing—struggling to coordinate the opinions of sales and marketing with manufacturing and supply chain initiatives on what should be produced, when it should be produced, and where it's needed.

The lack of good supply chain coordination can lead to frequent changes in production schedules, expedited transfers and shipments in distribution, excessive stock-outs, erratic levels of customer service, lack of visibility into future demand, and inventory in the wrong place and at the wrong time.

For many chemical companies, these problems are not new. In fact, their root cause typically revolves around a few basic issues—mainly, a lack of shared knowledge about the supply chain planning function, inadequate decision support systems, and unavailable or inconsistent data due to lack of integration to the core business system.

Supply chain planning involves functions such as demand forecasting and planning, distribution inventory planning, and plant capacity planning and scheduling. The right mix of strategy, education, and systems can have a very high impact on a manufacturer's overall operations—and ultimately its bottom line.

KNOWLEDGE OF THE SUPPLY CHAIN FUNCTION

Part of the challenge many chemical companies face has to do with a lack of knowledge regarding forecasting and planning techniques. Often, key decision makers have little formal training in the areas of forecasting, inventory planning, production planning, distribution planning or scheduling theory and processes. Many are simply following past practices, which may be outdated, overly simplistic, and yield undesirable outcomes.

Yet knowledge of basic forecasting techniques, combined with an understanding of the forecasting process, is absolutely essential in today's highly competitive environment. A greater knowledge of forecasting techniques and the systematic process of forecasting can improve forecast accuracy and forecast credibility. This can result in better coordination

between organizational units and greater stability in the production plan.

Planners are often frustrated at the quality of the forecasts they receive from their sales and marketing organizations. In many cases, they will override the forecast and use their own judgment. While this can work better in individual circumstances, it also means that marketing and planning are not working to a coordinated plan.

Forecasts at the item/location levels are often the least reliable.

Through the process of aggregation a more credible forecast can be generated. So while item/location forecasts may be unreliable, the aggregate forecast at the overall item level is more stable. Aggregation from the item to the brand level, across a wide range of items, tends to produce a yet more reliable forecast. Through a method of proration, adjustments to the forecast made at the higher brand levels can be prorated down to the item/location level.

This gives distribution a better expectation of shipping requirements, while giving production a better demand number for planning and scheduling at the plant level. Production plans, based upon intermediate product forecasts, tend to become more stable through this method of forecasting, since forecasts are more credible when built over a longer time horizon.

With today's technology, this process can occur instantaneously at the desktop, and the results can be easily shared throughout the network for use by multiple divisions within the organization.

A DEEPER KNOWLEDGE OF INVENTORY POLICY

Another key area in which planners and decision makers should be more proficient is inventory policy. For example, there is often confusion about the relationship between safety stock, reorder point, reorder batch size and customer service levels. Many chemical companies develop production plans around -"days of supply" or "cover period." Some will derive their figures by simply dividing annual demand by the number of forecast periods—without taking into account seasonality,

Benefits of Advanced Planning and Scheduling Techniques:

- Faster Planning and Re-Planning
- Increased Stability of Plans
- Reduced Overtime
- Improved Labor Utilization
- Reduced Changes in Daily Schedules
- Improved Customer Service Levels
- Improved Morale
- Reduced Inventory Levels
- Increased Plant Throughput
- Fewer Changeovers Due to Better Sequencing

trends, or the cost of production and carrying costs.

Low-volume products generally should be produced less often with a longer cover period so that changeover costs (which are generally lower than carrying costs) are reduced. On the other hand, high-volume products should be produced more frequently. The relationship of volume to cover period has an impact on safety stock and service levels. The shorter the cover period, the more frequent the production; and with lower safety stock, service levels are higher. The converse is also true.

Knowledge of basic inventory policies, and how they interrelate, can benefit planners by deriving an inventory replenishment plan, which achieves stated customer service levels consistent with lower levels of inventory.

Planners should have enough supply chain management understanding to know where to look, what questions to ask and how to interpret the information they are receiving. They don't need to know all the underlying statistical techniques. But they do need an easy-to-use system that can perform the calculations quickly and generate credible results. The combination of an effective system, along with forecasting and planning know-how, can yield significant results.

LONG-RANGE PLANNING HORIZONS

Supply chain planning systems help companies tackle long-term strategic issues, such as business forecasting and global capacity, all the way down to short-term tactical issues such as day-to-day scheduling. However, the length of the planning horizon determines the degree of flexibility and the methods used to manage the plant.

The planning horizon for a typical business is a rolling twelve-month period. This time horizon is often considered a

demand forecasting problem. Since the forecast is used to drive the budget, distribution, and production planning processes, increasing the accuracy of the forecast is fundamental to improving the stability of these plans—i.e., distribution, inventory, production—and the overall return on investment from corporate resources.

Therefore, implementing a good systematic forecasting process is the foundation of a sound supply chain planning infrastructure. Benefits include a one-number forecast, greater stability of plans, less reactive decision making, improved morale, lower inventory levels, higher customer service levels, increased throughput in manufacturing, greater confidence throughout the organization, and reduced freight costs.

MEDIUM-TERM PLANNING HORIZONS

Once a credible forecast is developed, planners can immediately plan distribution requirements, inventory levels, allocation of demand to plants (demand planning) and capacity planning (at the plant level).

In order to develop a long-range Master Production Schedule (MPS), the planner must first establish inventory levels for the finished products at each location. An inventory policy system provides essential help with this process.

The objective of an inventory policy system is to help the planner establish safety stock levels, reorder points and reorder batch sizes over time, consistent with meeting a

target customer service level. The location of the inventory is also considered during this process.

The inventory policy system builds upon the forecast and is the driver for distribution and production planning. It formalizes the process of setting stock policy and allows the planner to look at the tradeoffs between inventory investment and service levels. Naturally, the aim is to meet the target customer service levels while holding the minimum level of inventory.

ENTER PRODUCTION PLANNING

Once inventory levels are set at each location, the planner can then decide when and where (assuming multiple plant choices) production should occur. This is the function of the Production Planning system.

The Production Planning system covers months, weeks and days as it resolves the trade-off between capacity, labor and

inventory. By planning the inventory requirements over time in demand forecasting and inventory policy, the planner can see the long- and short-term effect on plant capacity.

The planning model considers demand requirements, line capacity and formulations required to meet the demand quantities and dates. Simulation capability tests different scenarios and considers multiple solutions quickly.

Benefits of improved planning using advanced planning and scheduling (APS) techniques include faster planning and re-planning, increased stability of plans, reduced overtime, improved labor utilization, reduced changes in daily schedules, improved customer service levels, improved morale, greater confidence in the plans, reduced inventory levels, increased plant throughput, and fewer changeovers due to better sequencing.

In most production planning scenarios, the objective is mainly to resolve staffing, materials and capacity issues over weeks and months, rather than minute-by-minute or hourly-hour—which is traditionally the realm of scheduling. At this level of

planning, planners can work with average run rates and key resources, aiming at a good trade-off between the quality of plans and the ease of maintenance of the system.

However, some modern APS tools, include sophisticated facilities for modeling production, even at the planning level—i.e., batching rules, alternative routing and recipes, changeover logic, sequencing rules, etc.—to ensure the plans produced are both realistic and optimal.

SHORT-TERM PLANNING HORIZONS

Production planning drives longer-range plans from demand forecasting. Shorter-range production plans must also resolve the replenishments of stock for the network of distribution centers, such as regional and local warehouses that ship to customer locations. The system considers each warehouse when deciding what products will be stocked and how much to stock in each location. As described above, the inventory policy system will recommend optimum stocking levels and reorder patterns.

Warehouse replenishment is based upon the frequency and volume of shipments from the plant to the warehouse. This function is typically performed by a distribution requirements planning system. Distribution requirements planning systems plan the transportation frequency among the network of distribution centers, while considering the plant capacity established in the production planning system. By varying the frequency and capacity of transportation, the available to promise—at the outlet—can be simulated.

Distribution requirements planning systems help reduce transportation costs; improve customer service levels; reduce stock-outs at distribution locations; improve communication between sales, distribution and production; increase stability of plans; boost confidence and morale; and ensure the right product is at the right place at the right time.

Short-term changes in demand are always a reality, but the combination of better forecasting with a formal process of warehouse replenishment leads to fewer disruptions, less contention and lower overall costs.

INTEGRATING WITH ERP SYSTEMS

High quality planning is simply not possible if the inventory data is inaccurate or out of date—or if the formulation information is incomplete. The forecasting system requires accurate sales history. The distribution requirements planning system requires accurate inventory balances. The capacity planning system requires meaningful plant capacity and product structure (recipe) information. Such data is generally available in most of the better ERP systems available today.

Supply chain planning systems are available in various forms of delivery: stand-alone, an APS server connected to the ERP host machine via a network and hosted solutions (software service). The supply chain planning system receives information updates from the ERP system periodically (weekly, daily, etc.).

Planning and scheduling issues are resolved through systematic processes that involve simulation and modeling. Planning is generally done periodically, according to the task at hand. Therefore, forecasts may be updated weekly or monthly, the production plan may be updated weekly or daily and the finite schedule may be run at the end of a shift or a day.

The supply chain planning system needs to be refreshed with new status information. This might include dynamic data such as on-hand inventory of finished goods, intermediates (WIP) and raw materials; updated demand (forecast and orders); expected purchase receipt timing; and planned downtime.

In addition to the dynamic data, the planning system must be updated periodically with static information, such as

new products recipes/formulae and operations, new plant resources with their operating characteristics, and new warehouses or new transportation options.

Because the ERP system will be integrated at several data points, careful consideration must be taken to ensure all data is up to date and accurate. Interfaces become very complex if the underlying ERP system is highly customized and/or spread over multiple servers and databases. Therefore, the best results are usually achieved through an integrated ERP system that covers all the underlying business functions.

BETTER CONTROL OVER THE PLANNING FUNCTION

In order to make sound tactical and strategic decisions that impact profitability, decision makers must have better control over the planning function. It's precisely in the area of forward decision-making where companies can have the most impact on improving business results.

To achieve these benefits, however, manufacturers must first invest in supply chain planning education, systems and practices that deliver visibility into the future and therefore empower decision makers.

When one considers the fact that improvements in forecasting can reduce forecast error by 15%—and a system can help increase plant output by 10% while reducing inventory levels by 20%—it's easier to see why this is such a critical area for business success in today's highly competitive chemical industry.



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