

Getting Started With Sales & Operations Planning

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Introduction

What do you mean we've got to start planning sales and production?" said the general manager. "How do you think we've been running this company for the last 25 years?"

Of course, she's right. Every company does some form of Sales and Operations Planning already.

But hundreds of companies implementing or operating integrated manufacturing planning and control systems (MRP II) have discovered startling benefits to be gained by formalizing and integrating this planning process. This involves a monthly review process by top management and all functional areas of the company. Its ultimate goal is to always keep the detailed sales, manufacturing, purchasing and capacity planning systems in synchronization with the latest high level plans of management (the business plan).

This presentation assumes understanding of the basic philosophies, concepts and mechanics of Sales and Operations Planning, Master Production Scheduling and MRP. The purpose of this presentation is to provide a simple, step-by-step implementation plan to get it off the ground quickly and effectively.

Points of Emphasis

The underlined portions of the following APICS Dictionary (Sixth Edition) definitions highlight the key points for developing the Sales and Operations Planning process and involving the right people.

Business Plan - A statement of long-range strategy and income, cost and profit objectives usually accompanied by budgets, projected balance sheet, and a cash flow (source and application of funds) statement. It is usually stated in terms of dollars and grouped by product family. The business plan and the sales and operations plan, although frequently stated in different terms, should be in agreement with each other. See: manufacturing resource planning.

Implication - Top management usually plans in sales, profit, etc. dollars, but to run the factory, a production plan stated in units, and always equal to the dollarized business plan, is required.

Sales & Operations Planning - The function of setting the overall level of manufacturing output (production plan) and other activities to best satisfy the current planned levels of sales (sales plan and/or forecasts), while meeting general business objectives of profitability, productivity, competitive customer lead times, etc., as expressed in the overall business plan. One of its primary purposes is to establish production rates that will achieve management's objective of maintaining, raising, or lowering inventories or backlogs, while usually attempting to keep the work force relatively stable. It must extend through a planning horizon sufficient to plan the labor, equipment, facilities, material, and finances required to accomplish the production plan. As this plan affects many company functions, it is normally prepared with information from marketing, manufacturing, engineering, finance, materials, etc.

Implication - If top management wishes to truly control inventories, backlogs and employment levels, it must ensure that the level of manufacturing output scheduled recognizes current sales plans and backlogs. Concurrence from all company functions

that can affect or be affected by the plans, is vital to ensure realism and commitment. The production plan must be stated in a unit of measure, by product family, that can be converted and reconciled to detailed end item schedules (the master production schedule).

Master Production Schedule (MPS) - The anticipated build schedule for those items assigned to the master scheduler. The master scheduler maintains this schedule and, in turn, it becomes a set of planning numbers which "drives" material requirements planning. It represents what the company plans to produce expressed in specific configurations, quantities and dates. The master production schedule is not a sales forecast which represents a statement of demand. The master production schedule must take into account the forecast, the production plan, and other important considerations such as backlog, availability of material, availability of capacity, management policy and goals, etc. Syn: master schedule. See: "closed-loop MRP".

Implication - For the master production schedule to achieve management's objectives, it must exactly match the production plan (and reflect goals, constraints, etc.) and satisfy the sales plan.

Rough Cut Capacity Planning - The process of converting the production plan and/or the master production schedule into capacity needs for key resources: manpower, machinery, warehouse space, vendors' capabilities and, in some cases, money. Product load profiles are often used to accomplish this. Syn: resource requirements planning. See: "capacity requirements planning".

Implication - The production plan and master production schedule must match each other and be achieved for management's goals to be met. But, to be achieved, they require recognizing the physical constraints of the factory and vendors, and the financial constraints of budgets and cash flow plans. Rough Cut Capacity Planning allows production plans and master production schedules (and changes thereto) to be checked and adjusted for reality.

Time Fence - A policy or guideline established to note where various restrictions or changes in operating procedures take place. For example, changes to the master production schedule can be accomplished easily beyond the cumulative lead time whereas changes inside the cumulative lead time becomes increasingly more difficult to a point where changes should be resisted. Time fences can be used to define these points."

Implication - When Rough Cut Capacity Planning, forecast changes, customer orders or the constraints of demonstrated capacity identify the need for rescheduling decisions, the procurement lead times of the various product families need to be considered. Top management and all affected functions must formulate policy that routinizes the proper decision making guidelines, participants and management approval levels.

General Implication - These definitions outline the mechanics necessary to effectively integrate a good Sales and Operating Plan with the other functions of a closed-loop MRP II system. The implications noted clearly define the need for active leadership and participation by top management and all functional areas of a company. This is necessary during the design, implementation and ongoing operation of formal Sales and Operations Planning and full MRP II.

Who Must Be Involved?

Based on the company-wide impact of this process described above, it should be clear that the general manager, president or chief executive officer (CEO) needs to oversee this function. This process drives the planning and execution systems, which dictate customer service and profitability. Therefore, the executive responsible for the profitability and

growth of the company needs to control Sales and Operations Planning.

The functional heads (vice presidents or directors) of marketing, manufacturing, design, finance and materials must also participate for the same reason. The master production scheduler, production and inventory control manager and marketing manager should also be present to propose needed plan changes and note and implement management decisions.

But often it is difficult to gain such an audience in the early stages, as represented by the general manager's quote that began this presentation. How can these vital participants be enlisted?

How To Get Started

Educate the Participants. Gaining interest and involvement is a laborious and slow process, unless there is a clear understanding of the goals, the impact and the process itself, involved in Sales and Operations Planning. The educational steps listed below are not interchangeable, but should be followed completely in sequence:

Type of Class	Participants	Purpose
MRP II for Top Management (outside class)	Top Management	Understand whole MRP II process, the role Sales and Operations Planning plays, Top Management's role, the payback.
MRP II - Full Detail (outside class)	Middle Management	Same as above, but with more mechanical detail
Sales & Operations Planning and Master Scheduling (outside class)	All	Understand how to implement and operate the system
2-Hour In-House Educational Sessions (approximately 20)	Top Management	Determine how the concepts will be applied at this company, set operating policies, assign implementation responsibilities
2-Hour In-House Educational Sessions (approximately 40)	Middle Management	Same as above, but in more procedural detail for Sales and Operations Planning, Master Scheduling and all other functions of MRP II.

Note: The balance of the steps outlined below can occur concurrently with the in-house sessions.

Define Planning Families. Most companies group their products into families or lines, but often based on the customer's perspective (i.e., products bought together such as a particular computer CPU with its matching printers, CRT's, etc.). It is vital to additionally or alternatively define families from a manufacturing viewpoint.

The basic rule to follow is that all products in a family must have a consistently proportional impact on costs, revenues and factory and supplier capacities. For example, a family could include knives, forks and spoons from a series of different patterns of silverware. Though knives, forks and spoons require widely varying manufacturing resources, a weighted average can be applied to the total number of pieces produced. Since knives, forks and spoons are sold in a consistent mix (place settings), if the production plan for the total pieces is changed, the impact on the critical manufacturing resources can be determined by multiplying the new plan times the weighted averages (load profiles) for each resource.

All products must be grouped in 10 to 12 families (a number capable of review in a 2 hour meeting). The units of measure in which the family production plans are expressed must also relate to the manufacturing process - pieces, sets, pounds, gallons, cases, etc. This allows the proper expression of rough cut capacity planning factors and demonstrated capacities.

These physical units of measure can then be converted back to dollars for financial analysis.

Define the Format. A standard format to display forecasts (sales plans), customer orders, production plans, backlogs and inventories needs to be determined up front. A suggested format is shown in [Figure 1](#). This format should be extended for the full planning horizon (12 to 24 months). Individual companies often expand this format to also include dollarization of the key unit data.

Prepare Pilot Data. A few families should be selected which will best demonstrate the benefit of the Sales and Operations Planning process. These may include families subject to seasonal demand, marketing promotions, volatile swings in actual demand versus forecast and/or limited capability to adjust manufacturing output rates.

Forecasts, actual customer demands, production and inventory plans and actuals should be posted for the prior three months. Plans, forecasts and customer orders for at least the next three months (to start) should also be posted. The starting production plans can be derived from the current planning process or annual budgets or current master schedules, depending on what's available.

Any plans or forecasts that appear to require review or alteration should be highlighted. Marketing and planning personnel should jointly prepare suggested changes for top management review and approval.

Develop a Proposed Sales & Operations Planning Policy and Meeting Agenda. The policy should include:

Objective of the process.

Schedule of future meetings.

Attendees and their individual.

Responsibilities (such as "VP Marketing - review of actuals versus forecasts/sales plans and changes to the future").

A description of the mechanics of the planning process (how forecasts/sales plans, backlogs, inventory goals, production plans, etc. are to be considered, by product family).

A description of how demonstrated capacities by product family will be

maintained and utilized.

A description of the Rough Cut Capacity Planning techniques to be used.

A guideline for determining which families will be reviewed in the meeting, based on actual variances from forecasts and plans.

A guideline for developing and approving various changes to the plans depending on the timing and impact of the changes (e.g., different approvals required for overtime, subcontract, new hires, etc.).

A statement defining how the plans will be used to establish financial plans, budgets and detailed Master Production Schedules and line item forecasts.

A timed agenda for a monthly review meeting, to last no longer than 2 hours.

Begin Monthly Meetings. The first few meetings often run longer since everyone is still becoming familiar with the process, formats, etc. It may take a few monthly meetings to fine tune the process and finalize the procedures and formats. Until everything is final, it may be advisable to just review the initial pilot families, or to only gradually add new families.

Implement Full Sales & Operations Planning. The following key issues need to be resolved to ensure that the full benefits of Sales and Operations Planning can be achieved:

Horizon. Establish how far out you need to plan based on the cumulative product replenishment cycle (manufacturing and purchase lead times) and the visibility required for planning changes in capacity (internal manufacturing, new plants and suppliers). Near the end of the horizon, data may be grouped quarterly.

Rolling Forecasts/Sales Plans. The shipment forecast/plan needs to be maintained continually through the full horizon, not just determined annually.

Bookings Versus Shipments. The forecast/ sales plan must be expressed by customer requested ship dates, not by when the orders are received. In make-to-order companies this may involve developing standard lead time offset averages by product family, to convert planned booking dates into shipment dates. Some companies find it useful to track shipments and bookings versus the customer backlog, to provide early analysis by marketing of potential forecast changes.

Production Plans. If the initial numbers used are annual budget figures or a summing up of current master production schedules, the process of maintaining a rolling, monthly-updated production plan, separate from the master production schedules, must be developed.

Ongoing measurement of how closely the summary of the master production schedules matches the production plans, by month, within tolerances established by family, should be initiated.

Appropriate adjustments to the plan, based on changing customer demands, forecasts/sales plans and inventory levels should then be implemented.

Measurements. A set of standard measurements, by family, should be published and reviewed at each meeting. These should include

Customer service

Sales versus forecast/plan

Shipment \$'s

Master production schedule versus production plan

Actual production versus master production schedules versus plan

Level and frequency of schedule changes, within time zones.

Establish Demonstrated Capacity. For each family, the number of units possible to be manufactured each month should be determined from recent past history. The historical averages should not be exceeded unless known increases in capacity are implemented. The plan should reflect the inevitable learning curve of introducing new people, suppliers or equipment.

Full Family Planning. Once the pilot families are being effectively managed through the full horizon, all other families should be added to the process, for the full horizon, representing virtually all manufacturing activity. The use of "average product" planning items for design-to-order business is often required, in both Sales and Operations Planning and Master Production Scheduling. The use of planning bills of material will be needed at the master production schedule level.

Rough Cut Capacity Planning. Key manufacturing and supplier capacity (and short term schedule change) constraints should be identified by family and expressed as load factors that can be multiplied by the planned quantities to produce expected resource requirements. These may include:

Total people

People by department or skill

Key work centers/lines

- bottlenecks
- fully loaded
- proprietary (no alternates)
- prone to break down

Space

Key suppliers (expressed in units or for key purchased materials)

Inspection and Q.C.

Design/engineering

Dollar levels of inventories.

Key operating objectives should be similarly expressed and analyzed. These may include:

Shipment \$'s

Production \$'s

Inventory \$'s

Profit \$'s

Work force utilization

Work force stabilization

Inventory levels to support seasonal build-ups or safety stock for products.

Time Zones (Fences). Depending on the lead times to procure and manufacture products within a given family, changing a schedule at different points in the future represents varying degrees of difficulty and cost. Exactly where these zones are for each family must be defined. Appropriate levels of analysis and approval should then be prescribed for proposed changes in each zone. Factors to consider include the amount of potential disruption in the factory and at suppliers, the potential extra cost (air freight, overtime, etc.), the impact on other commitments and the amount of increased inventory investment by delaying parts of the schedule already partially completed.

Management Objectives and Policies. A well functioning Sales and Operations Planning system will improve the ability to achieve objectives and follow policies. But it often also highlights the potential for changing policies to better meet the objectives. Such opportunities include:

Make-to-stock versus make-to-order versus finish-to-order, by product line or individual product

Target inventory levels

- amount
- at what level in the structure

Desired backlogs, lead times and customer service levels

Level labor loads

Seasonal build-ups

New product introductions.

Style of the Meeting. Several key approaches should be encouraged to maximize the benefits of this process.

First, the various functions should avoid blameplacing and competitiveness. This causes defensiveness and less than optimal cooperation. The focus should be on how to change or better achieve future plans or forecasts, not on penalizing poor prior predictions.

Second, the focus should be on future months' plans (generally 3 or more months into the

future). Short term plans are very difficult and costly to alter. It is management's job to deal with the uncertainty of the future, and change forecasts and plans far enough in advance to better avoid short term emergencies.

Third, a firm rule should be enforced forbidding time to be spent on "post-mortems" as to why a particular customer order was missed. The meeting should deal only with overall rates of shipment and production. Individual issues should be discussed outside this meeting. Specifics should be discussed only if there is potential impact on meeting future plans.

Finally, this process and the meeting should evolve to the point where middle management identifies problems and formulates suggested solutions before the meeting, so that top management's time can be preserved for only evaluating and approving the proposals. A "pre-meeting meeting" of middle management (manufacturing, materials, marketing, design, finance, etc.) often proves fruitful.

Final Result

A good Sales and Operations Planning process can start to produce benefits even before full MRP II is operational. It provides a single set of company numbers, maintained monthly and expressed at a summary level appropriate for top management review.

Good Sales and Operations Plans provide ready answers to:

- Why have inventory levels changed?
- Why have customer service levels changed?
- Why has profitability changed?

All of these questions can be tied back to performance versus the plans and forecasts, and the changes made to them. Price, cost and volume variances, from both a sales and a manufacturing viewpoint, are easily visible.

This process fosters an approach of Executive Consensus in running the business as opposed to one of Functional Selfishness and Competitiveness between manufacturing, materials, marketing, design, finance, etc.

Summary

Formal Sales and Operations Planning provides a single set of numbers and a routinized process to ensure that top management's objectives and plans are realistic and accurately reconciled to the detailed scheduling done in a company. The top executives and heads of all functional areas in the company must participate in this process, along with scheduling and marketing personnel.

Getting started first requires education. The next steps include defining families and formats, preparing pilot data, developing a policy and meeting agenda and finally, beginning the monthly meetings.

There are several keys to effectively implementing this process including: defining the horizon, maintaining a rolling forecast/sales plan, converting bookings to shipment forecasts/plans, developing the plans and measurements for all families, establishing demonstrated capacity, initiating Rough Cut Capacity Planning, defining time zone criteria and incorporating management objectives and policies, and their potential alteration, while maintaining several key rules of style in making the meetings and the whole process effective.

The final result is plans, and a process to maintain them, that all functions commit to and can be held accountable for.

FEEDBACK

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