

Chapter 5 Rough-Cut Planning

Perspective

The intent of rough-cut planning is to convert high-level plans into the impact on resources needed to carry out those plans. There are multiple reasons for doing rough-cut planning as part of the S&OP process:

- To provide “distance-vision” for both material and capacity needs, so the long-term plan can be validated. Having some form of visibility into future needs is particularly important for shared (non-aligned) resources. Shared resources are those that are not unique or aligned to an individual product family or value-stream¹, where the sales and operations plan for several different families determine the total capacity required.

In a **fully** lean manufacturing environment – few of which really exist – all resources would be aligned to the individual families (value-streams) and there would be no need for rough-cut capacity planning at all. Simply looking at the supply plan opposite the demonstrated performance from the past would be enough to gauge how reasonable future supply plans are. Unfortunately even many of the best lean companies have some shared resources – often far up the value-stream – but still important enough that some long-range planning is required.

- To help in managing changes to the S&OP in response to changing market and manufacturing conditions, and in light of actual performance that may differ from the plan.
- To connect the way a company wants to operate – in its markets and in manufacturing – with its capital planning processes, particularly in those situations where long term capacity appears insufficient to meet the plan, but where the horizon for acquiring additional capacity is adequate.

Rough-cut planning converts the sales and operations plan into approximate material and capacity requirements twelve to eighteen months into the future. In

¹ Value-stream: a lean manufacturing term meaning all of the activities, both value-adding and non-value-adding, needed to bring a product from concept to launch, and from order to delivery.

most companies, the horizon for S&OP is significantly longer than that being used for master scheduling and material requirements planning, and as such is almost ideally suited for all these objectives.

Understanding the capacity and material implications of S&OP is the first objective of rough-cut planning. “Is there enough capacity?” – “can the key materials be made available in sufficient volumes?” – “is the desirable plan a “do-able” plan?” - these are questions that must be answered before committing to the sales and operations plan. If capacity is insufficient and more equipment or people are not available, or if material will not be available, then *do-ability* has to win out over *desirability*. It isn’t enough to want something – you must have a chance of actually doing it. Otherwise, the sales and operations plan will direct purchases of material, commitment of labor and machine hours, authorize inventory levels that will not be achievable.

In most situations where plans are approved without regard to validity, the formal planning system will degenerate into a series of informal disconnected processes. One part of the organization may do things that protect its own interests, perhaps at the expense of other parts of the company and degraded business plan performance. The only way to have a “company game plan” that everyone operates to is to have a valid game plan from the start.

Managing change to the S&OP is the second objective of rough-cut. Effectively managing change may be one of the most challenging tasks in industrial management. The plan may need to change, but the dynamics of the decision include a mix of qualitative and quantitative factors. Customers and customer service are involved, often injecting more than the normal amount of emotion into the discussion. What people want to do and what the plant is capable of doing – how flexible it can be in the short term, how fast it can ramp up or down to the new supply levels, whether it can achieve the output volumes required of it – are often different things.

In these situations, there are plenty of opinions. What are really needed are facts. Problems and their effects must be reduced to alternatives with proposals for action. Managing the sales and operations plan without the means to evaluate the effects of changes on both material and capacity fails to provide a valid assessment of the alternatives. An incorrect or incomplete assessment of the alternatives may mean the wrong decision – ramping up too soon, or not soon enough, adjusting labor too quickly or not fast enough, reducing inventory to dangerously low levels and jeopardizing customer service, increasing inventory to the point where working capital levels threaten cash flow, extending customer lead times by increasing the order backlog, etc.

The only really effective way to handle changes in the sales and operations is to begin by correctly assessing the alternatives and identifying any **limitations** that must be resolved. Everyone involved must then press for a decision on any commitments that are necessary in order to resolve the limitations that exist.

Finally, rough-cut planning is the key function for driving long-term capital planning – the third objective. Here the basic idea is to predict when additional capacity will be required in advance of that need becoming a crisis, and then use the basic numbers and the process that predicted that need to justify capital expenditures. Capital planning is something every company does: S&OP and rough-cut ensure that the way the company wants to operate (the sales and operations plan) and the capital plan that guarantees that it is possible are consistent with each other.

There are two major types of rough-cut planning:

- Rough-cut capacity planning (RCCP)
- Rough-cut material planning (RCMP)

Rough-cut capacity planning is an approximate type of capacity planning using some load profiles (sometimes called “representative routings”) defined for the product families, focused on key or critical work centers, lines, departments, cells, suppliers, and support areas (engineering, distribution, shipping). For rough-cut capacity planning, “key” or “critical” resources are ones that are important, although not necessarily constant bottlenecks.

Typical resources that might be planned as part of rough-cut capacity planning might include:

- Overall plant capacity
- Labor hours in total or for people with unique skills
- Assembly hours in a specific cell or bottleneck process
- Machine capacity in a key piece of equipment or unique or proprietary plant process
- Testing cell capacity
- Engineering hours needed to configure the final product to the customer’s specification
- Space required in a warehouse or storage area.
- Waste or effluent release, etc.
- Shipping labor

- Design time or credit release time
- Inspection or QC time
- Supplier capacity

Rough-cut material planning is an approximate type of material planning using a simplified bill of material, often called a bill of resources. It can be used to project material requirements to key suppliers so as to bypass the need for detailed material planning way out into the future, to provide a simple, early estimate of changes in material requirements, and in some cases to bypass the need for detailed material planning entirely.

Normally, companies validate the sales and operations plan against all major resources, regardless of whether the resources are capacity or material. In most cases, the rough-cut plan will be based on the supply plan although there are instances where the limiting resource is driven by the sales, shipping, or inventory plan. For example, shipping labor is driven by the shipments plan not the supply plan. Similarly, space required in the cold storage warehouse is driven by the inventory plan not the volume of supply.

In some instances, rough-cut planning can't be done solely by product family, and has to be run using the items in the master production schedule. This can happen when resource requirements vary significantly based on the mix of items in the master schedule. In the long-term, the rough-cut planning process can plan based on average mix assumptions. In the shorter term, where the real mix is better known, the master schedule may be a better source for rough projections of capacity and material requirements.

When rough-cut planning is run directly from the master production schedule; it can be an invaluable tool for assessing changes to shorter term plans when the product mix is changing – something that S&OP cannot do.

Rough-Cut Capacity Planning

The load profiles used in rough-cut capacity planning are a way to relate product families or individual master schedule items to the key resources required to produce them. The load profiles should contain the resource identifier, an indicator of which plan (supply, sales, inventory, etc.) drives the capacity projection, number of hours, pounds, molds, etc., and the approximate offset in time from the completion date of the plan. Typically this data is set based on historical records, but where this information is not available it may be set from estimates by knowledgeable people.