



## Resolving a Family Feud:

### Market-Facing versus Lean Manufacturing Families

by Robert A. Stahl and William Kerber

**PREVIEW.** *Two very important business processes are **Lean Manufacturing** and **Executive S&OP**. Both processes require grouping products into families but for very different uses, so there is a sharp difference between how each process defines a family. In this column, Bob Stahl and Bill Kerber show how to resolve the family feud by converting market forecasts into production requirements.*

#### INTRODUCTION

In the global business village, struggles and challenges seem to double every time we turn around. Our ever-expanding body of knowledge about how to deal with increasing complexity, uncertainty, and risk – in short, how to better manage a company – seems to lead us to questions as well as answers. While this has always been part of the learning process, it can make us feel as though we are living equally in an age of wisdom and foolishness, to paraphrase Charles Dickens of a century and a half ago.

Still we needn't lose hope. When the answers come to us, it is often through the process of utilizing the many tools we have available, time tested and newly emerging, to build global supply-chain strategies. We are seeing more and more companies doing it right here in North America, taking simple concepts that seem back-of-a-napkinish and forging them into solutions that are working well in large and small companies. The ultimate sophistication is perhaps simplicity.

Two very important processes that have emerged are **Lean Manufacturing** and **Executive S&OP**. It's not a question of choosing between these tools, but rather how

your company can get them to work together, because that's how they work best. This column addresses one of the issues that causes confusion: grouping products into "families." Both Lean Manufacturing and Executive S&OP require that products be grouped into families, but for very different uses.

- In **Lean Manufacturing**, the term *family* means a grouping of products manufactured by the same resources. The idea is to create a "synchronous flow" in manufacturing that allows products to be produced at a uniform, linear, market-driven rate known as *takt time*. For example: 100 lbs per hour, 250 units per hour, etc.
- In **Executive S&OP**, families are groups of products that are similar in the ways that customers and markets view their use. Executive S&OP families are used to develop a reasoned and reasonable forecast based on market trends and grounded in leading indicators. For example, fire-retardant chemicals are used in the furniture market and in the automotive market. These are distinctly different markets.

Thus, there is a sharp difference between these two definitions of a family. Lean

families are focused internally, primarily on how the products are produced in manufacturing. Executive S&OP families are outward looking, toward the customers and markets. Some say that the Executive S&OP families are based on *planning attributes* about the future. While it might be the ideal circumstance, it's only in rare cases that Lean and Executive S&OP families are the same. So the question is, are they compatible? The answer is a resounding Yes – but not in the same way for every circumstance.

### ESTABLISHING FAMILIES

#### Lean Manufacturing Families

In a traditional plant layout, work centers are grouped by the type of work being done (departments) and not by the product being produced (widgets). Work passes from one departmental work center (#1 through #8 in Figure 1) to another in lump, or “batch,” fashion.

Figure 1.



In part, what lean manufacturing requires is that these work centers be reorganized to align into a synchronous flow – say small, medium, or large widgets. These *cells* (or *value streams*) are shown in Figure 2.

To accomplish this, individual products are grouped into **production families** that would flow through the same work centers in sequential fashion, ideally with a one-piece transfer.

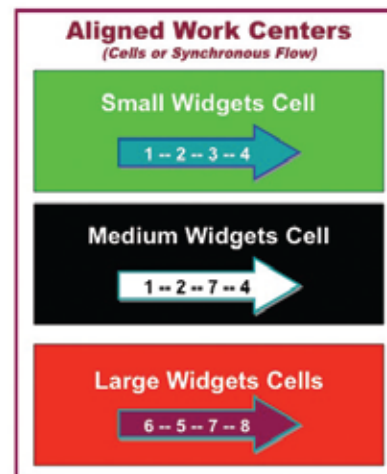
## Key Points

- Executive S&OP families need to support the creation of demand forecasts grounded in leading indicators – both internal and external. We call these market-facing families. Lean families are focused internally, primarily on how the products are produced in manufacturing.
- The challenge is in how companies can get them to work together because they work best when they work together.
- The families can be reconciled through the Rough-cut Resource Planning–technique of Executive S&OP, which converts forecasts by market-facing family into run rates by production family. This simple technique can work in any company: large or small, consumer or industrial products, cyclical/seasonal or level demand.

#### Executive S&OP Families

Executive S&OP also requires that products be grouped into families, but in a very different way, for a very different reason. Executive S&OP families need to support the creation of demand projections (forecasts), grounded in leading indicators – both internal and external. We call these

Figure 2.

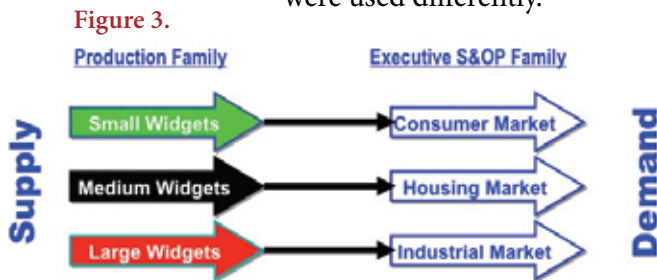


**market-facing families.** For example:

- **Consumer Market**
- **Housing Market**
- **Industrial Market**

For each market shown above, the trends, patterns, and leading indicators may be quite different. For example, housing starts may affect one market in a direct way, while industrial capital spending might affect another market in a very different way.

In order to construct appropriate Executive S&OP families, individual products are grouped into how they are used in the marketplace. One product might even be part of two different market-facing families, if it were used differently.



tion families (small, medium, and large widgets) for forecasting. This would work only in one case: if there were a direct alignment between the production families and the markets. This is shown in Figure 3.

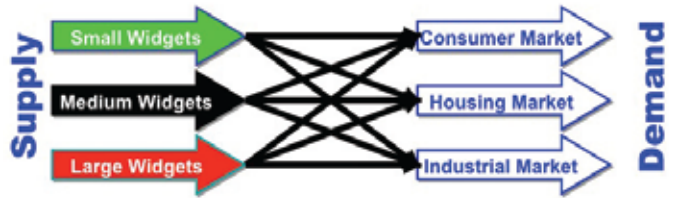
In other words, small widgets are sold only to the consumer market; medium widgets are sold only to the housing market; and large widgets are sold only to the industrial market.

If this is the case, things will work fine using one set of families for both Lean Manufacturing and Executive S&OP -- but this is rarely the case. If done this way when it is not inappropriate, it forces sales and marketing to forecast from the history for the production groupings, and these families cannot be correlated to market trends

and patterns (as through regression analysis) – not a good idea in today’s changing global economy.

Most companies are faced with Lean Manufacturing families and Executive S&OP families that are not aligned. That is, product from all lean families (small, medium, and large widgets) is used in more than one of the executive S&OP families (consumer, housing, and industrial markets), as depicted in Figure 4.

**Figure 4. Misalignment of Families**



### A REAL-WORLD EXAMPLE

Let’s look at an example involving a chemical company. This company makes chemicals of many types. One family of chemicals is used to retard the progress of fire. All individual products within this family are of similar chemistry and run on the same reactor train.

Customers in various markets use the individual products in different ways. This is summarized in Table 1.

**Table 1. Different Markets for the Production Family**

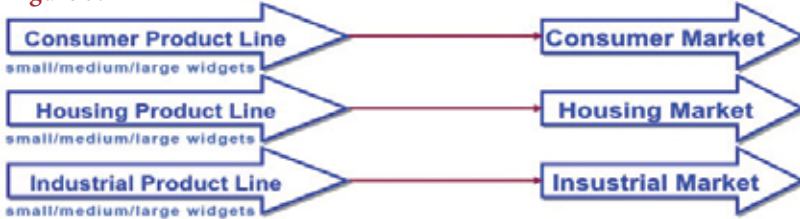
Production	Family	
Production	Marketing	Customer
Fire-Retardant Chemicals	Automotive	Toyota
	Furniture	Pa. House
	Electronic	Sony
	Construction	Acme Lumber

While supply people need to see volume by production family (fire-retardant chemicals), demand cannot be forecast that way. That’s because trends and patterns don’t happen by production family, but rather by market family. This is what we mean by a **market-facing family**, and it is part of the Executive S&OP practice, whether or not a company is in pursuit of Lean Manufacturing.

## SOLVING THE FAMILY FEUD

So how do you deal with this apparent conflict? We see two ways of doing it. The first is to create new lean-manufacturing value streams (cells) that align with market families, as illustrated in Figure 5. If it were possible, this alignment would allow the market forecast to be directly translated into a run rate for each of the lean value streams.

Figure 5.



Doing this is not often possible, desirable, or affordable, because it may require duplication of needed equipment in the production of each family, and often that equipment is underutilized.

The second choice is to use the techniques of Executive S&OP to convert each market-facing family demand into a value-stream volume or run rate.

As an example, say the volume forecast for the market-facing widget families is as listed in Table 2.

Table 2. Monthly Volumes of Market-Facing Families

Market Family	Monthly Volume
Consumer Widgets	1000 per month
Housing Widgets	500 per month
Industrial Widgets	200 per month
<b>Total</b>	<b>1700 per month</b>

Lean Manufacturing needs to know how many small, medium, and large widgets are required each month for each value stream. The forecasts above do not directly provide that answer, nor do they provide the full granular detail by item number that could be rolled up to a forecast by value stream.

Instead, we must convert the market-facing forecasts into Lean Manufacturing requirements. This can be done with the Rough-cut Resource Planning (RRP) technique of Executive S&OP. This approach uses simplifying data assumptions about the detail (mix).

Let's enhance our example by establishing from data mining the historical ratios of small, medium, and large widgets

in each market-facing family, as in Table 3. Each of the "historical ratios" needs to be developed from mining history with a Six-Sigma Control

Chart and be validated each and every future month.

Table 3. Simplifying Assumptions about Product Mix

	<u>Widgets – Monthly Historical Ratios</u>		
	(percent of total volume)		
<u>Market Family</u>	<u>Small</u>	<u>Medium</u>	<u>Large</u>
Consumer Widgets	80%	15%	5%
Housing Widgets	50%	30%	20%
Industrial Widgets	10%	20%	70%

Converting these historical ratios into volume is then a matter of simple arithmetic, multiplying each ratio by the volume forecast for each market family, as shown in Table 4.

Table 4. Volume Forecasts by Value Stream

<u>Market Family</u>	<u>Widgets Value Streams</u>			<u>Total</u>
	<u>Small</u>	<u>Medium</u>	<u>Large</u>	
Consumer Widgets	800	150	50	1000
Housing Widgets	250	150	100	500
Industrial Widgets	20	40	140	200
<b>Volume per month</b>	<b>1070</b>	<b>340</b>	<b>290</b>	<b>1700</b>

Now you can see the run rate for each of the value streams (e.g., 1,070 for small widgets), allowing a lean takt time (or line run rate) to be calculated (not shown). Therefore, we have a resolution of the family feud between Lean Manufacturing



and Executive S&OP family definitions. Of course, there will be complications. One you might expect is that if a business is seasonal or cyclical, its run rates will vary over the seasons and cycles in order to build or deplete inventory. In this situation, RRP would be used to convert the market-family forecasts into monthly or seasonal needs for critical resources, from which a production plan could be credibly established. For examples of this, see my last two columns, one about a highly cyclical steel company, and the other concerning a highly seasonal consumer-products company. They are:

- “How Jarden Branded Consumables Made Forecasting Simpler and Better through Executive S&OP” (*Foresight*, Fall 2009)



**Bob Stahl** is *Foresight* S&OP editor. He has spent 30-plus years as a practitioner and consultant to manufacturing companies, developing leading-edge processes for their manufacturing, logistics and supply-chain practices. He is a teacher, writer, and S&OP coach. Bob has co-authored six books, including *Sales*

& *Operations Planning-The How-To Handbook, 3rd Edition*, and *Sales & Operations Planning-The Executive's Guide*. Three of his books are used for professional certification.

RStahlSr@aol.com 508-226-0477

[www.RAStahlCompany.com](http://www.RAStahlCompany.com)

**William Kerber** is a principal of High Mix Lean, a firm providing Lean Transformation consulting. He is a member of the faculty of the Lean Enterprise Institute and has specialized in material-management systems as both a practitioner and consultant. Bill is an author of the new Lean Enterprise Workshop Series offered by APICS. He is currently finishing work on a new book, *Lean Supply-chain Management Essentials: A Framework for Materials Managers*, to be published by Productivity Press.



Bill@HighMixLean.com 609-714-1274

[www.HighMixLean.com](http://www.HighMixLean.com)

- “How V&M Star Converts Family Forecasts into Resource Requirements with Executive S&OP” (*Foresight*, Summer 2009)

These columns also show how to validate the simplifying data assumptions with traditional TQM control charts.

### A WORD ABOUT SOFTWARE

Because the resolution to this problem uses some very simple techniques, the need for elaborate software to get started is very minimal. You must have the capability to:

- extract transactional data from a data warehouse
- sort and summarize that data into tables and graphs
- display TQM control charts
- link various spreadsheets together

While there may be other useful tools, MS Access and Excel or their equivalent may be sufficient to support this approach.

### CONCLUSION

Executive S&OP and Lean Manufacturing have proven to be important for helping companies better their competitive position. Because both processes rely on families, confusion may exist, since the definition of what makes a family is very different between the two. The challenge is how to make them work together, because they work best when they work together.

Executive S&OP families are connected to specific markets, allowing forecasts to be driven by leading indicators. Rough-cut Resource Planning, a standard technique within Executive S&OP, uses simplifying data assumptions to translate forecasts from market-facing families into lean-manufacturing run rates by production families. These translated forecasts serve as the basis for calculating takt time, the first step in planning a lean value stream. Through this simple technique, companies can resolve the family feud and realize the full benefit of both of these powerful business processes.