

Supply Chain Training for Non- Supply Chain Professionals

Revision 1

Agenda

- Objectives
- The Goal of a Process
- The Forecasting Process
- The Supply Chain Process

Goals and Objectives

- Emphasize the critical role of Forecasting
- Provide a basic understanding of Supply Chain Planning for Non-Supply Chain professionals.
- Improve Collaboration across the Value Stream (eliminate the business silos).
- Demonstrate some basic tools in SAP.
- Identify the processes that help or hinder us.

What is a Process?

Jim Womack is a famous Lean Thinker, and here are some of his thoughts on Lean and Processes.

- It always begins with the customer.
- The customer wants value: the right good or service at the right time, place, and price, with perfect quality.
- Value in any activity – goods, services, or some combination -- is always the end result of a process (design, manufacture, and service for external customers, and business processes for internal customers.)
- Every process consists of a series of steps that need be taken properly in the proper sequence at the proper time.
- To maximize customer value, these steps must be taken with zero waste. (I trust you know the seven wastes of overproduction, waiting, excess conveyance, extra processing, excessive inventory, unnecessary motion, and defects requiring rework or scrap.)
- To achieve zero waste, every step in a value-creating process must be valuable, capable, available, adequate, and flexible, and the steps must flow smoothly and quickly from one to the next at the pull of the downstream customer. (This is how we eliminate the seven wastes identified by Toyota many years ago.)
- A truly lean process is a perfect process: perfectly satisfying the customer's desire for value with zero waste.
- None of us have ever seen a perfect process nor will most of us ever see one.

It always begins with the customer.

The customer wants value: the right good or service at the right time, place, and price, with perfect quality.

Cake and Brownie Company Products provide good value in the market place.

Delivering them seems to be a significant issue at times.

Key Questions to answer each month are Forecast Questions - What, How Many, and When

So How do we do this?

How do we deliver the correct product, in the right Quantity, at the right time?

- Value in any activity – goods, services, or some combination -- is always the end result of a process (design, manufacture, and service for external customers, and business processes for internal customers.)
- Every process consists of a series of steps that need be taken properly in the proper sequence at the proper time.
- None of us have ever seen a perfect process nor will most of us ever see one.

If Forecasting is to be a value added activity, it has to be part of a process

Forecasting and Planning in Real Life

Un-forecasted Demand



Suppose you meet 6 hungry sailors at the mall, and bring them home to dinner that night.

If your spouse is cooking that night, and you don't tell your spouse, what happens?

Is the un-forecasted demand a good thing or a bad thing? How is your home life?

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Forecasting Demand for Dinner

After you've recovered and are ready to invite some more new friends over, you might start to use a forecasting process.

At the next party, you invite exactly 7 new friends.

You buy the drinks and salad, and exactly the right amount of steaks, plus an extra couple just in case (a little safety stock never hurt anything).

The steaks are grilled to perfection....

Mix matters...

Your seven new friends
show up and you
introduce them to
your spouse who
points out...

They are all Hindus
and none of them
eat steak...



Hmmmm...

Mix Matters...

You got the exact quantity correct, but you forecasted the wrong meal...

You have hungry guests, and too much food (service and inventory are both out of control...)

And by the way ...How is your home life?



Forecasting & the Planning Process

- It always starts with Forecast.
- The Forecasting Process at Cake and Brownie Company involves taking the SAP trended data, and working with Sales and Marketing to validate the data.
- After input into SAP, it drives the purchase and manufacture of products to meet our customers needs.
- Key Elements of the forecast are **what** finished goods are needed, **how many** units are needed, and **when** (What, How much, and When).
- If we get these elements wrong, we will get service and inventory wrong.

Flexible Planning and MRP

- Supply Chain enters the Forecast into the Forecast Tool (currently Flexible Planning)
- The Forecast is reviewed as part of the SIOP Process
- After review and agreement, Flexible Planning takes forecasted demand for a SKU and passes it over to a software system - Materials Requirements Planning (MRP).
- MRP looks at forecast, then it looks at Inventory, and then decides what has to be made to cover any gap between Forecast and inventory.
- MRP generates Action messages – it tells planners what it thinks they should do – “Buy me” or “Make me” or “stop buying me” and “stop making me”.

MRP

- MRP means Materials Requirements Planning
- This systems drives the plan to buy or make enough components to cover forecast demand.
- If there is enough inventory to cover forecast we don't have to make or buy anything.
- In order to work, Bills of Materials, Purchase plans, and other data points must be set up, or we will not know what to make or buy.
- MRP always wants to perfectly balance Forecast with purchase/production, so always wants to end in zero inventory.
- MRP requirements are a calculation based on the forecasted quantity - I forecast 1 car, therefore I calculate I need 4 tires.

Materials Requirements Planning is Easy Math

you too can be a planner!

Do you remember those “solve for x” problems in school?
That’s MRP!

- Assume you have a forecast for 100 units, and 50 units in inventory. How much do we need to make or buy?
- $100 = 50 + x$, solve for x
- $X = 50$, so you make or buy 50 units
- Forecast = Production + Inventory
- Production = Forecast - Inventory

MRP Examples – simple math

- Let's say you have a forecast to sell 100 Units in Demand Solutions. What does MRP do with it?
- Forecast = Productions Orders + Inventory
- Note the 3 scenarios below – In each scenario, the combination of inventory plus Production covers the forecast

Forecast		Production		Inventory
100	=	100	+	0
Forecast		Production		Inventory
100	=	50	+	50
Forecast		Production		Inventory
100	=	0	+	100

Planning in Real Life (Part I)

You want your Supper? When?

In real life, if we want Fried Chicken at 6 PM, when should we start cooking?

- Most of us might start at 5 PM to get dinner ready.
- This is our dinner time fence – the latest we could start, and have dinner on time.
- Time Fences tell us when we should start something to complete it on time.



Note - You cannot fry the chicken at twice the heat and expect the same results!

Planning in Real Life (Part II)

Getting to work on time

Some of us need to get to work on time everyday.

One trick is to set the alarm clock ahead by 15 minutes, and fool yourself into getting up 15 minutes early.

This is a Safety Lead time



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Time itself doesn't change or increase, but the setting on our clocks changes, and that changes how we react in the morning

- We are building in a safety stock of time so we don't have to run around in the morning.
- Planners do the same thing with a system setting called safety lead time.
- Safety lead times settings cause us to order inventory earlier than we might normally.



Safety Stock – Fixed Quantity

- Can I create a false negative in a checkbook?
- Set it up so I show negative when we actually have \$500?
- If I overspend by \$400 one week, my safety stock saves my balance.

What happens if I overspend every week?

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I thought we had safety stock....

Coverage Profile

- Coverage Profile is a Dynamic Safety stock.
- A Coverage Profile of 5 days will try and always drive the system to make an extra five days of forecast.
- Because it is dynamic, it will want more safety stock when Forecast is high, and less when forecast is low.



Safety Stock does NOT guarantee Inventory is always available.

- Safety Stocks are *settings in the system*.
- It is usually calculated and statistically derived.
- It is not product hidden away in a guarded vault.
- Safety Stock causes us to have more product than the forecast would normally drive.
- If Demand is higher than forecasted, or if supply takes longer than the system is set to believe, we could stock out.
- It prevents some stock outs, but may only delays others, depending on the size of the demand or supply swing.

Time Fences on products

Imported hand tools may have 10 to 12 weeks lead times.

- This means forecast typically needs to be in the system and product ordered 10 to 12 weeks before the anticipated customer requirements.
- To receive product for shipment on October 1st, we should order it by July 1 to July 15th.

The Timbuktu and Keebler Elf Tree Factories are one week due to proximity to the DC, *but component lead times can be much longer.*

The size of a change in orders can affect lead-times.

How do Time Fences, MRP, and Forecast affect each other? Why do they matter?

- Production and Purchase Orders are created based on needs in the system driven by forecast.
- Production and purchase orders are released at the Time Fence.
- The Time Fence is based on Lead times.
- If it takes 10 weeks to get a product, an order will be suggested by MRP based on forecast, 10 weeks prior to the need date.
- Forecast for the current month drops off after the month is done. It no longer is in the system driving production/purchase orders.
- Where this gets a little tricky is when the forecast for a current month drops off and the current month was “unique” to the following months. For example, if it is a roll-out month and the roll-out does not occur, forecast drops off, and does not drive the roll-out orders.

MRP Example 1 – Demand over forecast

- In this example, Demand exceeds Forecast by 50% (50 Units).
- Since we react instantly, because we have POS or some data like that, we make the adjustment to forecast at the Time Fence.
- We stock out in June, but recover in July
- Note the size change in the production plan in Asia
- Note that what we know in April, impacts July

Rod A	January	February	March	April	May	June	July	August
Original Forecast			400	100	100	100	100	150
Revised Forecast				150	100	100	350	150
Actual Demand			400	150	150	150	150	150
Production Plan Asia	500	100	100	100	350	150	150	150
OTW		500	100	100	100	350	150	150
Inventory			100	50	0	(50)	150	150
Safety Stock Setting	100	100	100	100	150	150	150	150

MRP Example 2 - Demand Under Forecast

- In this example, Demand is under Forecast by 50% (50 Units).
- Since we react instantly, because we have POS or some data like that, we make the adjustment to forecast at the Time Fence.
- We zero out all orders from July to the end of the year.
- We end the year with 3 months inventory
- Note the Production Plan in Asia
- A key point about MRP – since we have inventory to cover Forecast, Forecast does not drive production (“solve for x”)

Rod B	January	February	March	April	May	June	July	August	September	October	November	December
Original Forecast			400	100	100	100	100	150	150	150	150	50
Revised Forecast					100	100	50	50	50	50	50	50
Actual Demand			400	50	50	50	50	50	50	50	50	50
Production Plan Asia	500	100	100	100			0	0	0	0	0	0
OTW		500	100	100	100	100	150	0	0	0	0	0
Inventory			100	150	200	250	250	350	300	250	200	150
Safety Stock Setting	100	100	100	100	50	50	50	50	50	50	50	50

MRP Example 3 and 4- Demand 100% Over forecast, and 20% of original Forecast

- Note Part C has sizable shortages/service issues.
- Note Part D has sizable inventory stranded.



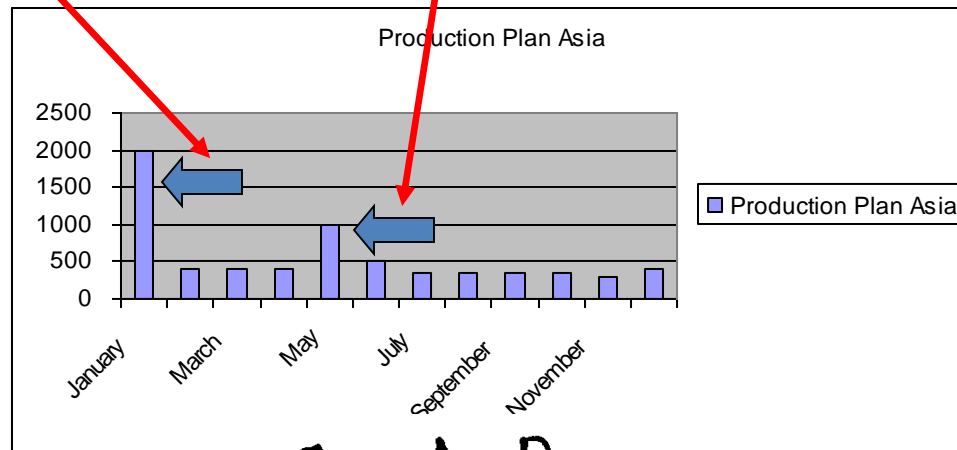
Rod C	January	February	March	April	May	June	July	August	September	October	November	December
Original Forecast			400	100	100	100	100	100	100	100	100	100
Revised Forecast					100	100	600	200	200	200	200	200
Actual Demand			400	200	200	200	200	200	200	200	200	200
Production Plan Asia	500	100	100	100	600	200	200	200	200	200	200	200
OTW		500	100	100	100	600	200	200	200	200	200	200
Inventory			100	0	(100)	(200)	200	200	200	200	200	200
Safety Stock Setting	100	100	100	100	200	200	200	200	200	200	200	200

Rod D	January	February	March	April	May	June	July	August	September	October	November	December
Original Forecast			400	100	100	100	100	100	100	100	100	100
Revised Forecast					100	100	20	20	20	20	20	20
Actual Demand			400	20	20	20	20	20	20	20	20	20
Production Plan Asia	500	100	100	100	0	0	0	0	0	0	0	0
OTW		500	100	100	100	0	0	0	0	0	0	0
Inventory			100	180	260	340	320	300	280	260	240	220
Safety Stock Setting	100	100	100	100	20	20	20	20	20	20	20	20

How about a combined view of the four examples?

- When we combine the four examples, we notice that the original aggregate fore cast of 400 total units each month is close to actual demand of 420.
- But look below at the production plan. Note the spikes.
- Also, note the inventory level is above target.
- Both add cost.

Combined 4 Rods	January	February	March	April	May	June	July	August	September	October	November	December
Original Forecast	0	0	1600	400	400	400	400	500	500	500	500	500
Revised Forecast	0	0	0	0	400	400	1020	420	420	420	420	420
Actual Demand	0	0	1600	420	420	420	420	420	420	420	420	420
Production Plan Asia	2000	400	400	400	1000	500	350	350	350	350	300	300
OTW	0	2000	400	400	400	1000	500	350	350	350	350	300
Inventory	0	0	400	380	360	340	920	1000	930	860	790	720
Safety Stock Setting	400	400	400	400	420	420	420	420	420	420	420	420



Over forecasting and not deleting unconsumed

OVER FORECAST										
Month 1		JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders		0	5	5	5	5	5	5	5
	Production Plan		10	10	10	10	10	10	10	10
	Actual Inventory		10	15	20	25	30	35	40	45
Month 2		JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10				5
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders		0	5	5	5	5	5	5	5
	Production Plan		10	10	10	10				5
	Actual Inventory		10	15	20	25	20	15	10	10

Under forecasting and not deleting unconsumed is not really an issue

UNDER FORECAST										
Month 1		JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders		20	20	20	20	20	20	20	20
	Production Plan		10	10	10	10	10	10	10	10
	Actual Inventory		10	0	(10)	(20)	(30)	(40)	(50)	(60)
Month 2		JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders		20	20	20	20	20	20	20	20
	Production Plan		10	10	10	10				5
	Actual Inventory		10	0	(10)	(20)	(40)	(60)	(80)	(95)

Under forecasted but with 2 week lead time spikes the production plan at the plant – it does not spike the forecast, but does spike demand by creating an STO reflecting additional demand

UNDER FORECAST and 2 week time fence										
Month 1	JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8	
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders		20	20	20	20	20	20	20	20
	Production Plan		10	10	10	10	10	10	10	10
	Actual Inventory		10	0	(10)	(20)	(30)	(40)	(50)	(60)
Month 2	JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8	
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders		20	20	20	20	20	20	20	20
	Production Plan		10	10	20	20				5
	Actual Inventory		10	0	0	0	(20)	(40)	(60)	(75)

Backward/Forward Consumption Scenarios

The first circled area shows that the actual order for 20, after weeks with no orders, consumes the current week and then backwards.

The second bubble shows forward consumption of forecast

UNDER FORECAST and Backwards/Forward consumption										
Month 1		JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders			20		30		10	20	
	Production Plan		10	10	10	10	10	10	10	10
	Actual Inventory		10	0	10	(10)	0	0	(10)	0
Month 2		JOP	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8
555c	Forecast		10	10	10	10	10	10	10	10
	Production Plan		10	10	10	10	10	10	10	10
	Inventory Plan	0	0	0	0	0	0	0	0	0
Delete FC 1x each month	Actual Orders			20		30		10	20	
	Production Plan		10	10	10	10	10	30		
	Actual Inventory		10	0	10	(10)	0	20	0	0

So does Forecast matter?

- Forecast drives both Customer service and inventory levels.
- Supply Chain follows a system driven process which needs to be set up correctly and on time.
- We can have bad service and bad inventory levels, with even small “aggregate” levels changes in demand.
- What, How much, and when are the critical questions!

Always, always let your forecast analyst know when things are changing

Bonus Round – SAP that will help you

- Business Warehouse – service and sales reports
- MC.9 - inventory
- MD04 – the Plan
- MD07 – red lights, green lights
- MB51 – shipments
- VA05 – display Customer orders

Questions?

- Topics we missed?
- Feedback?
- Does this add value or not?
- If it adds value, who are the target audiences?