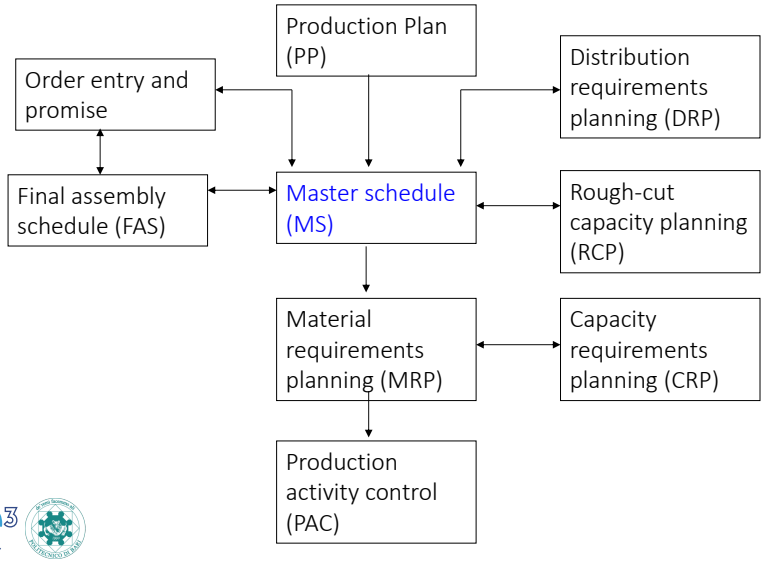
Co-funded by the Erasmus+ Programme of the European Union
The European Commission support for the production of this publication does not constitute endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein

Master Production Schedule

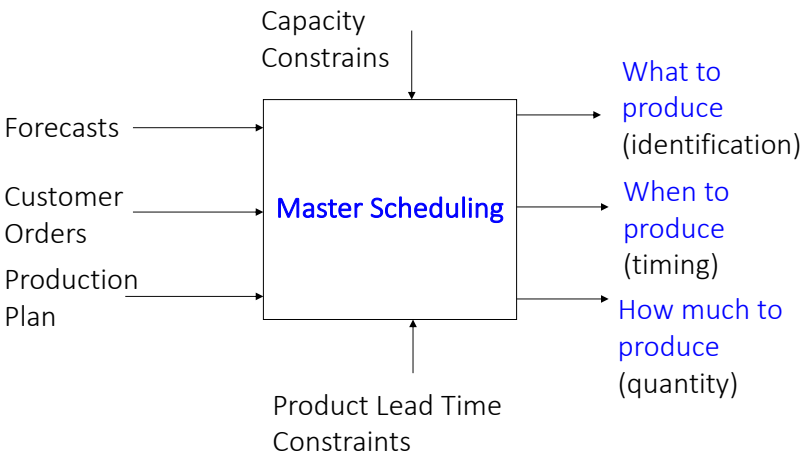
MPS or MS

v1. Spring 2021

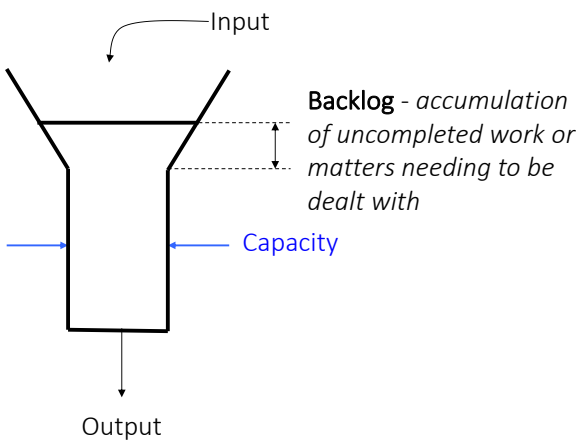
Master Schedule - planning relations



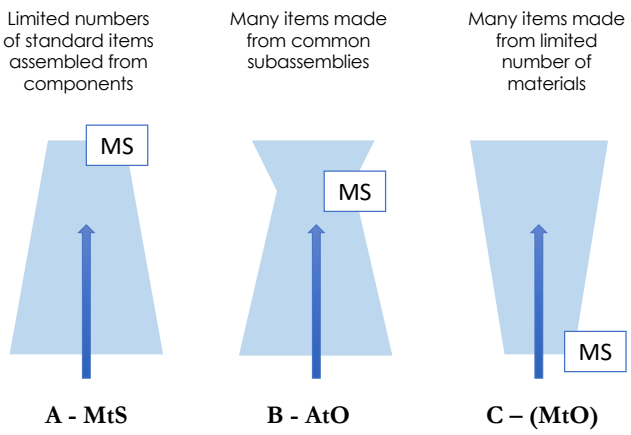
Master Schedule



Capacity Constraints



Use of MS

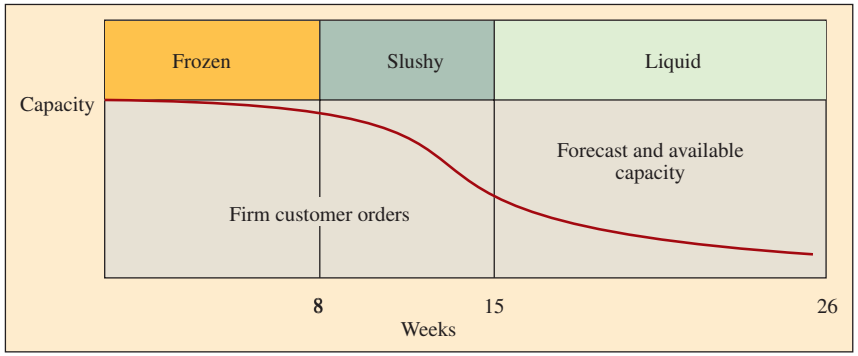


MS Levels

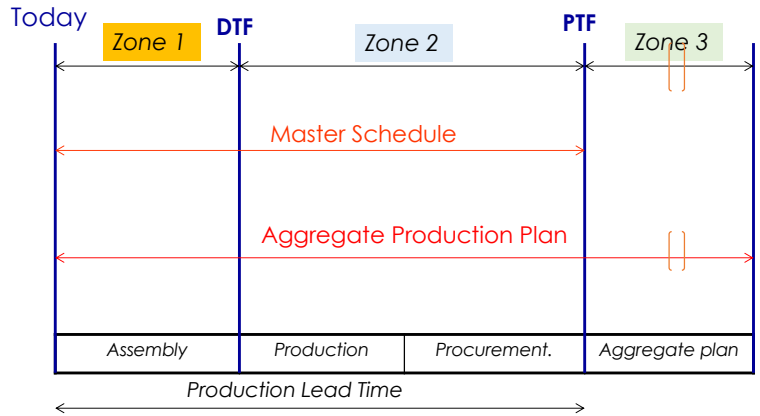
ENVIRONMENT	FORECAST	MASTER SCHEDULE LEVEL	CLASSIFICATION
Make-to-stock	End items	End items	Single-level master schedule
Make-to-order DLT ≥ PLT	None required	End items from actual orders	Single-level master schedule
Make-to-order DLT<PLT	Families with planning bill	Family planning bill and percentage of end items	Two-level master schedule
Assemble-to order	Generic end item with planning bill	Generic end items and percentage of options	Two-level master schedule

DLT - Delivery Lead Time
PLT - Product Lead Time

MS Time Fences



MS Revisions (rolling)



Demand Time Fence (DTF)
Planning Time Fence (PTF)

Zone 3 – future planning
Zone 2 – changes have a cost
Zone 1 – changes should be avoided

Definitions

- **Forecast:** expected demand in a period
- **Actual Demand:** demand manifested in a period (quantity sold or orders confirmed)
- **Master Schedule:** quantity of items scheduled to be available in a period
- **Projected Available Balance (PAB):** Expected value of items in stock at the end of the period
- **Available to Promise (ATP):** Scheduled but not yet committed production to meet customer orders not yet expressed.

ATP is the difference between the number of units currently included in the MS and firm customer orders

MS Format

Demand Time Fence (DTF)
Planning Time Fence (PTF)

Item		DTF	2							
Part number		PTF								
Lead time										
Lot size										
Safety stock										
			Period							
			1	2	3	4	5	6	7	8
Forecast										
Actual Demand										
Master Schedule										
Projected Available Balance										
Available to Promise										

The logic is that demand forecasting turns into orders

The DTF does not take into account the demand forecasts

PAB - Calculation

$$PAB(1) = PAB(0) + MS(1) - A(1) - S \qquad \boxed{\#\text{ period} \le \text{DTF}}$$

$$PAB(i) = PAB(i-1) + MS(i) - A(i), \quad \text{per } i \neq 1$$

$$PAB(i) = PAB(i-1) + MS(i) - A(i) - F(i) \qquad \boxed{\#\text{ period} > \text{DTF}}$$

PAB(i) "Projected Available Balance"
MS(i) "Master Schedule"
A(i) "Actual Demand"
F(i) "Forecast"
S "Safety Stock"

If the PAB becomes negative, this indicates a stock-out at the end of the period

ATP - Calculation

$$ATP(1) = PAB(0) + MS(1) - \sum_{j=1}^{LT} A(j)$$

$$ATP(i) = MS(i) - \sum_{j=i}^{i+LT-1} A(j) \quad \text{per } i \neq 1$$

MS(i) "Master Schedule": quantity scheduled and available for sale at the end of the period

ATP(i) "Available to Promise": quantity calculated in each period *i* where *MS(i)* ≠ 0

A(j) "Actual Demand"

$\sum_{j=i}^{i+LT-1} A(j)$ quantity committed for orders between the production period *i* and the following Master Schedule Receipt period (this excluded) when new batches will be produced and available for sale

Example 1 – Single Level MS

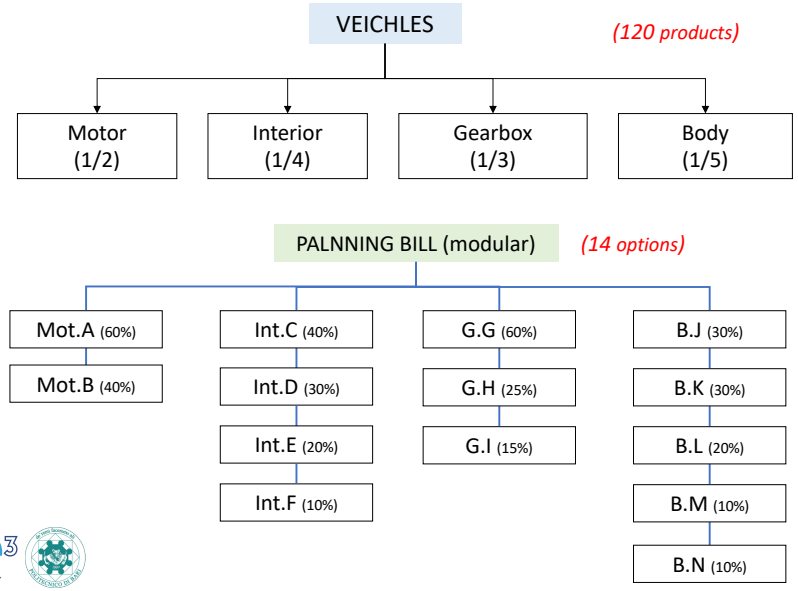
Data

- Lead time, DTF, PTF, Lot size, S
- Inventory at period 0
- Forecast at each period
- Actual demand at each period
- *Master schedule at each period*

Item		DTF	2 weeks
Part number		PTF	7 weeks
Lead time	2 weeks		
Lot size	20 units		
Safety stock	2 units		

		Period 1	2	3	4	5	6	7	8
Forecast		0	0	12	2	10	2	18	2
Actual Demand		15	5	4	2	5			
Master Schedule		20		20		20		20	
Projected Available Balance	6	***9***	***4***	***8***	***4***	***9***	***7***	***9***	***7***
Available to Promise		***6***		***14***		***15***		***20***	

Example 2 – Two Levels MS



Example 2 – Two Levels MS

Item	vehicle		Period 1	2	3	4	5	6	7	8
Master Schedule			40	40	40	40	40	40	40	40
Actual Demand			40	40	35	30	20	10		

60%

Item	eng.A	DTF	2 weeks
Part number		PTF	
Lead time	2 weeks		
Lot size	48 units		
Safety stock	2 units		

		Period 1	2	3	4	5	6	7	8
Forecast		0	2	4	6	12	18	24	24
Actual Demand		26	22	20	18	12	6		
Master Schedule		48		48		48		48	
Projected Available Balance	5	***25***	***3***	***27***	***3***	***27***	***3***	***27***	***3***
Available to Promise		***5***		***10***		***30***		***48***	

Item	vehicle		Period 1	2	3	4	5	6	7	8
Master Schedule			40	40	40	40	40	40	40	40
Actual Demand			40	40	35	30	20	10		

40%

Item	eng.B	DTF	3 weeks
Part number		PTF	
Lead time	2 weeks		
Lot size	32 units		
Safety stock	2 units		

		Period 1	2	3	4	5	6	7	8
Forecast		2	0	1	4	8	12	16	16
Actual Demand		14	18	15	12	8	4		
Master Schedule		32		32		32		32	
Projected Available Balance	2	***18***	***0***	***17***	***1***	***17***	***1***	***17***	***1***
Available to Promise		***2***		***5***		***20***		***32***	