

Problem 09 Let's Plan for the Distribution

SCHOOL OF **ENGINEERING** E222 – Logistics Planning and Control







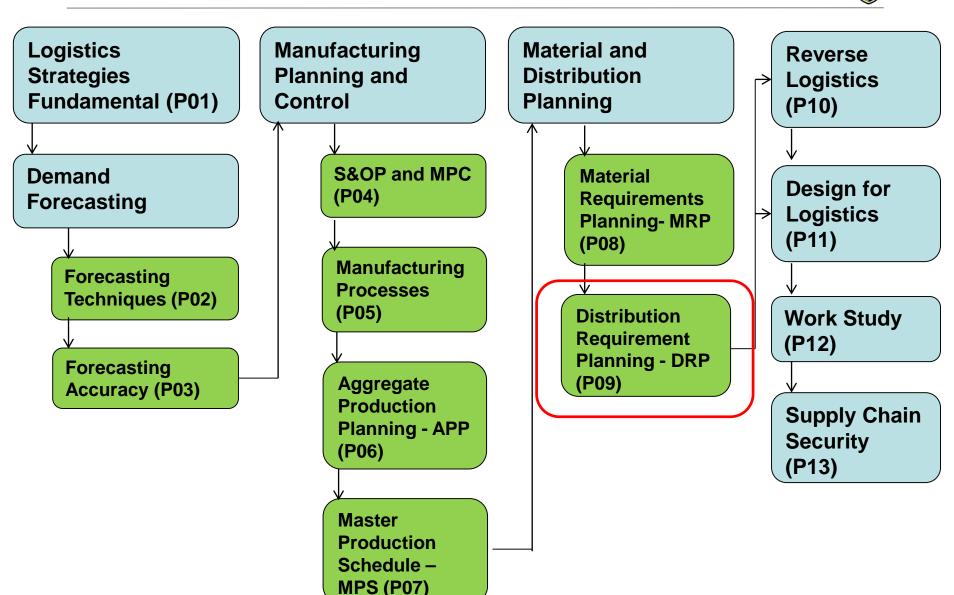








E222 Logistics Planning and Control – Topic Tree

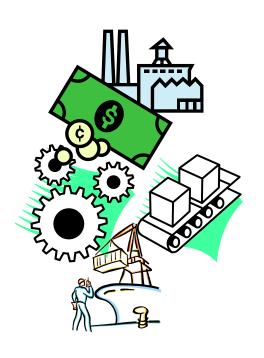


P09 – Let's Plan for the Distribution





- Linkages with MPC System
- Apply the DRP Techniques
 - Basic DRP Record
 - ✓ Linking several warehouse records
 - Safety stock in DRP



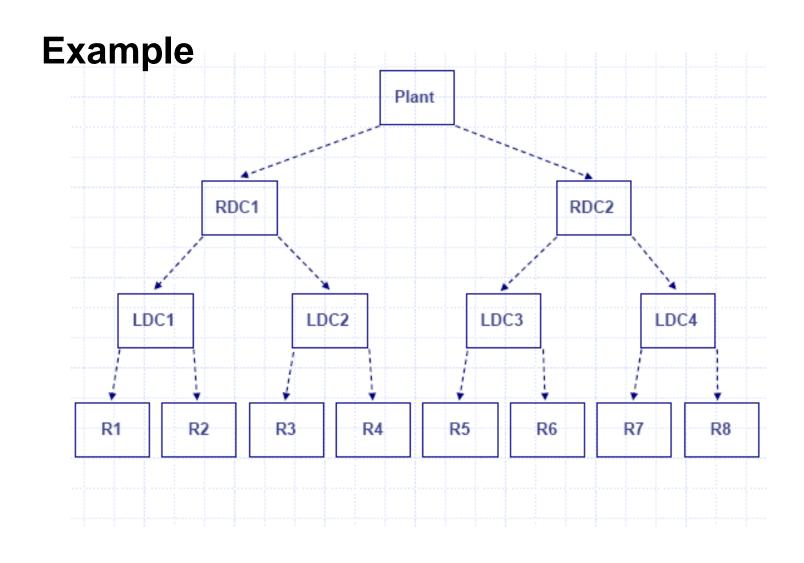
Distribution Requirement Planning (DRP)



- The basis for integrating supply chain inventory information and physical distribution activities with the Manufacturing Planning and Control (MPC) system.
- Managing the flow of materials between firms, warehouses, distribution centers.
 - ✓ DRP helps to manage these material flows.
 - Similar to MRP in Manufacturing.
- Relate firms in the supply chain by providing planning records that carry demand information from receiving points to supply points and vice versa.

A Multi-Echelon Inventory System





What if I Use Traditional Techniques?



- In multi-echelon inventory systems with decentralized control, lot size / reorder point logic will:
 - ✓ Create and amplify "lumpy" demand
 - ✓ Lead to the mal-distribution of available stock, hoarding of stock, and unnecessary stock-outs
 - ✓ Result in large safety stocks, expediting, and re-distribution.

Purposes of DRP

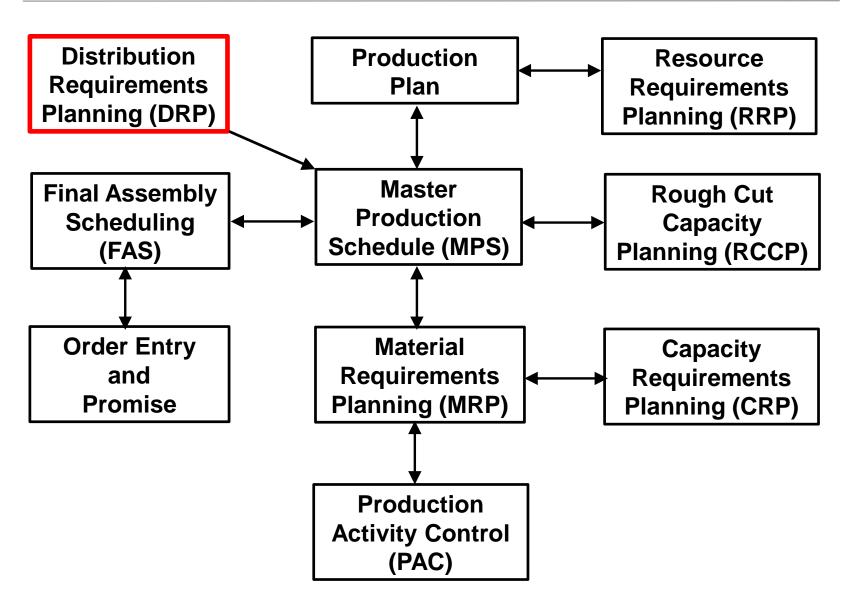


- DRP enables the firm to capture data, including local demand conditions, for modifying the forecast and to report current inventory positions.
- This is specially true when they have vendor managed inventories (VMI).
- DRP provides data for managing the distribution facility and the database for consistent communications with the customers and the rest of the company.

"DRP is simply the application of the MRP principles and techniques to distribution inventories"

DRP, MRP & MPC Relationship





Basic DRP Record



- Forecast requirements (Gross Requirement)
- In transit (Scheduled Receipts)
- Requirements (Net Requirement)
- Projected available balance (Available)
- Planned shipments (Planned Order Releases)
- Forecast in central supply (if applicable)

Time Phased Order Point (TPOP)



- MRP-like time planning logic for independent demand items, where gross requirements come from a forecast, not via explosion.
- Technique can be used to plan distribution center inventories as well as to plan for service (repair) parts.
 - ✓ Because MRP logic can readily handle items with dependent demand, independent demand, or a combination of both.
- Time-phased order point is an approach that uses time periods, thus allowing for lumpy withdrawals instead of average demand.
 - ✓ When used in distribution environments, the planned order releases are input to the master schedule dependent demands.

Safety Stock and DRP



- When there is more uncertainty in terms of timing, then it may be better to use safety lead time.
- When the uncertainty is in quantity then safety stock may be better.
- Carry safety stock where there is uncertainty (near the customer) or where there is some element of independent demand

Potential Management Issues with DRP



- Data Integrity and Completeness
- Organizational Support
- Stock-Aging

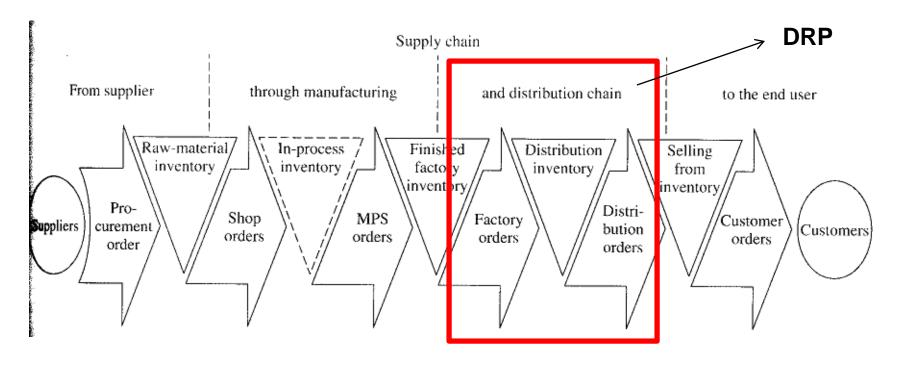
Data Integrity and Completeness



- A key issue is the use of aggregate forecasts which are later on broken down into detailed forecasts.
 - Adding up of errors
- Forecast errors should be avoided especially biased errors.
- Management programs should be established to monitor the process.
- Inventory accuracy depends on transaction process routines and discipline.

Organizational Support





 To better coordinate a chain like this, information in DRP form as well as organization form (e.g. material management) is required

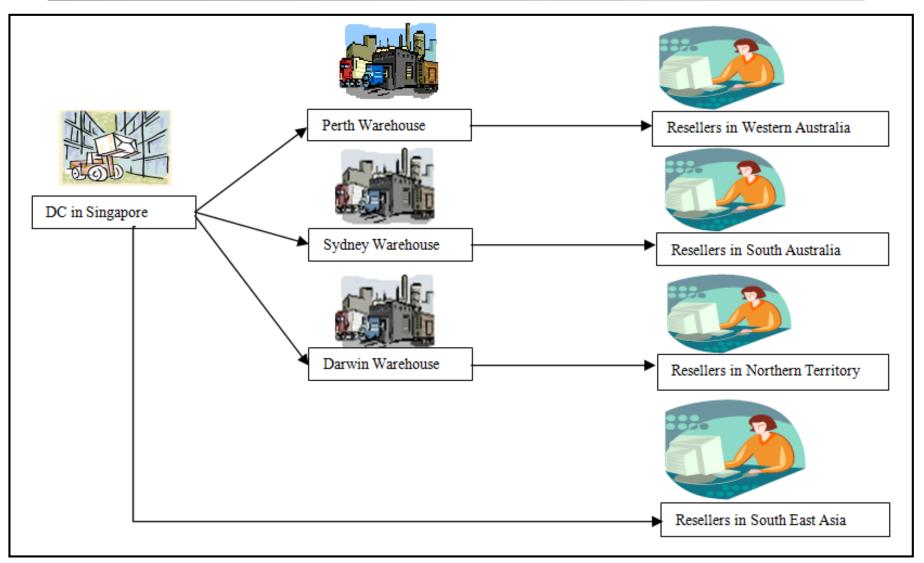
Monitoring Stock Aging



- Use strict first-in first-out (FIFO) physical movement.
- Identify those products that may be heading for a problem before it is too late.
 - Messages to flag potential shelf life problems.
- If demand is dropping forecast should be reduced. Available inventory or in transit should cover a larger period of time. Maybe shipped to another warehouse.

Today's Problem





DRP (Perth Warehouse)



Perth warehouse

Week	0	1	2	3	4	5	6	7	8
Gross requirements		520	450	380	430	290	360	390	440
Scheduled receipts		0	0	0	0	0	0	0	0
Net requirements		-80	370	250	180	-30	-170	220	160
Projected Available	600	80	130	250	320	530	170	280	340
Planned receipts		0	500	500	500	500	0	500	500
Planned order release	0	500	500	500	500	0	500	500	
Safety Stock		75	75	75	75	75	75	75	75

- ✓ Lot size of **500 units**
- ✓ Lead time of 1 week
- √ 75 units of safety stock are needed

DRP (Sydney Warehouse)



Sydney warehouse

Week	0	1	2	3	4	5	6	7	8
Gross requirements		780	680	780	720	649	820	760	850
Scheduled receipts		0	0	0	0	0	0	0	0
Net requirements		-120	560	340	560	209	529	289	639
Projected Available	900	120	440	160	440	291	471	211	361
Planned receipts		0	1000	500	1000	500	1000	500	1000
Planned order release		1000	500	1000	500	1000	500	1000	
Safety Stock		100	100	100	100	100	100	100	100

- ✓ Lot size of <u>500 units</u>
- ✓ Lead time of 1 week
- √ 100 units of safety stock are needed

DRP (Darwin Warehouse)



Darwin warehouse

Week	0	1	2	3	4	5	6	7	8
Gross requirements		250	340	280	200	290	350	320	320
Scheduled receipts		0	0	0	0	0	0	0	0
Net requirements		-450	-110	170	-30	-140	210	130	50
Projected Available	700	450	110	230	430	140	190	270	350
Planned receipts		0	0	400	400	0	400	400	400
Planned order release		400	400	0	400	400	400	0	0
Safety Stock		80	80	80	80	80	80	80	80

- ✓ Lot size of 400 units
- ✓ Lead time of 2 weeks
- √ 80 units of safety stock are needed

Singapore Distribution Center



Singapore DC

Week	0	1	2	3	4	5	6	7	8
Forecast		650	740	700	620	780	540	690	660
Perth Warehouse		500	500	500	500	0	500	500	0
Sydney Warehouse		1000	500	1000	500	1000	500	1000	0
Darwin Warehouse		400	400	0	400	400	400	0	0
Gross requirements		2550	2140	2200	2020	2180	1940	2190	660
Scheduled receipts		2500	0	0	0	1600	0	0	0
Net requirements		-2250	-110	1090	1110	-310	1630	1820	-520
Projected Available	2300	2250	1110	910	890	310	370	1180	520
Planned receipts		0	1000	2000	2000	0	2000	3000	0
Planned order release		1000	2000	2000	0	2000	3000	0	0
Safety Stock		300	300	300	300	300	300	300	300

- ✓ Lot size of 1000 units
- ✓ Lead time of 1 week
- √ 300 units of safety stock are needed

Conclusion



- DRP relates current field inventory availability, forecast & knowledge of demand to develop resupply plans and bring those to the MPS of the MPC system
- Gross requirement for Singapore DC is the sum of all planned order release from various warehouses plus forecast
- Stocks needs to be planned by taking the lead time into consideration
- Stocks need to be fulfilled once it falls below the Safety Stock (SS) requirement

Learning Outcome



- Explain Distribution Requirements Planning (DRP)
 - Linkages with MPC System
- Apply the DRP Techniques
 - Basic DRP Record
 - Linking several warehouse records
 - Safety stock in DRP