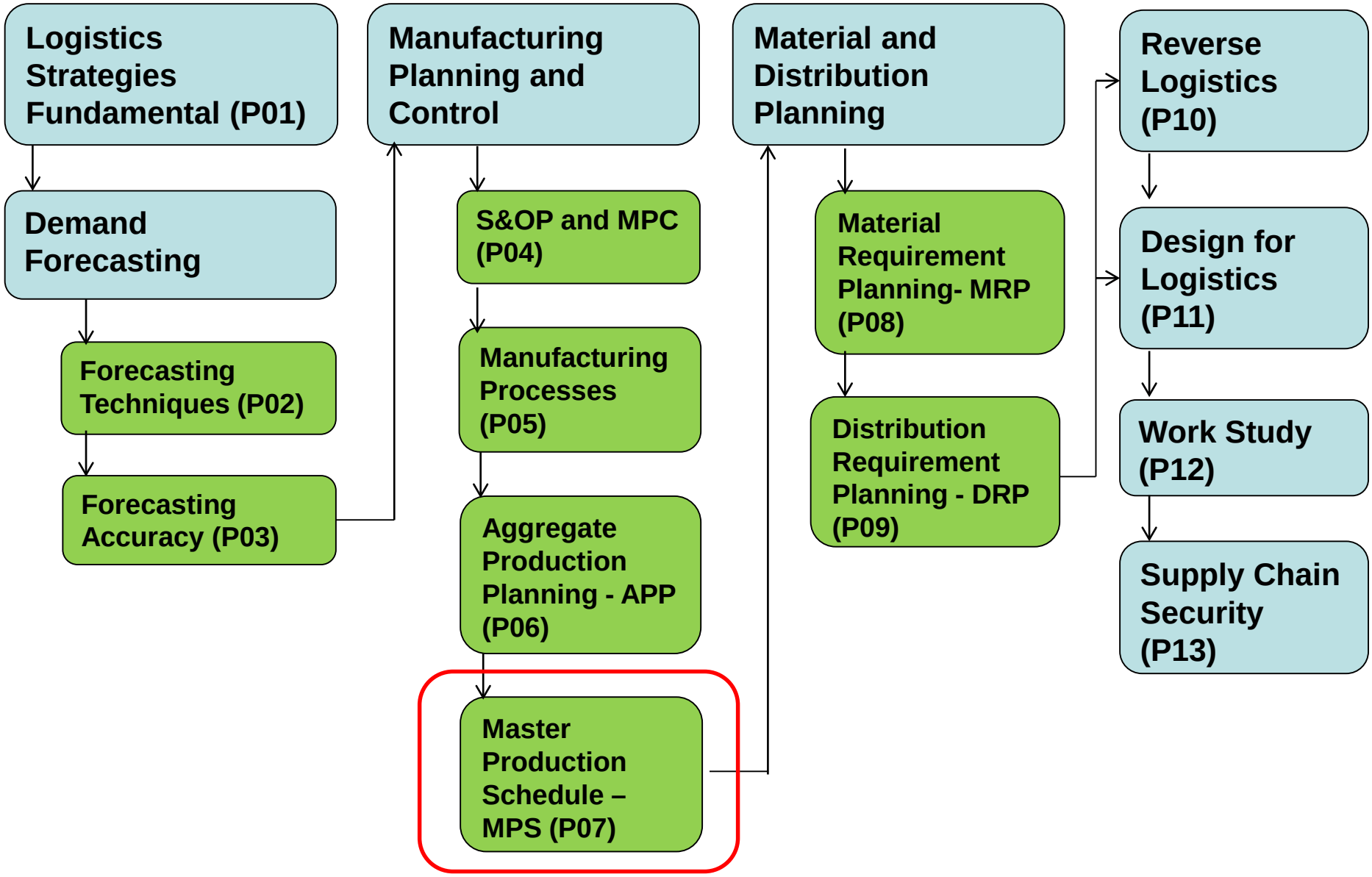
Problem 07
Production Scheduling

SCHOOL OF ENGINEERING

E222 – Logistics Planning and Control

E222 Logistics Planning and Control – Topic Tree



P07 – Production Scheduling

- Explain Master Production Schedule (MPS)
  - Functions
  - Applications (Inputs & Outputs)
- Determine the MPS trigger
- Calculate Available-to-Promise (ATP)

Types of Operational Problems Faced by a Manufacturing Company

- Missed customer deliveries
- Mismatched inventory
- Large queues and excessive work-in-progress
- Unplanned overtime
- Under-used resources
- End-of-month rush to meet financial closing date

What is Master Production Schedule (MPS) ?

A detailed plan that states how many end items will be produced within specified periods of time.

a. End items are either finished products or the highest level assemblies from which shippable products are built.

b. Time periods are usually measured in weeks, although they may be measured in hours, days, or even months.

Master Production Schedule (MPS) Process

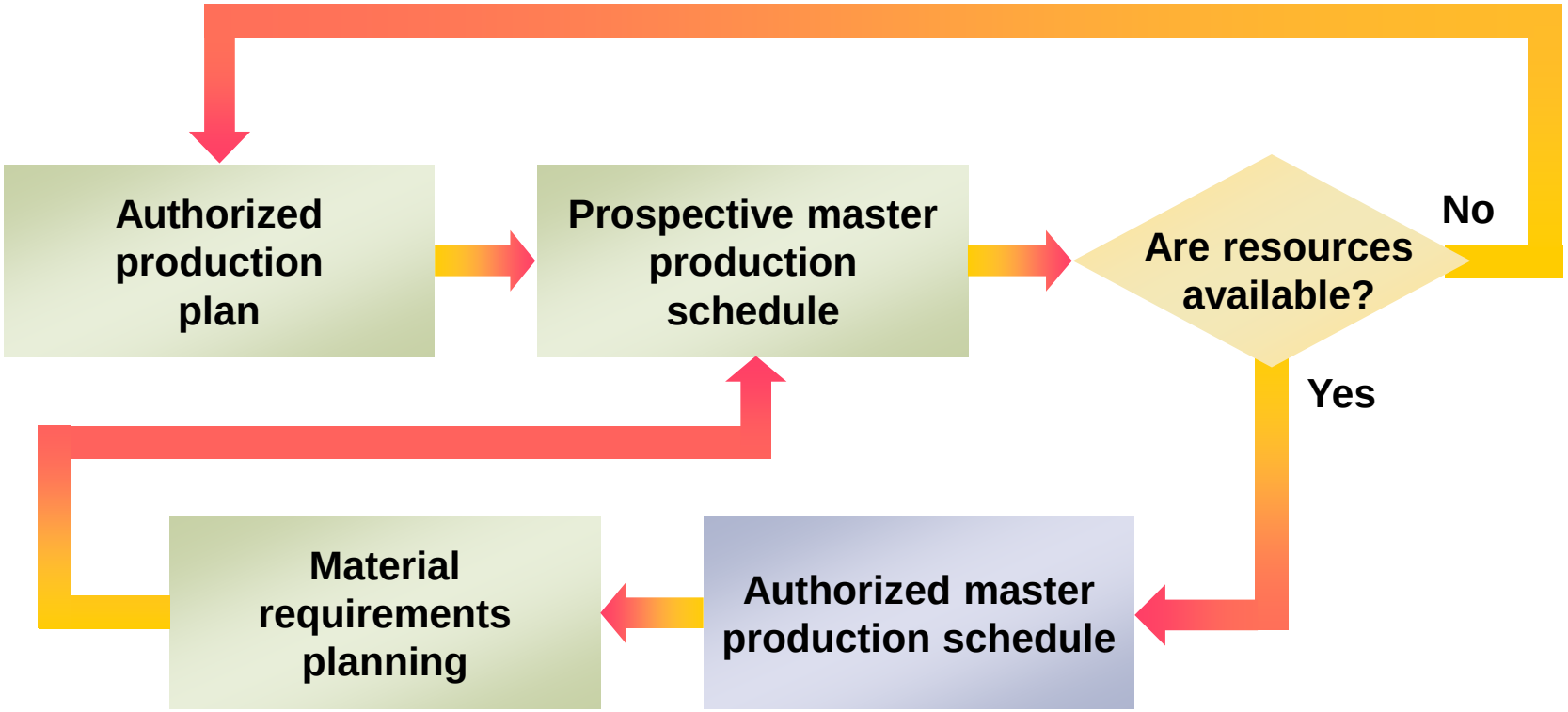


Figure G.1

Functions of MPS

- Provide tangibility to production activities
- Manage inventory
- Manage capacity constraints
  - ✓ Hedge demand variations
  - ✓ Balance to a constraint
- Control engineering changes
- Plan material requirements
- Optimize production activity sequence

Master Production Schedule

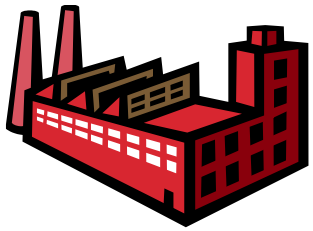
- MPS indicates quantity and timing of planned production, taking into account desired delivery quantity and timing, as well as on-hand inventory.

- **Inputs:**
  1. Inventory at start
  2. Forecast for each scheduling period
  3. Committed customer orders

- **Outputs:**
  1. Projected inventory
  2. Production requirements
  3. Uncommitted inventory (available-to-promise)

Problem Statement Analysis

- The MPS presented indicates a lot size of 600
- Objectives are to avoid missed deliveries, excessive WIP and mismatched inventories
- Assumptions:
  - Customer orders to be filled by end of the week
  - Production to start at beginning of week and MPS quantities will be achieved at end of the week
  - No capacity constraint
  - Availability of material is not an issue



Master Production Schedule

- Prior to demand time fence, the projected available balance (inventory) =
  Prior period inventory + MPS – customer orders

- After demand time fence =
  Prior period inventory + MPS – greater of forecast or customer orders

- When the inventory is insufficient to fulfill customer demand, this is a signal to trigger production.

- Production will take place according to the lot size of 600

Available-to-Promise (ATP)

- Available-To-Promise (ATP) inventory is that portion of the on-hand inventory plus scheduled production that is still not committed to the customer orders.

- For the first period (Wk 1), the ATP includes the beginning inventory plus any MPS amount in that period, minus the total of booked orders (customer orders) up to the time when the next MPS amount is available.

  - Thus, **ATP (Jan Week 1)** = 340 - 250 = **<u>90</u>**

Available-to-Promise (ATP)

- In subsequent periods (other than period 1), the ATP inventory consists of MPS amount in that period minus the actual customer orders already received for that period and all other periods until the next MPS amount is available.
  - Thus, **ATP (Jan Week 2)** = 600 – 220 – 210 - 260 = **-90**

- The same method continues for the rest of the weeks.

Note:

There are several methods in calculating ATP.

In this example, the method used is Discrete ATP without Lookahead

Available-to-Promise (ATP)

- As additional orders are booked, these would be entered into the schedule and the ATP (Available-To-Promise) quantity would be updated to reflect these orders

- CoolMech Corporation can then use the ATP quantity to provide realistic delivery dates to new customers

Today's Problem

Month	Week	Previous Inventory	Sales Forecast	Customer Order	Production Requirement	Net Inventory (before MPS)	MPS	Projected Inventory	Available-to-Promise
January	1	340	240	250	250	90	0	90	90
	2	90	230	220	220	-130	600	470	-90
	3	470	230	210	210	260	0	260	
	4	260	250	260	260	0	0	0	
February	1	0	160	180	180	-180	600	420	0
	2	420	150	200	200	220	0	220	
	3	220	210	220	220	0	0	0	
	4	0	280	240	280	-280	600	320	160
March	1	320	310	200	310	10	0	10	
	2	10	260	100	260	-250	600	350	250
	3	350	100	150	150	200	0	200	
	4	200	100	100	100	100	0	100	

Conclusion

- In January, CoolMech Corporation needs to produce 600 units of ***CM24T refrigerator***s in Week 2

- In February, the company needs to produce 600 units of ***CM24T refrigerator***s in Week 1 & Week 4 respectively

- In March, the company needs to produce 600 units of ***CM24T refrigerator***s in Week 2.

Learning Outcome

- Explain Master Production Schedule (MPS)
  - Functions
  - Applications (Inputs & Outputs)
- Determine the MPS trigger
- Calculate Available-to-Promise (ATP)