Class 9: Production Control

Production Control determines:

- When work is performed
- What work is performed
- Who performs work

Production Control is the nervous system of a business process
Key Definitions

• **Pull:** Work triggered by downstream (possibly internal) demand

• **Push:** Work triggered by a forecast of demand

• **Make-To-Order:** Work performed towards an existing (external) customer order

• **Make-To-Stock:** Work performed for a yet unknown customer
### Production Control Methods

<table>
<thead>
<tr>
<th></th>
<th>Push</th>
<th>Pull</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make-To-Stock</td>
<td>MRP</td>
<td>(Q,R) &amp; (S,T) Kanban</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CONWIP</td>
</tr>
<tr>
<td>Make-To-Order</td>
<td></td>
<td>Priority Rules Scheduling</td>
</tr>
</tbody>
</table>

*(this lecture)*
MRP Purpose

• Coordination of Production and Inventory in large, multi-stage production systems
• Capacity planning, scheduling, supplier coordination
• Timely dissemination of information
• Synchronized production and procurement
• Central engineering and logistic database

ERP
MRP Problems

- Deterministic model
- Large data requirements and GIGO
- Self-fulfilling lead-times
- Difficulty and cost of installation and maintenance
- Centralized command and control mindset
What is Kanban?

- Kanban Board
- Production Stage
- WIP
- Downstream Demand
- Production Stage
- WIP
- Downstream Demand

2002 - Jérémie Gallien
Multi-Stage Kanban & CONWIP
Customer and Process Timeline

Stage 1, Stage 2, Stage 3, Stage 4, and Customer timeline with LT1, LT2, LT3, LT4, and delivery LT.

MTO and MTS processes shown with arrows and notation.

2002 - Jérémie Gallien
Distribution System Example

Assuming a (S,T) weekly review policy in each warehouse (95% service level, T=1), How much safety stock should there be in this distribution system?
Work out your answer here
Central Warehouse

With a (S,T) weekly review policy in the central warehouse (95% service level, T=1), How much safety stock should there be now?
Work out your answer here
• Instead of geographic differentiation, this is an assembly differentiation
Delayed Differentiation

Upstream Steps

Customization Step

demand

demand

demand

LT1

LT2

0

t

Target customer delivery LT

2002 - Jérémie Gallien
Delayed Differentiation

Steps 0

Upstream Steps

Customization Step

LT1

LT2

Target customer delivery LT

t

demand
demand
demand

2002 - Jérémie Gallien
Production Control Wrap-Up

1. Production Control, Push, Pull, MTS, MTO
2. MRP, Kanban, CONWIP
3. MTS/MTO and Lead-Time Target
4. Pooling and Delayed Differentiation