Inventory Systems in Practice

Or “How I got out of doing the last two questions on the final exam”
The Project

- Upgrade the Hood Line to enable the production of another vehicle model and increase output from 800 units per day to 825 units per day
- Responsibility: Design, Manufacturing, Commissioning, Hood Design Interface, and “connections”
System View

Weld Assembly Line

- Body-in-White Storage Area (15 body capacity)
- Hood Attachment Station
- Tail Gate Attachment Station
- Door Attachment Station
- To Paint Shop

Hood Line Inventory Loop
- Hood Line (Sub-Line to main Weld Assembly Line)
- Tail Gate Line (Sub-Line to main Weld Assembly Line)
- Door Line (Sub-Line to main Weld Assembly Line)
Project View

Hood Attachment Station

Safety Stock and Cycle Stock not in production (on hood carts)

Hood Cart

Hood Cart

Hood Cart

Hood Cart

Hood Line
(Sub-Line to main Weld Assembly Line)

Inventory Movement

Operator

Aisle
Inventory Control

- The number of carts is fixed at four (4) per model. Each cart hold ten (10) hoods: **40 units of inventory maximum per model (+ safety stock)**
- Carts are designed to be as large as ergonomically possible and are to number as few as possible.
- Do the class models give the same answers?
Estimating the parameters

μ: Both the Weld Line and the Hood Line had the same production goal 825 units per day.

Line speed set to 840 units per day → 60.0 seconds per unit cycle time.

MTTR, MTTF:...
MTTF, MTTR

- **From design data**: 15 minutes per day of downtime.
- **From discussion**: There is 2-6 failures per day. This information needed some verification.
- **From operating policy**: There is 840 minutes per day of production time.

\[
MTTF = \frac{840 - 15}{2 - 6} \quad \text{(in min)}
\]

\[
MTTR = \frac{15}{2 - 6} \quad \text{(in min)}
\]
The Answer

The deterministic processing time model says that we need 40 units of inventory space.

Why?

- The production rate ($\mu$) is defined
- Demand rate is defined
- Inventory space is defined
- Only MTTR and MTTF can vary
  But: These quantities are highly correlated and controlled by the same person.

System is a tradeoff between maintenance and inventory space.