

TPPE74

Design and Development of Manufacturing Operations



Industrial Engineering and
Management of European
Higher Education

Seminar 5

Setup time reduction, Task C

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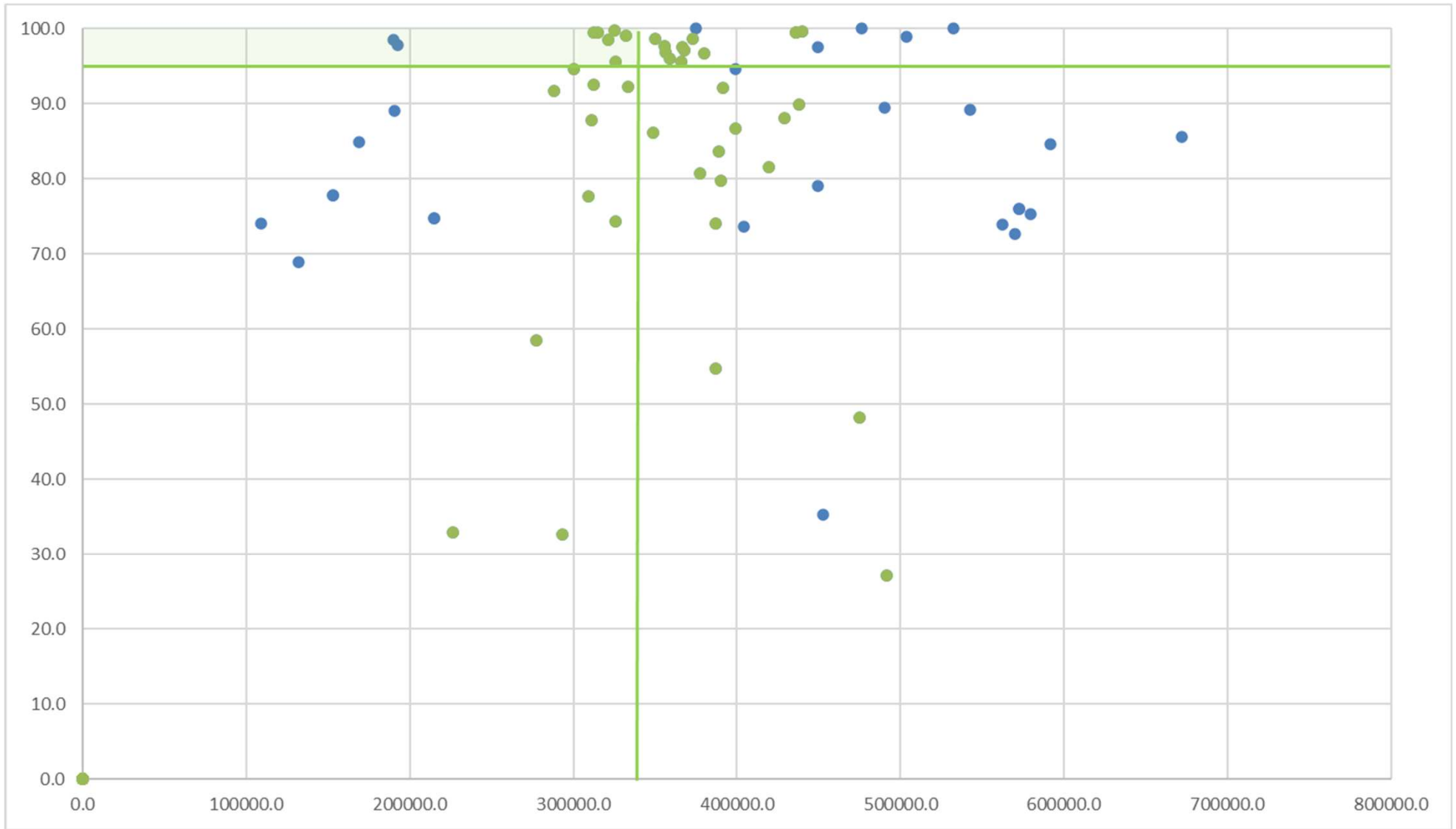
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Seminar 5

Content

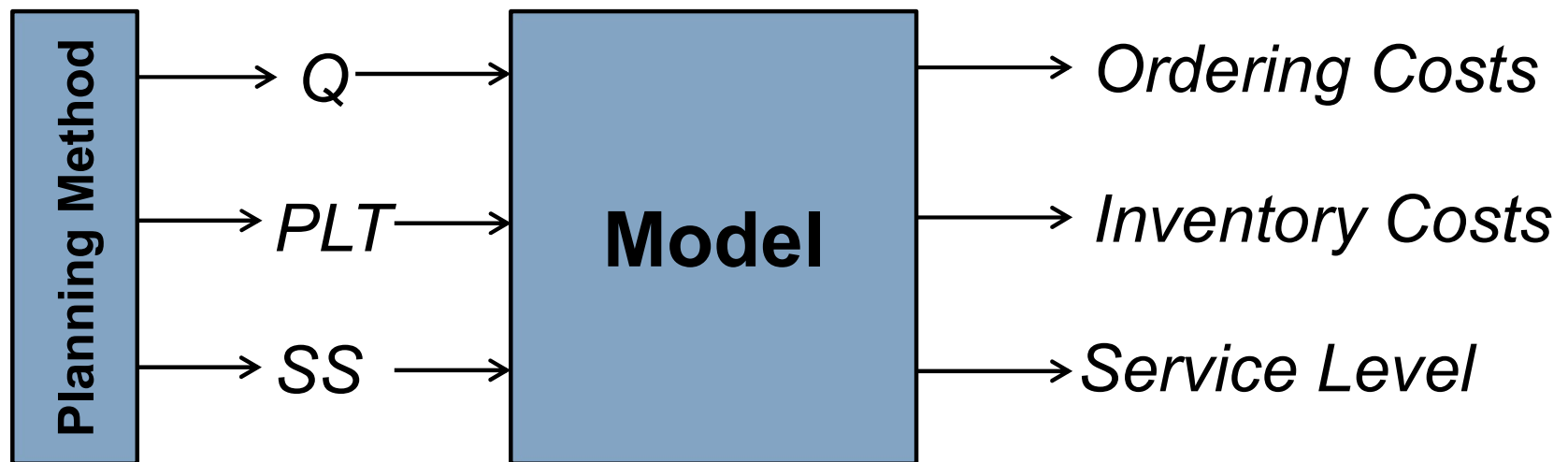
- The Project so far...
- Introduction to Task C
- Workflow of Task C
- Examination: Grading Criteria Task C
- Simulation run time slots

PICSIM Runs



PicSim

- Production and Inventory Control Simulator (PicSim)
- From the Project Directive:
“The markets all operate under the same **order winner, namely cost** (total cost in this case) and total service level (delivery) is seen as a market qualifier.”



Four Tasks in the Project

- Task A
 - Create graphs over nine different relationships.
 - Lisam Quiz to test conceptual shape.
- Task B
 - Run 10 simulations (we run the model) with the target to reach:
Inventory cost: 340 000 kr
Service level: 95 %
Total Cost: 680 000 kr
 - Test all different planning methods
 - Lisam Quiz before simulations (at least one in each group needs to pass)
- Task C
 - Carry out a setup time reduction and study the effects.
 - Run 3 simulations (we run the model) to study the effects.
- Task D
 - Formulate system specific guidelines and rules that apply to the design parameters.
 - Run 3 simulations (we run the model) to “optimize” the system.
 - Competition!

The Tasks

- Task C
 - Study how a setup reduction affects delivery service, capital, parameters, etc.
 - **Direct** effect of set-up time reduction
 - **Indirect** effect of a subsequent adjustment of the planning parameters such as order quantity, lead time and safety stock.
 - The following simulation runs are to be submitted as simulation runs in Lisam:
 1. Run 1: The base case before setup time reduction. One of the 10 runs from Task B.
 2. Run 2: The base case after setup time reduction.
 3. Run 3: Recalculated case after setup time reduction.
 4. Run 4: Improved recalculated case after setup time reduction.

The Manufacturing System

Table 3. Processing times per unit (hours).

Planning Group \ Product		A1	A2	A3	A4	A5
P1	Assembly and Processing	0.03	0.05	0.07	0.02	0.04
P2	Surface treatment	0.06	0.08	-	0.02	0.04
P3	Processing	-	-	0.05	0.03	0.04
P4	Drilling	-	0.05	-	0.02	0.08
P5	Packing and Inspection	0.11	0.06	0.10	-	-

Table 4. Setup times and capacities for planning groups.

Planning Group \ Product		Setup time [hours]	Capacity [hours/week]
P1	Assembly and Processing	2	40
P2	Surface treatment	2	40
P3	Processing	3	40
P4	Drilling	3	40
P5	Packing and Inspection	1	40

Workflow for Task C

Step C1 Determine the setup time reduction

- Where is a suitable place for a setup time reduction?
- How much can you reduce?
SMED? 10% or 90%?

Step C2 Submit your setup time reduction together with in runs 1 and 2

- Submit in Lisam.
- Write the choice of planning group and size of setup time reduction in the message: *“Setup time reduction in PG6, new setup time X hours.”*
- Run1 should be a purely theoretical system design, pick one of the ones you already have. Do appropriate updates (SS and PLT...?)
- Run 2 is same as Run 1 but with the setup time implemented.

Workflow for Task C

Run 1 and 2 analysis

- **Direct** effects are effects that occur when only the setup time is implemented.
- Focus on Inventory cost, Total cost, and Overall service level to find differences.
- Look at the rest of the outputs to find differences.

Workflow for Task C

Step C3 Recalculate the system design

- The setup time reduction gives us new preconditions for the system design
 - In ROP, new EOQ
 - In MRP, new EOQ
 - In CP, new t_{opt} .
 - In CPB new W and n .
- Recalculate the whole system design using the new setup time.
 - New Q , PLT and SS .

Step C4 Submit your new system design in run 3

- Submit in Lisam
- Run 3 is the new system design (purely theoretical).

Workflow for Task C

Run 1 and 3 analysis

- **Indirect** effects are effects that occur when the setup time is implemented and the whole system is redesigned.
- Focus on Inventory cost, Total cost, and Overall service level to find differences.
- Look at the rest of the outputs to find differences.

Workflow for Task C

Step C5 Improve the system design

- Use the simulation results (run 3) and improve the system design for run 4.
- Use the graphs (Task A) to interpret the simulation results (run 3).
- Improve the whole system design.
 - New Q, PLT and SS.

Step C6 Submit your new system design in run 4

- Submit in Lisam
- Run 4 is the improved new system design.

Workflow for Task C

Run X and 4 analysis

- **Compare this with your best run from Task B...**
- **Indirect** effects are effects that occur when the setup time is implemented and the whole system is redesigned.
- Focus on Inventory cost, Total cost, and Overall service level to find differences.
- Look at the rest of the outputs to find differences.

Examination – Grading Criteria

- Grade Pass requires the following:
- Active participation in the project group.
- For Task C:
 - One motivated and implemented set-up time reduction on one resource.
 - Discussion and analysis about the direct effects of the set-up time reduction by simulation runs.
 - Discussion and analysis about the indirect effects of the set-up time reduction by simulation runs.

Simulation Runs in Task C

Input for each simulation run is uploaded on Lisam under submissions. There are 6 submissions, numbered, one for each run. Use the submissions in the correct order. Simulation input is uploaded latest at the time (hand in) in the schedule below. Results are available latest at the second time (results ready) in the schedule.

No.	Date	Latest hand in	Results ready
1	Monday, May 10	09:00	11:00
2	Monday, May 10	13:00	15:00
3	Tuesday, May 11	09:00	11:00
4	Tuesday, May 11	13:00	15:00
5	Wednesday, May 12	09:00	11:00
6	Wednesday, May 12	13:00	15:00

Task D

Competition

- Friday May 21, kl. 13:15
- Each group can join the competition (not mandatory!)

The seminar for competing Groups

- The competing run is submitted in Task D PicSim Submission 3, on time.
- I run the competing runs live.
- The “best” solution wins nice prices.
- Non-competing groups can participate.

The seminar for non-competing Groups

- Watch the competing groups compete.