technische universität dortmund

AIM
European Academy for Industrial Management
www.europe-aim.de

Institute of Production Systems

“Experimental Learning in Industrial Engineering at TU Dortmund University”

AIM Meeting – TU Dortmund, January 10th 2013

“Experimental Learning”

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Experimental Learning in Industrial Engineering
Examples of EL at TU Dortmund

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Box Simulation Game

Gaming, Steel Industry

[DEW]

Seminars w/ partners from industry

Work system design, 1-week project

Experimental Learning in Industrial Engineering "Work System Design"

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Students of:

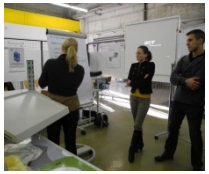
- Industrial Engineering,
- Mechanical Engineering, and
- Logistics

Learning environment:

- 1 week theoretical knowledge
- 3 hrs practical training in Exp. w/ PDCA
- **1 week project in IE Training Centre**
- Groups of 6-8 students

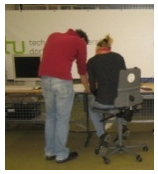
Contents:

- Product, operating sequence analysis
- Time and motion study
- Calculation of customer takt and pc/t
- Line balancing
- Ergonomic work place design
- Principles of Lean Production
- Material provision, capacity planning, …



Step 1:
Screen documents,
set up project plan

Step 2: Design work system



Planning w/ sheet and pencil

Experiments w/ PDCA

Step 3:
Tests, detailed planning,
Experiments w/ PDCA

Step 4:
Presentation and feedback

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“Work System Design” - Task

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Tasks	
Discuss tasks, look through data and documents, create **schedule of project** progress, assemble gearbox in current work system.	
Describe the current work system via **process analysis**. Collect all cycle times and further relevant data and key figures. Describe the current work system with a value stream and illustrate the workload of each station. **Design two different assembly concepts** regarding the orders and order-predictions. Evaluate which concept is more suitable for this situation. Generate a **first target state** for this work system.	
Use the **PDCA-method** to design the work system and develop a specific target state: Design each work station regarding ergonomical and procedural aspects (e.g. linkage). Use the findings to generate a target state.	
Discuss different **material provision** strategies and choose a suitable strategy. Design the material provision and the storage of materials in the working system. Develop a stable material provision and visualize it in a target state description.	Design **required tools and devices** (write a products requirements document including sketches Create a prototype of each device used in order to test its function. Make sketches of the prototypes and write a products requirements document
Describe the developed working system via a **process analysis** as a group. Evaluate the **stability and productivity** of the working system. If necessary, design changes and test them experimentally.	
Calculate the **staff requirements and investment costs**. Develop a **suitable pay program**.	
Introduce the running work system by **presenting your results** to the group (1 hr). An oral examination will follow.	

Project description

- Working time per employee: 40 hrs./week (8 hrs./shift)
- Break: 30 mins/shift
- Currently produced volume of gearboxes: 145 pieces/shift (2 shifts/day)
- Vacation per employee and year: 24 days
- Defective goods: about 2% (no rework)
- Personal and factual allowance about 12% (no recovery time allowance)
- Basic load: about 250 to 300 gearboxes/day
- Orders for the upcoming 6 months: 440 gearboxes/day
- In the following two years, 500 gearboxes per day are requested.
- Orders haven‘t been signed yet
- Meanwhile, a new product variant was developed. The ration between the option „standard“ und the option „thread“ is 3:1. The customer wants daily delivery in small batches.

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Current condition at the very beginning

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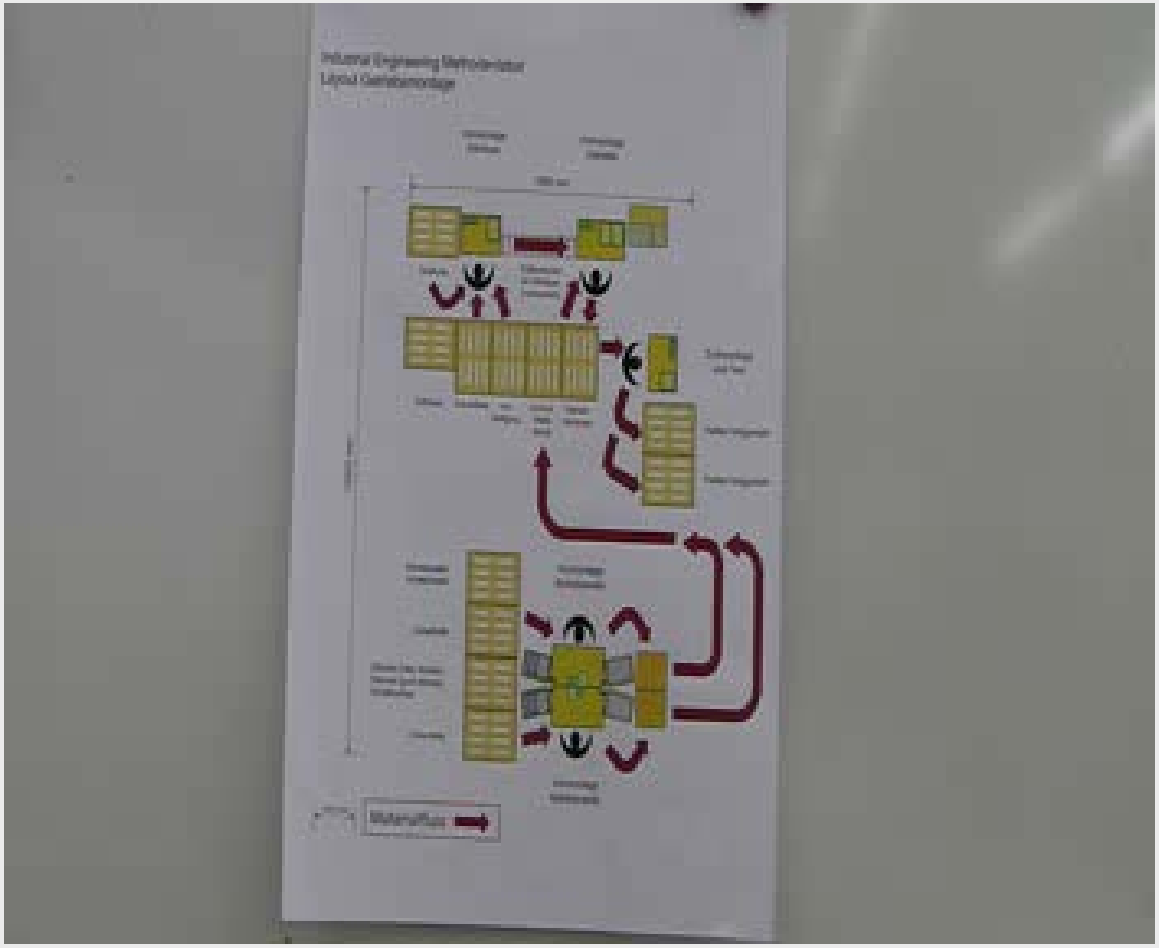

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Realized solutions at SOP

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Let‘s go and see!