



Technische
Universität
Braunschweig

Institut für Werkzeugmaschinen
und Fertigungstechnik **WMF**



Sustainable Cyber Physical Production Systems Team Project - Introduction

Dr. Sebastian Thiede, Prof. Christoph Herrmann,
Sebastian Gellrich, Marvin Czarski, Bastian Thiede

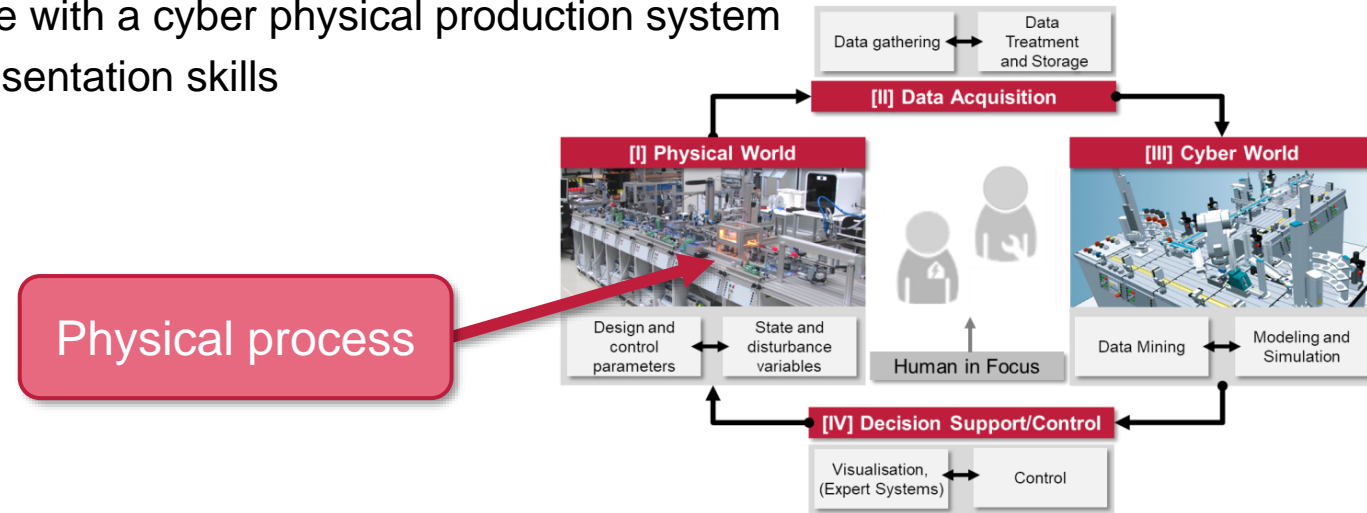
Agenda

- 1 Team Project and Task**
- 2 Schedule**
- 3 Organizational Issues**

Team Project

Team project goals:

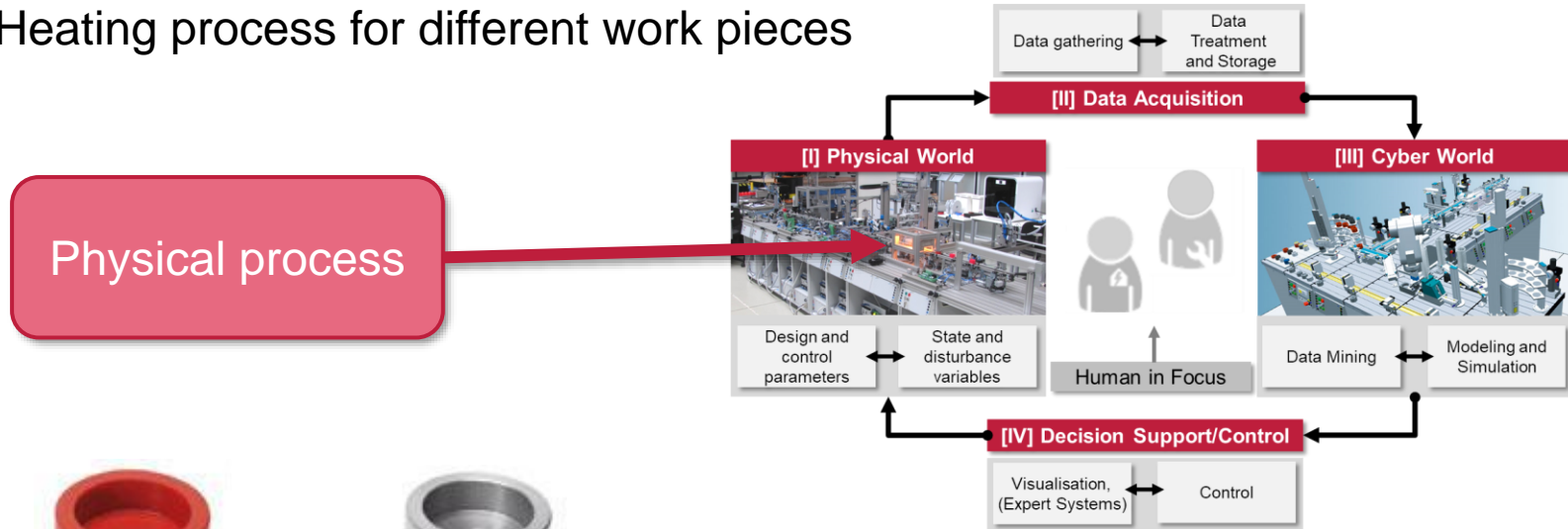
- Applying and understanding the methods of the lecture
- Learning about the implementation of a cyber physical system
- Practical experience with a cyber physical production system
- Team work and presentation skills



Team Project

Physical Process

Heating process for different work pieces



PE



Aluminium

RFID temperature sensor



Current Process Settings

- All work pieces are held in the oven for **100 seconds** to ensure an inner temperature of at least **26°C**
- The heating element is controlled by a PID controller set to **46°C**

Data Acquisition & Control

- *Temperature measurement* of the work pieces will be available before and after the process, not during processing
- Access to the *holding time* and *temperature* in the oven is provided by a graphical user interface

Task Setting

Create a Cyber Physical Production System for the heating process that online recommends optimal process parameters for an eco-efficient process

Primary Target

Ensure an inner temperature of at least **26°C** after heating

Secondary Target

All solutions will be benchmarked depending on **energy consumption**

Final Benchmark of your CPPS

4 parts in various order of material and initial temperature are heated directly one after another (oven capacity = 1 part) (equal settings for all groups)

Team Project

Schedule

Date	Module	Lecture	Team Project
29.10.2019	1	Introduction	
05.11.2019	2	Digitalisation in Future Factories	Introduction; division into groups
12.11.2019	3	Information Flows	
19.11.2019	4	Data Analytics I	
26.11.2019	5	Data Analytics II	Milestone description of parameter and system
03.12.2019	6	Modelling and Simulation I	PowerPoint presentation of modelling approach (submission on 2nd of December)
10.12.2019	7	Modelling and Simulation II	
17.12.2019	8	Human Interaction	
Christmas Break			
07.01.2020	9	Implementation of CPS on Factory Levels I	
14.01.2020	10	Guest Lecture	Milestone approach finished
21.01.2020	11	Implementation of CPS on Factory Levels II	Benchmarking
28.01.2020	12	Maintenance	Benchmarking
04.02.2020	13	Critical Review & Repetition	Poster presentation of results

05.11.2019 | Dr. Sebastian Thiede, Prof. Christoph Herrmann, Sebastian Gellrich, Marvin Czarski, Bastian Thiede
SCyPPS Team Project | Slide 7

Team Project

Organizational Issues

Group Work

- The seminar room is blocked for you as working space until 1 pm
- At least one of us (Sebastian, Bastian, Marvin) will be there as well and answer your questions
- The heating process at the xLine will be set up for you (reservation via Stoodle)
 - time slots before (8 – 9.30 am) and after the lecture (11.30 am – 1 pm)
- Aim for 6 group members
- Participation is mandatory for exam
- Sign in right after this presentation

Team Project

Organizational Issues

General

- Team Project is organized in separate STUD.IP course
- Stoodle survey for xLine access is also available on same STUD.IP course

Presentations

- Templates are available on STUD.IP
- Submission deadline for first presentation (PowerPoint, 5 min + Questions) is 2nd of December 2019
- Submission deadline for second presentation (poster) is 30th of January 2020 – the poster will be printed by us
- Mandatory presence on presentations (3rd of December 2019 and 4th of February 2020)

Team Project

Access to xLine via Stoodle


Course: Team Project Sustainable Cyber Physical Production Systems (STUD.IP)

ants Files Schedule References Wiki **Stoodle** More ...

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Survey: Data Acquisition at xLine

Only one group per time slot allowed. Appearance is mandatory at the time slots you registered for.

	19.11. 08:00 - 08:45 (Slot 1)	19.11. 08:45 - 09:30 (Slot 2)	19.11. 11:30 - 12:15 (Slot 3)	19.11. 12:15 - 13:00 (Slot 4)	26.11. 08:00 - 08:45 (Slot 5)	26.11. 08:45 - 09:30 (Slot 6)	26.11. 11:30 - 12:15 (Slot 7)	26.11. 12:15 - 13:00 (Slot 8)	03.12. 08:00 - 08:45 (Slot 9)	03.12. 08:45 - 09:30 (Slot 10)	10.12. 08:00 - 08:45 (Slot 11)	10.12. 08:45 - 09:30 (Slot 12)	10.12. 11:30 - 12:15 (Slot 13)	10.12. 12:15 - 13:00 (Slot 14)	17.12. 08:00 - 08:45 (Slot 15)	17.12. 08:45 - 09:30 (Slot 16)	17.12. 11:30 - 12:15 (Slot 17)	17.12. 12:15 - 13:00 (Slot 18)	07.01. 08:00 - 08:45 (Slot 19)	07.01. 08:45 - 09:30 (Slot 20)	07.01. 11:30 - 12:15 (Slot 21)	07.01. 12:15 - 13:00 (Slot 22)	14.01. 08:00 - 08:45 (Slot 23)	14.01. 08:45 - 09:30 (Slot 24)	14.01. 11:30 - 12:15 (Slot 25)	14.01. 12:15 - 13:00 (Slot 26)	
 Sebastian Gellrich, M. Sc. >	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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