

Digital Factory for Individualized Mass Products

Moving away from monotonous mass production to the production of custom products that meet the customer's needs is a clear trend that will continue in the near future, according to many experts. This requires individual planning and design of the components from the first design through to production during operation. In particular, small and medium-sized enterprises need to be able to respond promptly and flexibly to the needs of the market. They must be able to change in the sense of lean management in order to avoid wastage.

All parties involved in the production process must be able to understand the scope of their actions and the consequences for the production process. In the process, large volumes of data are generated and worked out that are conventionally no longer manageable. Here, electronic data processing takes a deep-seated interest in manufacturing. All relevant variables must be defined exactly and processed safely. This module uses concrete examples to illustrate how customers' needs are incorporated into the design and how these data are processed and processed automatically. Data for prototypes are generated and produced using the FDM process. The students design their personal products and practice the process of production as well as the customization. They define degrees of freedom and process data and rules in databases. Work results are not just drawings and program data, but concrete prototypes and production parts. They work together with the teachings of computer-aided design practices. You will learn about important principles of CNC programming and implement methods of rapid prototyping.

Competences Trained by Working on this Module

Competences Matrix Teachers Vet 4.0				
Competence development fields	Digital competencies			
	1. Professional competences 4.0	2. Media competences	3. Application know-how	4. Basic ICT know-how and skills
A. To develop and implement annual teaching plan and to manage documents	1.1. To identify technological and organizational changes in the mechatronics and electronics in the systemic way for the training course and to prepare them didactically. 1.2. To evaluate the possibilities and risks of the digitalized work and business processes. 1.3. To restructure networked process chains in learning. 1.4. To train by applying content of embedded systems, including their operating systems. 1.5. To provide know-how on handling interactions with sensors, reading information and collecting of data. 1.6. To train on handling the processes of robotics (robot and "cobot"), including know-how to program and control production robots in the different technological processes. 1.7. To provide know how on the installation and exploitation of the Internet of Things and CPS.	2.1. To identify and assess digital key competences applied in the ICT media. 2.2. To identify the media competences applied in the work, business and social contexts. 2.3. To design and plan the installation of the media technologies in the school. 2.4. To organize cooperation of learners in the digital learning environment. 2.5. To organize knowledge management.	3.1. To install learning management systems. 3.2. To install specialized social media. 3.3. To install professional software for learning. 3.4. To select and install the didactic instruments for cooperative learning. 3.5. To document the digital teaching plans for common (cooperative) usage. 3.6. To handle software for management.	4.1. To install professionally Office software appliances. 4.2. To configure and set-up learning management systems. 4.3. To provide digital applications in the local area network.
B. To plan and design learning processes	1.1. To design the concept of digital process chain (4.0) in the teaching and learning process. 1.2. To select digitalized learning and teaching scenarios that facilitate problem oriented and self-organized learning. 1.3. To plan and execute interactive, virtual and individual learning phases. 1.4. To organize the interdisciplinary cooperation in the learning process.	2.1. To select, install and evaluate the digital teaching and learning scenarios. 2.2. To check the used media for accessibility/openness, problem solving and requirement level. 2.3. To check on how the media facilitate development of decision making skills, abilities to cooperate and creativity.	3.1. To install the elements of digital learning scenarios and formats (Blended und Online-Learning).	4.1. To integrate audio and video data. 4.2. To prepare video-tutorials. 4.3. To prepare Digitalized Content. 4.4. To integrate the data from external and internal sources in the teaching. 4.5. To consider copyright protection issues.
C. To communicate, cooperate	1.1. To select interactive media for learning and training. 1.2. To present the information and data for learners by using interactive media. 1.3. To ensure the safety of personal and corporate data used in the training and work processes.	2.1. To execute timely and operative communication with the internal (school) and external addressees regardless their location and time.	3.1. To apply the digital communication instruments for the regular and remote teaching. 3.2. To use electronic teaching diaries.	4.1. To evaluate the data of learning, teaching and work processes. 4.2. To handle inquiries and feedback from the digitalized instruments.
D. To analyze and evaluate learning process, achievements and success of learners	1.1. To check media usage for occupational and learning relevance. 1.2. To design reflection processes. 1.3. To evaluate content, human and technical resources for media use.	2.1. To identify informally and non-formally acquired digital skills. 2.2. To analyze students' media literacy development. 2.3. To analyze and classify media technology in the course of education.	3.1. To plan and evaluate the formats of individual and team activities. 3.2. To select and install the online tools for diagnostics and assessment of performance at learning and work.	4.1. To collect, aggregate, analyze and evaluate data from learning processes (Learning Analytics). 4.2. To adjust the performance rating tools. 4.3. To apply privacy and data security requirements.

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Tasks

1. Please, retrace the student module and the intended learning process.

Tools: [mapped teacher matrix](#), [student's module](#), [basic questions](#)

2. If necessary, rebuild the final product by your own. Tools: [student's module](#),
3. Reflect on where there were difficulties and how to avoid them in class.
4. Consider the need for adjustment with regard to your own students and map the competence matrix for students.

Tool: [competence matrix for students](#)

5. Adjust the module or refine it by filling out these forms:

[Explanation of the structure of student's modules](#)

[Form Sequencing student's module](#)

[Learning Modules Requirement](#)






[Evaluation student's module](#)

6. Evaluate your own learning process.

Tool: [Evaluation form](#)

Additional material for teacher and trainer:

The following documents gives you a further information!

-  [Digital factory Description new.pdf](#) (3,7 MiB)
-  [Digital factory overview web.pdf](#) (173,8 MiB)
-  [Digital factory overview web.pptx](#) (74,3 MiB)
-  [Hand_out_new.pdf](#) (12,5 MiB)
-  [Hand_out_new.pptx](#) (36,3 MiB)



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Assessment

Assessment of all products to be delivered:

- list of important changes of work processes for your students
- list of competences you and your students need to reach
- list of competences you want to acquire in short-term
- your students' module
- an evaluation tool

Evaluation

Reflect and exchange your experience with other colleagues (in your working group or a [virtual working group](#)), define a focus you want to reflect on with your students and create a suitable evaluation tool for them.

⇒ [Proposal for Self Reflection](#)

Useful links

- <https://www.surveymonkey.de/>
- <https://www.limesurvey.org/de/>
- <https://www.umfrageonline.com/>
- <https://de.wordpress.com>
- <https://de.jimdo.com/>
- <https://de.wix.com/>
- <https://www.weebly.com/de>
- <https://www.tumblr.com/>
- <https://www.blogger.com>



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