Production Automation

Code: MK5SZERAG04G117_EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Electrical measurement and signal processing

Further courses are built on it: Yes/<u>No</u>

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The aim of the subject is the technological process planning and CNC production of workpieces in automation production environment. Knowing of the coordinate systems and CNC program blocks are necessary for the creation of a CNC program. During this course the students learn the CNC production designing of special and typical milling operations. They learn the edge geometry of the milling cutting tool and the selection method of devices for milling tasks.

Based on the result of CAD modelling and CAM simulation the real production could be done by automatic CNC working machines.

In the second half of the course students will learn about the installation and automation issues of pneumatic systems. Through practical exercises they learn about pneumatics, electro pneumatics and PLC and meet industry-specific solutions. They gain experience in building pnematic circuits during the exercises. Students learn different methods of debugging in the system.

Literature:

Compulsory:

- Berta M.: CNC szerszámgépek szerszámrendszerei, Nyíregyházi Főiskola, Nyíregyháza, 2015, p. 156, ISBN 978 615 5545 03 0
- Szabó T.: Gépészeti automatizálás, Edutus Főiskola, Tatabánya, 2011., p. 98.
- Takács J.: Gyártásautomatizálás, Typotex kiadó, Budapest, 2012., p. 192.
- Prasad, Birendra: CAD/CAM Robotics and Factories of the Future, Volume II: Automation of Design, Analysis and Manufacturing, Springer Verlag, 2012, ISBN 9783642523250
- Wang, Lingfeng, Tan, Kay CHen: Modern Industrial Automation Software Design, Blackwell Publishers (Wiley), 2006, ISBN 9780471683735

Recommended:

- Fritz Klocke: Manufacturing Processes I, Cutting, RWTH Edition, RWTH Aachen University, p. 524, ISBN 978-3-642-11978-1
- Mikel P. Groover: Fundamentals of Modern Manufacturing, Materials, Processes and Systems, Third Edition, United States of Amerika, p. 520, ISBN 978-0-471-74485-6

Schedule

1st week: Registration week	
2nd week:	**3rd week:**
Lecture: The construction of CNC working machines, the main functions	**Lecture:** CNC milling machines, coordinate systems, CNC program generation

Practice: Analysis of manufacturing technologies for CNC machines I.: tools, tool selections, motion cycles

4th week:

Lecture: Analysis of the edge geometry of milling tools

Practice: Analysis of manufacturing technologies for CNC machines III.: workpiece clamping, programing, experimental production

6th week:

Lecture: Designing of milling technology for CNC machine. Typical milling tasks.

Practice: Technological process planning by SolidCAM software II.

Practice: Analysis of manufacturing technologies for CNC machines II.: milling tasks, methods

5th week:

Lecture: Selection of workpiece devices for milling tasks

Practice: Technological process planning by SolidCAM software I.

7th week:

Lecture: Determination of the technological parameters of milling technology. Special milling tasks.

Practice: Technological process planning by SolidCAM software III.

8th week: 1st drawing week

9th week:

Lecture: The structure and general characteristics of pneumatic systems

Practice: Design and installation of pneumatic circuits

11th week:

Lecture: Pneumatic control systems, PLC programming

Practice: Building a PLC-controlled pneumatic system

13th week:

Lecture: Troubleshooting, Diagnostics

Practice: Exercise Solution

10th week:

Lecture: The structure and general characteristics of electro-pneumatic systems

Practice: Learn about electro-pneumatic tools

12th week:

Lecture: Automation of pneumatic systems

Practice: Task release

14th week:

Lecture: Written examination

Practice: Presentation of tasks

15th week: 2nd drawing week

Requirements

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1. Students have to visit the lectures and seminars. Three misses are permissive for the seminar.
2. Students have to create two own tasks (technological task and automation task).
3. There will be two tests in the semester. They have to write them for minimum sufficient marks. Based on these results they will get the final practice mark.