COURSE DESCRIPTION CARD - SYLLABUS

Course name
Design of plastics processing processes [S1MiBM2>PPPTS]

Course

Field of study
Mechanical Engineering

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

Lecturers

Prerequisites

Basic knowledge of the basics of machine construction, material processing technology, and methods of measuring physical quantities.

Course objective

Learning about possible methods of designing different types of plastic injection technology depending on the type of product produced and the processing of various polymer materials.

Course-related learning outcomes

Knowledge:
1. Has advanced knowledge in the construction, operation, programming and testing of machines and robots.
2. The student should identify various injection processes and be able to select the appropriate injection process for the production of specific types of products.
2. The student should be able to explain the processes occurring during the production of products using injection molding technology.
3. Has advanced knowledge in the field of research, selection and properties of engineering materials specific to mechanics and machine construction.

Skills:
1. The student is able to analyze the course of injection processes.
2. The student is able to define possible causes of disruptions in the product manufacturing process using injection molding technologies and is able to propose necessary changes in the production system and process parameters.
3. The student is able to select technological parameters of the injection process.
4. The student is able to control the injection process.
5. Is able to select, depending on the requirements, engineering materials for applications in mechanics and machine construction.
6. Is able to select, design and apply technological processes in order to shape the form, structure and properties of products.

Social competences:
1. The student is aware of the role of manufacturing processes, especially injection technology, in the economy and human life.
2. The student demonstrates an active attitude in creating processes for manufacturing products using injection molding technologies.
3. The student is determined to achieve the goals set for him.
4. The student is able to assess the quality and economy of product manufacturing processes, with particular emphasis on the injection molding processes of plastic products.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
Passing on the basis of a written examination consisting of 5 general questions (passing in case of correct answer to at least 3 questions: <3 fail; 3 dst; 3.5 dst+; 4 db; 4.5 db+; 5 very good) conducted at the end semester.
Laboratories:
Credit based on attendance at laboratory classes and answering the instructor's questions in oral or written form, graded on a scale of 2 to 5. Reports on selected laboratory exercises. Final grade on a grade scale from 2 to 5 - the average of the grades received from the laboratories (all must be graded positively, above grade 2).

Programme content

Lecture:
Presentation of various types of injection technology for plastic products: (injection blowing technology, gas-assisted product injection technology, MuCell and ErgoCell technologies, injection technologies with dynamic changes in mold temperature, injection technologies with the addition of blowing agents, fabric overmolding technologies, injection technologies with decoration in form, technologies of injection of composites with mineral and plant fibers, technologies of injection molding with pressing, technology of injection of plastic details with metal crimps, micro-injection technologies, injection of metal powders, injection of WPC composites, multi-material injection molding. Phenomena occurring as a result of various injection processes of plastic products. The specificity of individual injection processes and the possibilities of their applications in industrial practice. Processing parameters of the most popular plastics and composites in various types of injection technology. The influence of technological parameters of injection processes on the properties of the obtained products.
Laboratories:
Selection of technological parameters for various injection processes.
Selection of machines, devices and tools to implement the selected injection process.
Setting up the injection process on the injection molding machine.
Using a robot in the injection process.
Construction of an injection mold - assembly and disassembly of the mold on an injection molding machine.
Control of the injection process and analysis of phenomena occurring during the process.
Injection of WPC composites, fiberglass composites and composites with plant fillers.
Assessment of the impact of parameters on the process and product defects.

Course topics

none

Teaching methods

Lecture: multimedia presentation, illustrations, sample multimedia films of injection processes.
Laboratory: work with devices, production of products, discussion, team work

Bibliography

Basic:
1. Przetwórstwo tworzyw wielkocząsteczkowych, R. Sikora, Wydawnictwo Żak, Warszawa, 1993
2. Praca zbiorowa. Poradnik - Tworzywa sztuczne, WNT, Warszawa 2006
3. Zawistowski H., Frenkler D.; Konstrukcja form wtryskowych do tworzyw termoplastycznych; WNT, Warszawa 2003
4. Zawistowski H., Zięba Sz.; Ustawianie procesu wtryskiwania tworzyw termoplastycznych; PLASTECH, Warszawa 2015

Additional:
1. Haponiuk J.T.; Tworzywa sztuczne w praktyce; Wyd. Verlag Dashofer, Warszawa 2008
2. Douglas M. Bryce; Plastic Injection Molding ...manufacturing process fundamentals Vol. I - IV; Society of Manufacturing Engineers, Dearborn, Michigan 1996

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00