COURSE DESCRIPTION CARD - SYLLABUS

Course name
Technology of thermo-chemical treatment in automotive production [S1MiTPM1>TOCCwPM]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The basic knowledge from the range of simple heat treatment and material engineering in the automotive industry. The logical thinking and use of the information obtained from the library and the Internet. The understanding needs for learning and acquiring new knowledge.

Course objective

It’s understanding the kind of thermo-chemical treatment and the connected with her simple heat treatment as well as their influence on the structure and properties of metal alloys used in the automotive industry.

Course-related learning outcomes

Knowledge:
1. The student should name and describe classic and modern kinds of thermo-chemical treatment applied in the automotive industry.
2. The student should characterize material properties depending on the thermo-chemical treatment and simpel heat treatment applied in the automotive industry.

Skills:

1. The student is able to choose appropriate technology of the thermo-chemical treatment in depending on the required properties of the material applied in the automotive industry.
2. The student is able to offer and choose the device to carry out the thermo-chemical treatment and the heat treatment in the automotive industry.
3. The student is able to design technological process of heat treatment and thermo-chemical treatment selected machine parts or tools applied in the automotive industry.

Social competences:
1. The student is active in analyzing and solving problems in a group.
2. The student is aware of the role of heat treatment and surface engineering methods for chemical and thermal processes in the manufacturing technology of products in the automotive industry.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
The credit of lecture on the basis of a written answer consisting of 2 (two) - 6 (six) questions or test on e-Kursy PP platform, which realized at the end of semester.
Evaluation criteria: dst (3.0) ÷ dst+ (3.5) => 50.1 ÷ 70%; db (4.0) ÷ db+ (4.5) => 70.1 ÷ 90%; bdb (5.0) => 90.1 ÷100%
Laboratory:
The credit is on the basis of oral or written answers from the scope of the content of each performed laboratory exercises, a report from each laboratory exercise according to the indications leading laboratory exercises.
Evaluation criteria: dst (3.0) ÷ dst+ (3.5) => 50.1 ÷ 70%; db (4.0) ÷ db+ (4.5) => 70.1 ÷ 90%; bdb (5.0) => 90.1 ÷100%
In order to obtain the credit of laboratories all exercises must be included (the positive response and reports).

Programme content

1) The heat treatment - -definitions, kinds, methods.
2) The technologies of thermo-chemical treatment applied to the iron alloys and non-ferrous alloys in the automotive industry.
3) The technologies of the simple heat treatment and her correlation with the thermo-chemical treatment in the automotive industry
4) The devices and the instrumentation, which realized operation of the heat treatment in the automotive industry.
5) The producibility of elements from the viewpoint of the heat treatment operation applied in the automotive industry.
6) The control used in the technologies of heat treatment applied in the automotive industry.

Course topics

Lecture:
1. The basic notion from heat treatment applied in the automotive industry.
2. The technologies of thermo-chemical treatment applied in the automotive industry, which introducing in the top layer of elements such the metallic or non-metallic elements - the selected processes.
3. The heat treatment selected non-ferrous materials applied in the automotive industry.
4. The classification and characteristics of the devices for simple simpel heat treatment and thermo-chemical treatment applied in the automotive industry.
5. The control in the simple heat treatment and thermo-chemical treatment applied in the automotive industry.
6. The producibility, the ecology and the heat treatment processes applied in the automotive industry.
7. The influence of thermo-chemical treatment on forming of material properties used in the automotive industry.
8. The examples process of simple heat treatment and thermo-chemical treatment selected elements or tools used in the automotive industry.
Laboratory:

1. It carrying out the selected processes of thermo-chemical treatment (carburizing, nitriding, boriding) and different variants of the simple heat treatment of ferrous alloys. Part 1, 2 and 3.
2. The control processes of simple heat treatment and thermo-chemical: temperature, time, the chemical composition of atmosphere, carbon potential, nitric potential.
3. The control after processes of thermo-chemical treatment and simple heat treatment : hardness, micro hardness, characteristics of diffusion layer: structure, the thickness layers and phases composition.
4. The design of heat treatment technology cards selected elements used in the automotive industry.

Teaching methods

1. Lecture: multimedia presentation, discussion..
2. Laboratory:practical exercises, experimentation, discussion, team work.

Bibliography

Basic:
1. Dobrzański L.A.: Materiały inżynierskie z podstawami technologii procesów materiałowych., TOM1 i Tom2, wyd. 1, Wydawnictwo Naukowe PWN SA, Gliwice 2024
2. Przybyłowicz K., Skrzypek S. J.: Inżynieria metali i technologie materiałowe, Wydawnictwo Naukowe PWN SA, Warszawa 2019
3. Totten G. E., Pye D., Przyłęcka M., Gęstwa W. : Chapter 29 - Heat Treating of Steel; w książce pt: Smithells Metals Reference Book; Edited By: William F. Gale, Terry C. Totemeier; Editorial Services Unit, Elsevier Science Ltd, The Boulevard Langford Lane Kidlington, Oxford; 2004, s.29-1 ÷ 29-83
2. Kula P. Inżynieria warstwy wierzchniej. Monografie. Wyd. Politechniki Łódzkiej, Łódź, 2000

Additional:
The current articles connected with the subject matter of the topic.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00