



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Manufacturing of surface layers by welding methods [S1FT2>WWWMS]

Course

Field of study

Technical Physics

Year/Semester

3/6

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

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in the field of physics, materials science. Ability to think logically, use information from the library and the Internet. understanding of the need to learn and acquire new knowledge.

Course objective

Learn about methods and ways of producing top layers by welding methods. Understanding the properties and applications of such layers.

Course-related learning outcomes

Knowledge:

1. The student should characterize the types of top layers produced by different welding methods
2. The student should select the parameters of the process of making top layers by welding methods
3. The student should define the elements of the construction of the top layers produced by welding methods

Skills:

1. The student can operate welding equipment

2. The student can choose the initial conditions of the processes of making top layers
3. The student is able to plan the processes of making top layers

Social competences:

1. The student can cooperate in a group
2. The student is aware of the role of top layer manufacturing processes by welding methods in the modern economy and society

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: pass on the basis of a colloquium consisting of 5 general questions (pass in case of correct answer to min. 3 questions: <3 = ndst, 3 = dst, 3,5 = dst+, 4 = db, 4,5 = db+, 5 = bdb) carried out at the end of the semester.

Programme content

1. Construction and operation of welding equipment.
2. Welding methods of surface layering by gas burner, MMA, TIG, MIG/MAG, microplasma and thermal spraying by flame, arc, supersonic, plasma, cold gas spraying (to be chosen by the lecturer).
3. Properties of connections of different materials.
4. Characteristics and classification of additional materials for welding.
5. Properties of top layers produced by different welding methods.
6. The role of parameters for the manufacture of top layers by incinerator methods in shaping the properties of layers.
7. Industrial applications using the surface protection by the discussed welding methods

Course topics

The subject of the course Manufacturing of Surface Layers by Welding Methods includes the possibility of using welding-related methods to change the properties of the surface layer. Topics describe additive methods that use diverse additive materials due to their form and chemical composition. The course topics explain the differentiation of metallurgical processes into invasive and non-invasive with relation to the reactions occurring between the additive material and the substrate. The metallurgy of producing surface layers by differentiated methods will also be explained in depth, because of the rate of heating, the amount of heat introduced and the extent the zone of microstructural transformation. Thermal spraying methods will be explained in detail in the chronology of spray gun power and spray jet energy, as well as the coating materials used in relation to their morphology and form. The course will conclude with a presentation the application of thermal spraying methods significantly expanding the possibility of using materials with limited resistance to the operating environment and protected by a coating and, ultimately, working in conditions where their application and long-term operation were previously impossible.

Teaching methods

Multimedia presentation, presentation illustrated with examples given on the board, alternatively a remote process using a multimedia presentation and / or camera.

Bibliography

Basic:

1. Napawanie i natryskiwanie cieplne, Klimpel A., WNT, Warszawa, 2000,
2. Maszyny i urządzenia spawalnicze, Dobaj E., WNT Warszawa, 1998.

Additional:

1. Poradnik Inżyniera Spawalnictwo cz.1, Pilarczyk J., WNT, Warszawa, 2001,
2. Spawalnictwo, Ferenc K., WNT, Warszawa, 2007.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	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)	20	1,00