

340200 - TSAI-M7P02 - Surface Treatments for Industrial Applications

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 702 - CMEM - Department of Materials Science and Metallurgy
Academic year: 2018
Degree: BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: Josep Anton Picas Barrachina
Others: Josep Anton Picas Barrachina

Requirements

Basic knowledge of Material Science

Degree competences to which the subject contributes

Specific:

1. CE25. Knowledge and ability to apply material engineering.
2. CE26. Applied knowledge of systems and fabrication process, METROLOGIA and quality control.

Transversal:

3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
4. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
5. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.
6. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

Teaching methodology

Theoretical classes and practical examples of the different processes to produce coatings and surface treatments
Visualization in the laboratory of the main characterization tests used in this field. Visits to several manufacturing plants related with this field.

Learning objectives of the subject

The requirements modern technology demands of the tools, the equipment and the mechanical components, force the industrial sector to produce advanced Surface Treatments and Coatings with specific characteristics. The objective of this subject is to give sufficient knowledge on Surface Treatments and Coatings, from their production to their technological application. Both perspectives are essential for any Engineer who works in several fields: Engineering of Processes, Coatings Manufacture, Technical Office, etc



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Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

Unit 1: Fundamentals of Surface Engineering	Learning time: 1h Theory classes: 1h
Unit 2: Surface properties: chemical and tribological properties	Learning time: 2h Theory classes: 1h Laboratory classes: 1h
Unit 3: Characterization techniques and quality control of coatings	Learning time: 2h Theory classes: 1h Laboratory classes: 1h
Unit 4: Surface heat treatments (iron based materials)	Learning time: 2h Theory classes: 1h Laboratory classes: 1h
Unit 5: Tractaments mecànics superficials	Learning time: 1h Theory classes: 1h
Unit 6: thermochemical treatments	Learning time: 2h Theory classes: 1h Practical classes: 1h
Unit 7: Anodizing (aluminium and titanium alloys)	Learning time: 2h Theory classes: 1h Practical classes: 1h

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Unit 8: Implantació iònica	Learning time: 1h Theory classes: 1h
Unit 9: Laser surface treatments	Learning time: 1h Theory classes: 1h
Unit 10: Chemical and electrochemical coatings	Learning time: 2h Theory classes: 1h Laboratory classes: 1h
Unit 11: Thermal spray coatings	Learning time: 1h Theory classes: 1h
Unit 12: Chemical and physivcal vapor deposition tehniques: CVD and PVD	Learning time: 1h Theory classes: 1h
Topic 13: Paintings and Sol-gel coatings.	Learning time: 2h Theory classes: 2h
<p>Description: This topic defines what a painting is and the different techniques of deposition. The basic concepts related to the sol-gel coating technology are also defined.</p>	

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Planning of activities

(ENG) ACTIVITAT 1: CLASSE EXPOSITIVA

(ENG) ACTIVITAT 2: ESTUDI DE LES PROPIETAST TRIBOLOGIQUES D'UN RECOBRIMENT

(ENG) ACTIVITAT 3: CARACTERITZACIÓ METAL·LOGRÀFICA D'UN RECOBRIMENT MITJANÇANT MICROSCOPIA ELECTRÒNICA

(ENG) ACTIVITAT 4: PRÀCTICA DE SELECCIÓ DE TRACTAMENTS SUPERFICIALS I RECOBRIMENTS

(ENG) ACTIVITAT 5: QÜESTIONARI MOODLE

(ENG) ACTIVITAT 6: TREBALL

(ENG) ACTIVITAT 6: VISITES A EMPRESES

(ENG) ACTIVITAT 7: 1ª PROVA

(ENG) ACTIVITAT 8: 2ª PROVA

(ENG) ACTIVITAT 9: PROVA FINAL

(ENG) ACTIVITAT 5: RECOBRIMENTS ELECTROLÍTICS

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Qualification system

The average mark between the marks of the work carried out in the laboratory (20%) and the visits to manufacturing plants (10%), the mark of two tests with different questions based on the theory classes (mark of the two theory-based tests : 30% each). Moreover a work on some topics related to the subject will be carried out with a 10% of the final mark. This work must be presented orally by the authors.

The laboratory practices, the tests carried out via Campus Digital and the activities carried out in the classroom or others during the regular period of classes will not be re-evaluated.

Bibliography

Complementary:

ASM handbook. Vol. 5, Surface engineering. Materials Park, Ohio: ASM International, 1996. ISBN 087170384X.

Surface engineering : processes and applications. Lancaster [Pa.] [etc.]: Technomic, 1995. ISBN 1566761549.

Handbook of hard coatings : deposition technologies, properties and applications. Park Ridge (N.J.): Noyes, 2001. ISBN 0815514387.

Modern tribology handbook [on line]. Boca Ratón: CRC Press, cop. 2001 [Consultation: 17/09/2014]. Available on: <<http://lib.myilibrary.com?id=135751>>. ISBN 9781281357519.

Ciencia e ingeniería de la superficie de los materiales metálicos. Madrid: Consejo Superior de Investigaciones Científicas, 2000. ISBN 8400079205.

Pawlowski, Lech. Protective coating and paints. Foxit Software Company, 2004.

Coatings technology handbook. 3rd ed. Boca Raton: CRC, 2006. ISBN 9781574446494.

Pawlowski, Lech. The Science and engineering of thermal spray coatings. 2nd ed. Chichester ; Hoboken, NJ: John Wiley & Sons, 2008. ISBN 9780471490494.