Assembly techniques

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Cursus  | Sem.  | Type  
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Science et génie des matériaux | MA2, MA4 | Opt.

Summary
Introduction to the assembly of materials by homogeneous or heterogeneous joints (welding, bonding, mechanical assembly). Mechanical and environmental resistance of joints.

Content

**Metallic assemblies**
- Assembly systems
- Brazing and welding
- Welding techniques
- Surface and interfacial phenomena

**Polymer assemblies**
- Theoretical aspects of adhesion
- Principal classes of adhesives and their applications
- Properties of polymeric joints
- Polymer interdiffusion in plastic welding
- Mechanical methods of plastic joining

**Ceramic assemblies**
- Techniques for ceramic/metal/glass joints
- Physical and chemical basis for determining the properties of heterogeneous joints
- Typical applications

Keywords
Welding, brazing, adhesives, mechanical joining, polymers, ceramics, metals

Learning Prerequisites

Recommended courses
- Polymères, structures, propriétés, MSE-230, MX, Plummer
- Materials mechanics, MSE-205, MX, Bourban
- Deformation of materials, MSE-310, MX, Logé
- Surfaces and interfaces, MSE-304, MX, Ceriotti
Important concepts to start the course
Basic physics and chemistry, simple mechanics

Learning Outcomes

By the end of the course, the student must be able to:

- Describe the basic principles of the different joining methods
- Recognize specific characteristics of joints in the different classes of materials (metals, ceramics and plastics)
- Explain the advantages and disadvantages of different joining techniques
- Perform simple structural analysis of mechanical joints
- Discriminate between different classes of adhesives and their applications
- Choose the best joining method for a given application
- Choose the best joining method for different materials
- Analyze the failure of a joint

Transversal skills

- Collect data.
- Make an oral presentation.
- Access and evaluate appropriate sources of information.

Teaching methods

Ex cathedra, seminars, workshop demonstration, exercises

Expected student activities

Attendance at lectures and workshop demonstration, participation in exercises

Assessment methods

Intermediate tests on metals and ceramics and polymers + presentation of a case study. The final mark is the average of the average mark for the tests and the mark for the case study (which hence counts for 50 % of the overall mark)

Supervision

Office hours Yes

Resources

Websites

- http://my.epfl.ch

Prerequisite for

Master thesis