



Course code Course title
METRO 008 Metal matrix composites

Prerequisites

Basic physics and chemistry, Aluminium alloys.

Training Objectives

- Understanding the main concepts of metal matrix composites (MMCs)
- Understanding the processes suitable for the production of MMCs
- Understanding the more relevant properties of MMCs, both at room and high temperature
- Understanding the basics of extrusion, casting, forging and welding of MMCs
- Basic knowledge of actual and potential applications of MMCs

Summary

1. Introduction and definition
 - matrix and reinforcement
 - main kinds of matrices and reinforcements
 - long fibers, short fibers, particles
2. Production of MMCs (1)
 - Classification of MMCs production routes;
 - processes in solid state (diffusion bonding, powder metallurgy)
3. Production of MMCs (2)
 - Processes in liquid state
 - compocasting,
 - infiltration: spontaneous, in vacuum, under pressure, squeeze, reactive
4. Review of MMCs mechanical properties (1)
 - Mechanical behaviour of MMCs at room temperature (tensile, fatigue)
5. Review of MMCs mechanical properties (2)
 - Mechanical behaviour of MMCs at high temperature
 - (tensile, fatigue, creep);
 - hot working of MMCs

6. Extrusion and Welding of MMCs
 - Main features of the extrusion and welding processes of MMCs,
 - Considerations on specific matrix-reinforcement systems

7. Forging and Casting of MMCs
 - Main features of the forging and casting processes of MMCs,
 - Considerations on specific matrix-reinforcement systems

8. Applications of MMCs
 - Actual and possible industrial applications of MMCs