

PROCESS METALLURGY AND SIMULATION LABORATORY

Experimental facilities and simulation software for process metallurgy

Experimental and numerical investigations on metallurgical processes are carried out by means of simulation software and lab-scale process facilities, including a set of muffle furnaces that can operate up to 1700°C in ambient or inert atmosphere, a rolling mill and a hot extrusion system for small billets and tubes. Equipment for handling, mixing and milling of metallic and ceramic powder are also available to researchers.

INSTRUMENTS & FACILITIES

Thermocalc Software SUNLL licence for computational thermo-dynamics with DICTRA (Diffusion-Controlled phase TRAnsformation) and PRISMA (precipitation reactions) software modules are available to research in the Academic version. Thermodynamic and mobility databases are available for Fe, Al and Ni-based alloys.

Procast PRO-CT-01 with the following modules: GUI (VTS-CE-28), Thermal 2 core, Fluidynamic 2 core, Semisolid 2 core, Irradiation 2 core.

Deform DEFORMTM Premier, educational licence, version 11.3 with the following modules: Forming express, GeoTool, Integrated 2D3D, Inategrated Manufacturing, Inverse Heat, Material Suite.

Nabertherm lift-bottom furnace temperature up to 1700°C, in ambient or inert atmospheres, internal diameter = 120, height = 130 mm, max load 2 kg.

Carbolite tube furnace
(temperature up to 1050°C, in ambient or inert atmospheres)
Internal diameter = 75 mm, uniform heated len-gth = 540 mm

Nabertherm tube furnace RHTC 80/450/16 (temperature up to 1600°C in ambient, inert or vacuum atmosphere). Internal diameter = 70 mm, uniform heated lenght = 150 mm.

Carbolite HRF 722D (temperature up to 750 °C), 220x200x495 mm.

Carbolite GPC 12/36 (temperature up to 1200 °C), 250x320x450 mm.

Lenton UAF 14/27 (temperature up to 1400 °C in ambient or inert atmospheres), 290x270x340.

OAM rolling mill (symmetric and asymmetric operation mode, cylinders of 150 mm diameter, speed: 0-20 rpm).

MTS Exceed E45 equipped with induction coil, dies and plungers for cold and hot extrusion of small billets and tubes and for compaction of powder.

Retsch M400 ball mill system equipped with steel and jars and FILTRA FTS 0200 sieving machine with full series of sieve diameter = 200 mm x height 50 mm (from 10 mm to 32 um).

Adler Powder mixer and sieving facilities.

ACTIVITIES

Simulation of metallurgical processes and heat treatments

Laboratory casting of metallic alloys

Rolling of metals at room and high temperatures

Hot extrusion of small billets and tubes

Hot and cold compaction of powder

High energy ball milling of metal and ceramic powder

Powder handling, mixing and sieving

