ENMat **European Network of Materials Research Centres**

NAME : CENTRE FOR RESEARCH AND DEVELOPMENT OF MATERIALS AND TECHNOLOGIES(CRDMT)

INSTITUTION : CZECH SOCIETY FOR NEW MATERIALS AND TECHNOLOGIES, PRAHA

COUNTRY : CZECH REPUBLIC

Profile :
CRDMT was established to provide all possible support for research in the area of new materials and technologies. The Centre associates the most important part of materials research units(at the present time 19) in universities, institutes of the Academy of Science and organizations closely linked to the production sector, thus covering the area of both fundamental and applied research. Founded in 1994, it interlinks collective members of CSNMT (Czech Society for New Materials and Technologies) who showed interest in joint participation in the solution of research projects, exchange of various information (including education in the field of materials science and engineering), advisory and consultancy activities, etc.

Activities :

- Research and development in the field of materials science and engineering (joint research projects), information support for research and study programmes and projects of institutes and universities (creating and making accessible databases about research and developments units, programmes and projects under solution, available instruments, facilities and places for study - or work-oriented stays in research establishments, etc.)
- Service provided to industry (counseling and consultancy activities, offering research infrastructure, scientific service, technology transfer, dissemination of information concerning new advanced materials and technologies, etc.)
- Other activities (joint organization of national and international conferences, support and promotion of tuition in materials science and engineering at universities, including doctoral studies, etc.)

Expertise on following materials :
Thanks to the structure of CRDMT, the expertise covers nearly all engineering materials**.**

Actual research domains concerning materials technology / Competences :

- **Faculty of Mechanical Engineering, BUT BRNO**
  - Development of research techniques(optical tomography, holographic and confocal microscopy, optical diffraction and optical image processing, contactless measurement of the surface quality,etc.)
  - Structure and properties of aluminium and magnesium alloys
  - Nanomaterials and nanotechnologies

- Etching and modification of solid surfaces and thin films by broad ion beams. Design and application of UHV apparatus for direct deposition of ultrathin films by focused ion beam. In-situ analysis of surfaces and deposited films. Building-up of research techniques or design of apparatuses: Time-of-flight-low-energy-ion-spectroscopy (TOF LEIS), secondary-ion-mass-spectroscopy (SIMS), X-ray photoelectron spectroscopy (XPS), scanning tunneling/atomic force microscopy (STM/AFM) in UHV conditions, surface structure determination by low-energy-electron-diffraction (LEED). Preparation and investigation of nanostructures by STM/AFM.
- Mechanical properties and structure of materials. Ab initio approaches to determination of elastic and magnetic properties of crystals. Multiaxila fatigue of metallic materials. Quantitative fractography by means of stereogrammetrical methods. Cracks/microcracks behaviour in selected composites with brittle matrix.
- Structure and properties of aluminium and magnesium alloys and composites
- Nanomaterials and nanotechnologies(ceramics)
- Kinetics of carbides precipitation in Cr-Mo steels
- The modelling and experimental study of structural stability of modern heat resistent steels and their weldments

- COMTES FHT,Ltd. Plzeň

- Numerical simulation of forming
- Physical simulation of forming
- Mechanical properties of metals
- Metallography
- Forming tool properties
- Microforming
- Image analysis
- Heat treatment
- Thermomechanical treatment

- Faculty of Electrical Engineering, Czech Technical Univ., Praha

- Electrically conducting composite plastic materials,
- Solar cells prepared from organic materials,
- Thin layers (mainly by vacuum evaporation),
- Materials for the new electromechanical transducers for nanoelectromechanical systems (NEMS).

- Institute of Plasma Physics, Academy of Sciences of Czech Republic, Brno

- Plasma spraying of coatings and free standing bodies
- Characterization of plasma sprayed materials
- Properties of plasma sprayed materials
- Materials for fusion applications

- Faculty of Metallurgy and Materials Engineering, VSB-TU Ostrava

- Continuous casting
- Nickel Super Alloys INCONEL base
- Sulphide Stress Cracking
- Corrosion Resistance of High Alloy Materials in the Passive State
- Fracture Toughness of Ceramics Cutting Tools.

- ŠKODA RESEARCH,Ltd. Plzeň

- Investigation of Material Behaviours
- Metallurgical research
- Standard Tests of Vehicles
- Fatigue Life Assessment
- Noise and Vibration Measurement
- Electrotechnical Testing
- Computer Simulation
- Computational Fluid Dynamic
- Application of Thermal Spraying Technology

- Department of Materials and Metallurgy, Faculty of Machine Engineering, West Bohemian University, Plzeň

- Physical metallurgy of alloy steels
- Thin film coatings of steels and polymers
- Numerical modelling of forging processes

- Aicraft Research and Testing Institute, Praha-Letňany

- Static and fatigue characteristics of materials in normal conditions or in heat/low temperature and humidity conditions
- Crack propagation, fracture mechanics

- SVÚM,Co., Praha

- Structure analysis of metals, polymer and composites
- Testing of materials in accredited labs – metals, polymers, composites coating, surface treatment

- Institute of Thermomechanics, Academy of Sciences of Czech Republic

- Nondestructive material characterization and diagnostics (acoustic emission, ultrasound, guided waves, crystal acoustics, acoustic microscopy, ultrasonic spectroscopy and nonlinear acoustics)
- Development of novel acoustic, ultrasonic, optical methods
- In situ techniques
- Physical properties of phase transforming materials
- Shape memory alloys
- Smart structures and composites
- Functional materials and actuators

- Faculty of Mechanical Engineering, Technical University Liberec

- Characterization of metals and non-metallic materials (composites, intermetallics)
- Surface Engineering – coatings nanolayers, RF PVD deposition, diamond-like carbon (DLC), nanocrystalline diamond (NCD), TiO_2 layers
- Testing.of properties thin layers (biocompatibility (endo-prosthesis), barrier coatings – thermal and wear resistant, tribological properties,
- TD (non destructive testing)

- VÚHŽ,Co. Dobrá

- Measurement of molten steel level in granulator during continuous casting
- Coated tools with long service life

- Production of special equipment for metallurgical plants, foundries and machine plants
- Centrifugal casting
- Manufacturing of special rolled shapes from steel and non-ferrous metals
- Material testing and expertises

- Research and Development Division, Vítkovice,Co

- Physical metallurgy of steels
- Materials engineering
- Advanced forming technologies
- Fatigue and fracture behaviour of steels
- Production of special ingot steel
- Chemical analyses of metallic materials
- Secondary metallurgy research

- Technology Innovation Centre, VÚK, Panenské Břežany

- Applied research and development of non-ferrous alloys
- Development of lead-free non-ferrous alloys
- Development of production and processing technologies of non-ferrous metals
- Testing and analyses of metal materials
- Development of thermo-mechanical heat treatment of non-ferrous alloys
- Technology transfer
- Development of metal and alloy data-bases

- Department of Physics of Metals, Faculty of Mathematics and Physics, Charles University, Praha

- Mechanical properties of metals and alloys
- Properties of magnesium and aluminium alloys
- Properties of intermetallics
- Acoustic emission
- Electron microscopy
- Thermophysical properties of materials

- Institute of Physics of Materials AS CR, Brno

- Creep, high-cycle and low-cycle fatigue, creep-fatigue interaction and other types of mechanical loading
- Brittle fracture and fracture mechanics
- Processing, microstructure and mechanical properties of ultrafine-grained metals and alloys
- Dislocation substructure, recovery and recrystallization of metallic Materials
- Thermodynamic, diffusion and magnetic properties
- Microstructure of phases
- Particle and fibre-reinforced metal-base composites and nanocomposites.

- Faculty of Nuclear Science and Physical Engineering, Czech Technical University Praha

- Fractography
- Fractographic Reconstitution of Fatigue Crack History
- Failure Analysis

- Testing of Mechanical Properties
- Damage Processes of Thermally Sprayed Coatings
- Numerical Modelling of Stress and Strain Fields in Failure Processes
- Advanced materials – Intermetalics, Ceramics, Composites etc.

- Faculty of Mechanical Engineering, Czech Technical University Praha,

- Structure and mechanical properties of wrought and cast HSLA steels.
- Development of new testing methods for diagnostics of metallic materials.
- Processing and properties of advanced magnesium alloys.
- Optimization of constitution and heat treatment of tool steels made by powder metallurgy.
- Carbon – carbon composites for bioengineering.
- Research on polymeric and composite materials for automotive applications.
- Development of materials for custom-fit products.
- Development of polymer composite materials for high performance machining systems.
- Damage and durability of thermoplastics polymer nanocomposites.
- Recycling processes for engineering plastics.

- Institute of Physics, Academy of Sciences of Czech Republic

- Fundamental processes of crystal growth, phase transformations and plastic deformation
- The properties of intergranular and interphase boundaries, grain boundary
- Migration and segregation, interfaces in shape memory materials, the impact of interfaces on deformation processes and transformation reactions
- Preparation of oriented single crystals and bicrystals with fully characterized boundaries
- Characterization of thin layers, quantitative phase analysis
- In situ deformation in TEM
- Multi-scale modelling of material properties for the interpretation of experimental findings spanning from the models based on the anisotropic continuum to the atomistic simulations

Available research infrastructure :

As is clear from the above mentioned profile, CRDMT serves as a kind of Centre for 19 units**,** each with its own research infrastructure (see also their web sites).

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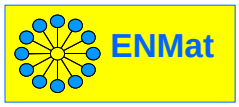

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