**Regional materials science and technology centre (RMTVC) – Research Programmes**

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| **Research programme:  1. Development and optimisation of new technologies for preparation of high-purity materials, special metal alloys and inter-metallic compounds with a defined structure and physical properties for applications in electronics, medicine, engineering and chemical industries.** |
| **Objectives (focus, user groups):**  The program aims to build research infrastructure of laboratories of the department of Preparation of materials and scientific-research teams that will develop, prepare and optimise the properties of advanced materials and technologies of their preparation for application sphere. Department of preparation of material consists of the "Laboratory of clean metals" and "Laboratory of special materials.  **User groups:** enterprises in electrical engineering, electronic industry, vacuum technology, research institutes and universities, processors of materials for high-temperature applications, dental, orthopaedic laboratories, teaching hospitals, producers and processors of non-ferrous metals and their alloys (brass, bronze, aluminium alloys, nickel alloys , lead-free solders) for various applications in engineering, energy, transport, medicine and elsewhere. |

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| **Research programme:  2. Development and optimisation of processes of powder technologies for manufacture of selected types of materials and products** |
| **Objectives (focus, user groups):**  The project aims to build a research infrastructure of laboratories of the department of Powder technologies and scientific-research teams that will develop, prepare and optimise the properties of advanced materials and technologies for their preparation for application sphere.  **User groups:** producers of magnetic materials, manufacturers of magnetic components for electric drives and generators, manufacturers of electric drives for traction systems, manufacturers of medical devices, test equipment, actuating mechanims, manufacturers of electrical equipment, automotive industry, manufacturers of friction materials. |

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| **Research programme:  3. Management of specific properties of intensively rolled and thermo-mechanical treated materials with use of their structural potential** |
| **Objectives (focus, user groups):**  The aim is the managed achievement of very fine micro-structures of metallic materials in technological conditions of rolling and drawing, which will entail the acquisition of outstanding, or precisely defined mechanical and other service properties of the formed prod.  **User groups:** rolling mills producing long and flat products the alloys of iron and non-ferrous metals, tube rolling mills, wire drawing mills, subjects involved in applied research of material aspects of forming, using special possibilities of thermo-mechanical processing of metallic materials. |

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| **Research programme:  4. New sources of strength and toughness of materials for high technological** **applications** |
| **Objectives (focus, user groups):**  The objective of this program is development of new design methods, modelling and evaluation of the safety and reliability of steel structures affected by degradation processes, namely as a result of the very quick dangerous brittle fracture, fatigue of the material caused by alternating stress or as a result of the large plastic deformation elicited by creep. Part of the program is also the development of new methods for evaluation of the depth profile of chemical composition and microstructure, behaviours of surfaces and surface layers, namely under conditions of corrosion processes. The infrastructure of laboratories for investigation of microstructure, mechanical and physical properties of new materials developed by RMSTC will be built within the framework of the solution.  **Group of users:** metallurgical corporations, companies of heavy and light machinery, companies of electronic industry, research institutes and universities, structures planning and design laboratories and development working places applying new innovative trends in design of steel structures, tube systems and pressure facilities. |

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| **Research programme:  5. Research on nano-structured materials** |
| **Objectives (focus, user groups):**  The aim is to qualify appropriate optical, magneto-optical and magnetic methods (spectral ellipsometry, ellipsometry with the total reflection, magneto-spectroscopy, magnetic microscopy, SPR, FTIR and magneto-optical vector magnetometry) for non-destructive, rapid and accurate geometric and material diagnosis of nano-structures. The main objective is to define the optimal parameters of nano-structures and nano-systems for application outputs (optical filters, deflectors, modulators, sensors of physical quantities).  **User group:** it is formed by the companies, which apply the nano-structured materials in optical, mechanical engineering and material industry and in defectoscopy: TÜV Ostrava, Opava TLO, IC Litewaves Halifax, SGR Paris, APC Prague, Liberec Preciosa, Arcelor Mittal, etc. |

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| **Research programme:  6. Experimental verification of new technological processes for metal materials with higher qualitative parameters.** |
| **Objectives (focus, user groups):**  The program aims to build the research and development infrastructure of the department of Experimental verification of technologies and applications and scientific-research teams that will research, develop and apply new technological processes for metallic materials with higher qualitative parameters. The department of Experimental verification of technologies and applications consists of the "Laboratory for experimental verification of technologies for production of new materials" and "Laboratory for modelling of processes in liquid and solid phases”.  **User groups**: enterprises of metallurgical, foundry, mechanical engineering, automotive and power industries. |