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X-RAY AND NEUTRON DIFFRACTION AT CZECH TECHNICAL UNIVERSITY IN PRAGUE

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Any technical university who aims to deliver results worth top class research cannot exist without both X-ray and neutron diffraction laboratories. Czech Technical University (CTU) in Prague is no exception and the role of such facilities is fulfilled by two labs which form a core of Department of Solid State Engineering of the Faculty of Nuclear Sciences and Physical Engineering. The history of these workplaces can boast with such names as prof. Adéla Kochanovská and prof. Ivo Kraus who both belong to pioneers of residual stresses investigation by means of X-ray diffraction in former Czechoslovakia.

Due to the broad scope of tasks being solved at all faculties of CTU during the last half a century, the staff had to face and cope with truly challenging and, indeed, interesting engineering issues. Yet, the very name of the faculty provides ample hints as where its main focus has been directed. The rise of nuclear industry in Czechoslovakia relied not on the faculty as for its main source of specialists in power plants operators and nuclear reactors designers, but also of a provider of nuclear industry consultancy, maintenance, testing, research and development. Since nuclear power plants and aerospace industry are considered by many as the *crème de la crème* of mechanical engineering, both laboratories broadened their horizons significantly by cooperation with practically all major mechanical engineering industrial companies in the Czech Republic and Slovakia.

Applications of neutron diffraction in condensed matter research in the neutron diffraction laboratory of CTU cover the range from location of light atoms and cation distributions to magnetic structures and phase transitions. Magnetic ordering characterization, as well as the control of the technologic processes of chemical catalysts (faujasites), structure analysis of high temperature superconductors,

three-dimensional quantitative texture analysis and non-destructive analysis of macroscopic residual stress of metals and alloys belong to the main tasks that are being solved.

X-ray diffraction laboratory has the reputation for being the leading workplace for X-ray diffraction tensometry in the Czech Republic and as such it has strived to meet the growing demands for knowledge of surface and depth distributions of macroscopic and microscopic residual stresses resulting from wide range of material manufacturing and surface treatments. These requirements by their nature claim, often tedious, job of surface and depth mapping and hence either frequent presence of goniometer operator or measurements automation. The choice of the latter attitude has materialized in a system with six degree of freedom, distance determination by triangular laser with 5 μ m precision and homemade programme for the entire system controlling. During the last decade, the laboratory participated on numerous projects and grants. In order to offer just a brief notion, the most interesting are listed in the following.

Investigation of Microstructure and Physical Parameters of High-Technology Treated Solid Surfaces (National Science Fund, Ministry of Education and Science of Bulgaria), *X-ray diffraction research of laser hardening* (GAČR 106/95/0080), *State of surface residual stress induced by cutting* (GAČR 101/96/1181), *Investigation of surface hardening technologies and their effects on the creation of residual stresses, their measuring and evaluation* (MPO FT-TA/06 č. OV60400086), *Surface integrity as a tool for increasing utility properties of products manufactured by machinery made by TOS Varnsdorf a.s.* (MPO FT-TA4/0125).