FZU
Institute of Physics of the Czech Academy of Sciences

SEMINAR

25. 06. 2021 | 14:00

Seminar hall
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Surface Integrity of Meso-sized Components in Laser Shock Peening

Micro and miniature components are vital players in manufacturing industries, especially in aerospace, automobile, electronics, telecommunications, information technology, and medical industries. The high demand for smaller and useful appliances, machines and parts in worldwide economies are increasing quickly and steadily owing to their modest volume, lightweight, portability and stable efficiency. The residual stresses caused by micro-manufacturing procedures or surface modification methods in micro and miniature parts or components plays a significant role in assessing their service life. Most of the micro-manufacturing processes such as micro-milling, micro-powder injection technology, micro-molding, extrusion, micro-stamping, additive manufacturing (3D printing) etc., are not able to produce the required residual stresses in substrate material and they eventually result in lowering the fatigue life of the developed components. The micro-manufactured components working under high temperature and corrosive environments such sensors, nozzles, valves, and sensors mostly fail due to fatigue.

The post processing's of the micro-manufactured products by mechanical means (such as heat treatment and shot peening) also considered as a challenging task due to their small size, lower material availability, risk of thermal damages and mechanical distortions. Laser shock peening (LSP), or laser peening, is an efficient technique to enhance the resistance of micro-manufactured parts to damage by foreign objects and improve the fatigue life. LSP has potential to improve the mechanical and metallurgical properties of micro and miniature parts due to its *capabilities of deep penetration, better surface quality aspects, and unaltered geometry of the treated components*. In the present work LSP has been planned for meso-sized spur and helical gears. The details of gear, its essential characteristics and planning for improving its surface integrity and quality has been presented.

This event is supported by ESIF and MEYS
(Project **FZU International Mobility MSCA IF IV** – CZ.02.2.69/0.0/0.0/20_079/0017754)

EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research,
Development and Education

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