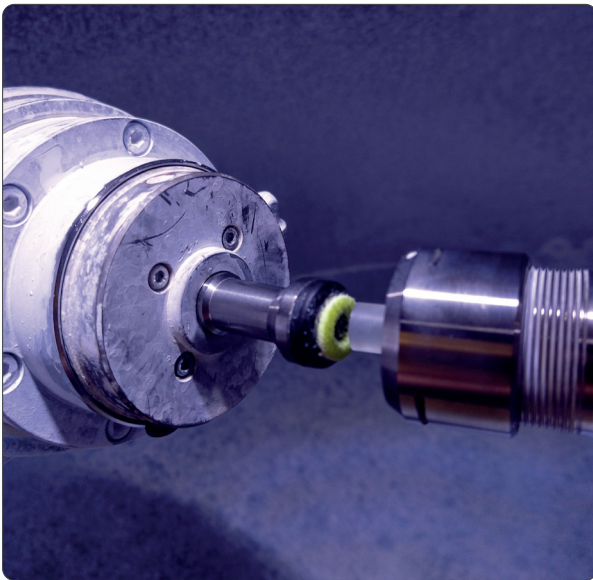


Project number: TN01000008
Provider: Technology Agency of the Czech Republic
Program: NCK 1 Center of Electron and Photonic Optics
Realization period: 1st September 2018 – 31st December 2020

Project Name:

Laser Rod Face Characterization and 3D Corrective Micropolishing Process Development



The Sub-project solved within NCC1 aims at solving a current problem associated with the production of high-quality laser rods, where an uneven distribution of refractive index within a crystal appears during the growing, which reduces the resulting product quality. A team consisting of experts from the TOPTEC Center, the Institute of Scientific Instruments of the CAS, Crytur, spol. s r.o., and Meopta - optika, s.r.o. decided, based on an analysis of the current state, to develop a process of 3-D micromachining of laser rod faces, which can be used for compensating the shape of a transmitted (deformed) wave surface. The main difficulties encountered by the chosen method of solution are the need for precise shape and refractive index distribution characterization, the high hardness of the YAG material, and the small diameter of the corrected bar face requiring very accurate referencing and miniature correction spots.

The Sub-project is realized in the following three phases:

- characterization of refractive index distribution inside a laser rod and characterization of the shape of the laser rod faces,
- development of rod planar face surface corrective micropolishing with repeatability better than $\lambda / 8$ RMS using contact tools,
- development of rod planar face surface corrective micropolishing with repeatability better than $\lambda / 8$ RMS using non-contact tools,
- is expected that the Sub-project will result in Verified Technologies of 3-D corrections by means of both contact and non-contact tools. Moreover, the development of Functional Samples of a contact and a non-contact correction tool is intended. The knowledge gained during the project solution is continuously published in the literature:
- O. Matoušek, F. Procháska, J. Kredba, „Laser rods characterization by Fourier transform phase-shifting interferometry,“ Proc. SPIE 11385, Optics and Measurement International Conference 2019, 113850C (30 December 2019); doi: 10.1117/12.2547487