

Fully Funded EPSRC PhD Case studentship.

Project Title: Design and manufacture of freeform functional surfaces in novel optical materials

Ultra-precision diamond machining including turning, milling and various tool servo-based machining processes enables the adventurous design and fabrication of freeform surfaces of nearly arbitrary complexity. To achieve this, it requires the accurate transformation of optical functions to surface geometrical specifications, and the dynamic conditions encountered in machining process must be predicated and well controlled.

The aim of this PhD research project is to broaden the knowledge of design and manufacture of freeform surfaces in novel optical materials. A systematic research work will be conducted on freeform manufacturing such as optical function design, machining process modelling and optimisation, surface integrity and quality control. In particular, to overcome the limitations of conventional CAD&CAM packages on freeform optics, an analytical strategy will be developed for optical functional design, toolpath generation, pre-process error mapping and compensation of tool servo-based machining operation errors. Case studies will be designed and carried out to demonstrate the capability of developed machining technologies, for example the manufacturing and functional test of several freeform optics such as focus tunable lenses (e.g. Alvarez lens pair) and multiple freeform optics (e.g. the primary and tertiary mirrors of an imaging spectrometer).

Eligibility: The student must have a high-grade qualification, at least the equivalent of a UK 1st or 2:1 class degree or MSc with distinction in Physics, Engineering or related disciplines. The student must be proficient in both written and spoken English, and possess excellent presentation and communication skills.

Salary: £15,285 (2020/21 EPSRC Standard)

Contact:

Dr Zhen Tong
Senior Research Fellow
Future Metrology Hub
Centre for Precision Technologies
University of Huddersfield

Tel: 01484 473537

E-mail: z.tong@hud.ac.uk