Fully Funded EPSRC PhD Case studentship.

Project Title: Towards Metrology Systems on-a-Chip Using Photonic Integration

The size and cost of measurement systems is a major limitation in the application of metrology across many areas of precision manufacturing. This problem is becoming more relevant than ever as manufacturing systems evolve towards an increasingly digitalised and autonomous model of operation, where system are self-monitoring and self-correcting. This context is leading to an increasing need for a more integrated 'on-machine' approach to metrology systems. Currently optical measurement in a typical manufacturing environment is usually carried out 'off-line' using dedicated instrumentation which is large and expensive. Even where efforts have been made to miniaturise and integrate measurement technology, the underlying construction of sensors and instrumentation is still overwhelming based on a bulk optics approach, which has large component and assembly/alignment costs. Integrated photonics technologies are offer a potential solution to the challenge of developing low-cost sensors capability, but currently development in this area is overwhelming driven by the needs of the telecommunications industry.

This PhD project will investigate routes to the creation of optical metrology systems on-a-chip, where photonic integration will be used to develop a miniaturised broadband interferometry system comprising light sources, detectors and other necessary sub-components, to achieve low-cost miniaturised sensors for the measurement of surface topography, layer thickness and position/displacement. The project will involve optical design and modelling of components both in-air and in-waveguide. A working knowledge of optical metrology techniques will be necessary to feed into the design and development of the integrated photonic device. The evaluation of electrical and optical performance evaluation of all developed photonic sub-components will also be an important activity. This will lead ultimately to complete systems integration, validation and a prototype device. These latter activities will require the development of signal processing and calibration techniques

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. Applicants must meet standard EPSRC eligibility criteria for studentships, full details can be found at https://epsrc.ukri.org/skills/students/help/eligibility/

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

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