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**CDT-ACM PhD Project 2019**

**Project Title: In situ measurement of strains induced during Laser Shock Peening**

**Project Supervisors:**

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**Short Description**

Laser shock peening uses laser-driven shocks to plastically deform a surface and induce a deep (>2mm) compressive residual stress in a component surface, making it much less vulnerable to e.g. crack initiation in fretting fatigue of titanium jet engine fan blades. Recent progress on laser technology opens the possibility to tailor the shape of the laser pulse to minimise the amount of plastic strain produced and hence the vulnerability to e.g. O ingress and attack related to the plastic strain field. In addition, modelling technology has advanced since the technology was first introduced in the late 90s and the advent of XFELs has enabled diffraction measurements to be performed much faster (100ps) than the travel speed of the shock, allowing the stress wave produced to be measured in situ.  In this project we will measure the stress eave using the new STFC laser being placed at the European XFEL in Hamburg, model the shock and examine how to tailor the stress state produced and plastic strain profile.