Faculty of Engineering
Summer Research Program 2019-2020

Project Title: The effect of defect size and type on fatigue life of Hastelloy X made by Selective Laser Melting

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Objective

1. Optimising processing condition of SLMed Hastelloy X and leave minimal roughness on component surfaces.
2. Optimising processing condition to minimise internal porosity or eliminate unmelted powders in SLMed material and component.
3. Understanding the relationship between processing conditions and cracks, porosity, microstructures and fatigue properties and establishing fundamental mechanisms for the phenomena observed.

Project Details

Selective laser melting (SLM) is a technology which can be used to build ready-for-use 3D components from their computer designs in one step. This process offers enormous benefits for complex component design or for fabricating small batches of components and it is hence being actively pursued by aerospace and defence companies. However SLM process is not as simple as it seems and it requires extensive research to keep the fabrication continuous and meet the specifications in terms of dimension accuracy, surface roughness and mechanical properties. Fatigue life of SLMed parts are strongly influenced by processing-related defects such as rough surfaces and unmelted powders.

The skills that will be gained through this project include: usage of the software for the design of supporting structures; operating EOSM290 laser powder bed machine; Optical microscope for examining microstructures;

Prerequisites

Additional Information