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Proposed Project for MECH 493: Introduction to Academic Research

Development of a Laser Based Manufacturing System for 3-D Printing of Metal Parts

Background: Additive manufacturing (also known as 3D printing) has been the new trend in manufacturing of metallic components with complex geometries, such as impeller blades in aerospace engine components, or dies and molds with complex cooling channels. Figure 1 shows some typical metal parts which are achieved by additive manufacturing process.

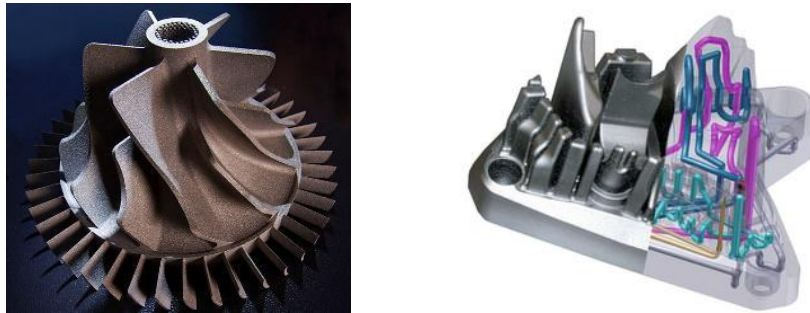


Figure 1 Typical metal parts made by additive manufacturing [1, 2].

Project Description: This project will focus on system integration to achieve a lab-based additive manufacturing machine, which is able to perform deposition of metal powders layer-by-layer using laser beam to produce the parts. The key components which are currently available at UBC include a laser generator, laser beam optics, deposition head, cooling system, and powder feeder. Necessary mechanical and electric components will be designed and fabricated to enable the control of the laser power and powder delivery from the central control system. Students who have backgrounds in Mechatronics and are interested in Manufacturing are encouraged to apply. The project will involve the integration of the existing parts to enable the operation of the system, and analyze how the process conditions influence the part quality.

[1] <https://www.mmsonline.com/articles/the-magazine-about-additive-manufacturing-of-functional-parts>

[2] <https://www.renishaw.com/en/industrial-applications-of-renishaw-metal-additive-manufacturing-technology--15256>