

# *Mechanical and Aerospace Engineering Seminar*

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**Dr. Ajit Achuthan**  
**Mechanical and Aerospace Engineering**  
**Clarkson University**  
Will present a talk titled:

## **Additive Manufacturing (AM) of metals and alloys: Looking beyond complex geometries to complex material design**

### **Abstract:**

In this talk, I will argue for changing from the current mindset that treats Additive Manufacturing (AM) simply as a technology for manufacturing parts of complex geometries to envisioning AM as an advanced design and manufacturing tool. AM began its journey three decades ago as a rapid prototyping technology, a rather mundane application, but has recently gained interest as a promising technology for the manufacture of load bearing structures. The primary reason for this interest is the nearly infinite freedom AM offers for the geometry of the part. However, controlling the process parameters to achieve good mechanical properties in terms of uniform, repeatable, and defect-free microstructure has become a major challenge. This is because of the high sensitivity of the microstructure, and therefore, the mechanical properties, to process parameters. As a result, most of the current R&D activities in AM are focused on improving the process to achieve a material quality that match a typical conventional manufacturing process.

The objective of this talk is to demonstrate that the current geometry-driven approach limits the scope of AM technology and to propose a new holistic approach that combines geometry and material design. I will start with background on the influence of microstructure on mechanical properties of DED manufactured 316L specimens and present a concept of load bearing structures with spatially tailored properties. Then, I will give an overview of various technologies developed by our group to leverage AM as a design and manufacturing tool. The technologies include a suite of advanced computational models and novel experimental techniques. Finally, I will demonstrate how our new models and techniques can help change to the proposed new holistic mindset by presenting a case study of the mechanics of deformation in hierarchical material systems.

**Date: March 25, 2022**

**Location: CAMP 176**

**Time: 11:00 am**

**ZOOM Link for virtual attendance**

<https://clarkson.zoom.us/j/94333678632?pwd=b25DRlY3STRkak9iNGFmMUY1UjNPZz09>

Meeting ID: 943 3367 8632

Passcode: 743721

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**Bio:** Dr. Ajit Achuthan is an Associate Professor at the Department of Mechanical and Aerospace Engineering at Clarkson University. He is also the president and the founder of Additive Manufacturing Innovations LLC, an R&D startup company located in Potsdam, NY. Dr. Achuthan graduated with a PhD from Purdue University. After his PhD and a short Postdoc stint at Purdue, Dr. Achuthan joined General Electric company (GE) in 2004 as a research engineer at GE's Global Research Center in Albany. In 2009, Dr. Achuthan joined Clarkson University as an Assistant Professor, and was promoted to Associate Professor in 2015. His research focus is on additive manufacturing of metals and alloys. He has five patents and over 30 publications in peer reviewed journals. His research is primarily funded by the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), and National Institute of Standards and Technology (NIST), U.S. Naval Research Laboratory (NRL), and New York State Energy Research and Development Authority (NYSERDA). Dr. Achuthan has received visiting faculty fellowships from NASA and NRL. He has also served as a member of the steering committee to develop a report on the Status of and Vision for Additive Manufacturing Ecosystem in New York State – an initiative by NYSERDA