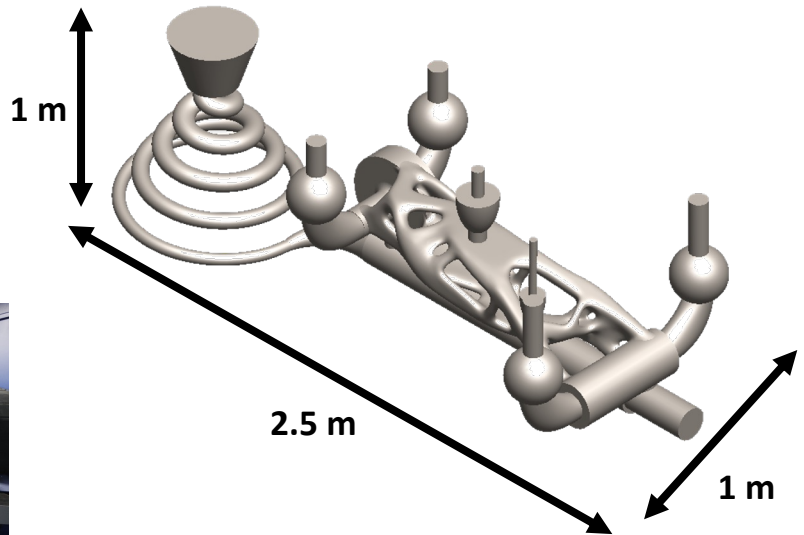# THE UNIVERSITY OF MAINE

The Knowledge & Innovation for Next Generation (KING) Manufacturing Lab

Leadership:

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The **K**nowledge & **I**nnovation for **N**ext **G**eneration (**KING**) Manufacturing Lab investigates experimental and computational manufacturing to revolutionize how we produce durable goods for improved sustainability, with a specific focus on large-scale additive and convergent manufacturing. One of the major questions we're solving is how to achieve the benefits provided by additive manufacturing (AM) (i.e., topology optimization, lightweighting, part consolidation, internal geometries) in large-scale metal components. Current metal AM processes run into issues as they increase in scale due to build volume restrictions, raw material costs, and increased thermal stresses. In the KING Manufacturing Lab, we are tackling this question from two different directions. First, on the additive side, we are studying part design and toolpath planning strategies for the Directed Energy Deposition (DED) AM process to better understand how changes in these strategies impact thermal stresses and microstructure as print size increases. We are also studying convergent manufacturing techniques by combining AM with metal casting to produce large-scale complex metal components. Using AM to fabricate molds facilitates complex AM geometries, while metal casting is already a proven method to produce large-scale components. Our current research for this project focuses on creating a new process to better manufacture the large molds required for these castings while still retaining the design freedom of AM.

We are actively looking for graduate RAs and undergraduate researchers. Please reach out via email or stop by my office in Ferland EEDC 218