



## Designer-Centered Approaches to Digital Design for Manufacturing and Sustainability

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Room 2540 GGB

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#### **Abstract:**

The potential of digital manufacturability analysis systems to speed up product development, promote sustainability, and reduce manufacturing failures is evident, but practitioner acceptance remains uncertain. Current design for manufacturing and design for sustainability methods are not

easily integrated into designers' workflows due to lack of automation, incompatibility with early design phases, or high system cost. In short, there is a mismatch between designer needs for early, rapid manufacturing and sustainability feedback and current system capabilities. My work seeks to enhance the collaboration between designers and digital design tools by deepening current understanding of designers' needs, experiences, and decision-making processes in digital product development. I will describe the design and development of MATLAB- and Python-based analysis tools that use predictive models to provide part-specific feedback on manufacturability and environmental impact for additive manufacturing processes. Integration of these tools into experiments with designers provides insights on designer acceptance, the impact of digital tools on design performance, and designers' responses to different sustainability metrics. I will detail two recent research thrusts, focusing on applications in laser powder bed fusion and polymer material extrusion. Preliminary findings highlight the potential of interactive analysis tools to spur designer creativity through simultaneous exploration of design and manufacturing objectives and constraints.

**Bio:**

Hannah Budinoff is an Assistant Professor of Systems and Industrial Engineering at the University of Arizona. She holds a Ph.D. and M.S. in Mechanical Engineering from UC Berkeley and a B.S. in Mechanical Engineering from the University of Arizona. Her research interests include automated geometric manufacturability analysis with a focus on additive manufacturing processes, design and development of design support tools, and engineering identity and design skill development. Budinoff actively collaborates with government, academic, and industry researchers supported by funding from a range of sources including NSF, NIST, and DoD agencies.

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