

Lindsey B. Bezek

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Objective

Attain an engaging career in additive manufacturing to gain continued experience, advance the field, and contribute to the betterment of society.

Education

Virginia Polytechnic Institute and State University

Ph.D. candidate, Mechanical Engineering, expected graduation: May 2022

B.S., Mechanical Engineering, 2017

- Magna Cum Laude
- Honors Baccalaureate Diploma

B.A., Music: Vocal Performance, 2017

- Magna Cum Laude
- Honors Scholar Diploma

Work Experience

Virginia Tech's Design, Research, and Education for Additive Manufacturing Systems (DREAMS) Lab

Graduate Research Assistant (Aug. 2017-present)

- Collaborated with the Virginia Tech Department of Civil and Environmental Engineering to assess particle filtration efficiency of additively manufactured respirator designs
- Collaborated with the Virginia Tech School of Medicine and Carilion Research Institute to use multi-material jetting to fabricate realistic structural heart models from computed tomography scans of patients
- Collaborated with the Virginia Tech Department of Chemistry to develop tissue-mimicking materials to be used in realistic heart models
- Characterizing the fracture energy at the interface between polypropylene-like and elastomer-like material jetting polymers within a single build
- Exploring how designed multi-material interfaces can improve fracture energies, which will lead to designing to maximize the interfacial strength between polymers with dissimilar properties

Undergraduate Researcher (June 2014-May 2017)

- Contributed to the development of a first-of-its-kind multi-tool additive manufacturing system that combines binder jetting, material jetting, vat photopolymerization, and multiple extrusion technologies on one platform to expand additive multi-material capabilities
- Performed tensile tests and characterized material properties of multiple rigid and flexible material jetting polymers under various orientation and aging conditions
- Designed and material jetted multi-material samples used to study the interface between adjacent regions of rigid and flexible polymers
- Determined process parameters to print a carbon-based material via binder jetting
- Maintained active involvement in lab outreach events by providing lab tours and interacting with the public at campus-wide science events

National Aeronautics and Space Administration (NASA) Langley Research Center

Intern, Advanced Materials and Processing Branch (May-Aug. 2018)

- Designed innovative electric motor components using design for additive manufacturing (DfAM) strategies

National Institute of Standards and Technology (NIST)

Pathways Intern, Engineering Laboratory: Intelligent Systems Division (Dec. 2015-2018)

- Interpreted data sets from multiple studies of residual stress in nickel alloy 625 manufactured with laser-based powder bed fusion
- Used laser interferometry for precision measurement of a binder jetting process
- Assisted with the design and manufacture of custom parts to hold optical equipment that will be used for in-situ part monitoring in the laser-based powder bed fusion process

Summer Undergraduate Research Fellow (May-Aug. 2013, 2015)

- Designed and executed an experiment to quantify residual stress in nickel laser-based powder bed fusion parts of different geometries
- Interacted with researchers in other NIST labs for project collaboration
- Utilized library resources to perform a thorough literature survey
- Developed a method for process-intermittent measurement of binder jetting to foster process monitoring and feedback control methods for the powder bed fusion process

Awards and Recognitions

- Virginia Tech's TECH Together Campaign Phase I Finalist (2020)
- Secretary for the National Science Foundation and Air Force Office of Scientific Research Joint Workshop on Mechanics-Based Design of Intelligent Material Systems by Multimaterial Additive Manufacturing, 22nd International Conference on Composite Materials, Melbourne, Australia (2019)
- Davenport Leadership Scholar (2019)
- National Science Foundation Graduate Research Fellowship Program Recipient (2018)
- New Horizon Graduate Scholar (2017)
- George H. and Gladys H. Cunningham Scholarship (2017)
- 2nd Place in the American Society of Mechanical Engineers (ASME) Student Manufacturing Design Competition (2017)
 - Represented senior design team at the Manufacturing Science and Engineering Conference at the University of Southern California, Los Angeles, CA
- National Science Foundation Graduate Research Fellowship Program Honorable Mention (2017)
- Glen Salmon Scholarship for Multidisciplinary Studies (2016), first ever recipient
- Virginia Tech finalist for the Barry M. Goldwater Scholarship (2016)
- Best Poster Presentation at the Solid Freeform Fabrication Symposium (2015)
 - Selected from 33 poster presentations
- Finalist in the Additive Manufacturing Vehicle Design Grand Challenge (2015)
- Joe D. Simmons Metrology Scholarship (2015)
- Presidential Global Scholar (2014)

Peer-Reviewed Publications and Textbook Chapters

- **L. B. Bezek**, J. Pan, C. Harb, C. E. Zawaski, B. Molla, J. R. Kubalak, L. C. Marr, and C. B. Williams, "Additively Manufactured Respirators: Quantifying Particle Transmission and Identifying System-Level Challenges for Improving Filtration Efficiency," *Journal of Manufacturing Systems* (2020)
- **L. B. Bezek**, M. P. Cauchi, R. De Vita, J. R. Foerst, and C. B. Williams, "3D Printing Tissue-Mimicking Materials for Realistic Transseptal Puncture Models," *Journal of the Mechanical Behavior of Biomedical Materials*, Vol. 110 103971 (2020)
- C. B. Williams and **L. B. Bezek**. "Material Jetting of Polymers" *ASM Handbook Volume 24: Additive Manufacturing Processes*, edited by D. Bourell, W. Frazier, H. Kuhn, and M. Seifi, ASM International, 2020.
- I. Q. Vu, **L. B. Bass**, C. B. Williams, and D. A. Dillard, "Characterizing the Effect of Print Orientation on Interface Integrity of Multi-Material Jetting Additive Manufacturing," *Additive Manufacturing*, Vol. 22 (2018)
- **L. Bass**, J. Milner, T. Gnäupel Herold, S. Moylan, "Residual Stress in Additive Manufactured Nickel Alloy 625 Parts," *Journal of Manufacturing Science and Engineering*, Vol. 140 No. 6. (2018)
- G. W. Wagner, **L. B. Bass**, D. A. Rau, S. B. Ziv, M. S. Wolf, D. L. Wolf, Y. Bai, V. Meenakshisundaram, and C. B. Williams, "Design and Development of a Multi-Tool Additive Manufacturing System," *International Solid Freeform Fabrication Symposium*. (2017)

- **L. Bass**, N. A. Meisel, and C. B. Williams, “Exploring Variability of Orientation and Aging Effects in Material Properties of Multi-Material Jetting Parts,” *Rapid Prototyping Journal*, Vol. 22 No. 5. (2016)
- **L. B. Bass**, N. A. Meisel, and C. B. Williams, “Exploring Variability in Material Properties of Multi-Material Jetting Parts,” *International Solid Freeform Fabrication Symposium*. (2015) (Best poster)
- I. Vu, **L. Bass**, N. Meisel, B. Orler, C. B. Williams, and D. A. Dillard, “Characterization of Multi-Material Interfaces in PolyJet Additive Manufacturing,” *International Solid Freeform Fabrication Symposium*. (2015)

Poster Presentations

- **L. B. Bezek**, C. B. Williams, J. R. Foerst, and M. P. Cauchi, “Material Jetting Realistic Medical Models with Tunable Tissue-Mimicking Materials,” *Macromolecules Innovation Institute (MII) Technical Conference and Review 2019*, Blacksburg, VA, November 4-6, 2019.
- **L. B. Bass**, D. A. Dillard, and C. B. Williams, “Tailored Fracture Energies at Multi-Material Interfaces of Material Jetting Parts,” *Macromolecules Innovation Institute (MII) Technical Conference and Review 2018*. Blacksburg, VA, April 16-18, 2018.
- **L. B. Bass**, N. A. Meisel, and C. B. Williams, “Exploring Variability in Material Properties of Multi-Material Jetting Parts,” *International Solid Freeform Fabrication Symposium*. Austin, TX, August 10-12, 2015. (Best poster)