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<b>Education</b>	<b>Doctor of Philosophy in Mechanical Engineering</b> University of Tennessee, Knoxville TN	<b>December 2023</b>
	<b>Master of Science in Mechanical Engineering</b> University of Tennessee, Knoxville TN	<b>May 2022</b>
	<b>Bachelor of Science in Mechanical Engineering</b> University of Florida, Gainesville FL	<b>May 2017</b>
<b>Experience</b>	<b>Oak Ridge National Laboratory</b> <i>R&amp;D Associate Staff, Advanced Machining and Machine Tool Research</i> Leverage a strong background in mechanical design, precision engineering, traditional manufacturing, and hybrid manufacturing to develop creative and practical solutions to a diverse set of manufacturing related problems under compressed timelines. Projects range from designing and testing a novel CNC machine tool, to creating a novel metrology platform for measuring milling forces at elevated temperatures, to developing the joining mechanism for a large format 3D printed polymer autoclave mold. Each project involves significant collaboration and communication between engineering teams and project stakeholders.	<b>October 2019 to Present</b>
	<b>Research</b> Limited constraint additive base plates <ul style="list-style-type: none"><li>Developed a novel base plate architecture to reduce part distortion and residual stress.</li><li>Thermo-mechanical finite element simulation and component testing.</li></ul> Modeling of elevated temperature milling for hybrid manufacturing <ul style="list-style-type: none"><li>Developed an elevated temperature cutting force dynamometer for hybrid manufacturing.</li><li>Developed a novel high stiffness thermal protection system, USPTO 6354576.</li><li>Developed a cutting force model to predict changes in cutting force with temperature.</li></ul> Concrete machine tool <ul style="list-style-type: none"><li>Lead designer for novel concrete base machining center manufactured with a 3D printed polymer form.</li><li>Accelerated design and manufacturing schedule, 6 months from project initiation to first test cut.</li><li>Featured at IMTS 2020 and 2022.</li></ul> Large parts on small format machines <ul style="list-style-type: none"><li>Developed a method for machining large, high-aspect ratio parts on a small format machine.</li><li>Leveraged unique design of the concrete machine tool.</li><li>Successfully completed a full-scale demonstration part that was 5x larger than the machine work volume.</li></ul> Large multi-part polymer mold <ul style="list-style-type: none"><li>Collaborated with large scale polymer team to develop new strategies for machining and joining large scale polymer molds for autoclave components.</li></ul> Powder damping rods design and testing <ul style="list-style-type: none"><li>Designed test samples to evaluate the effect of captured powder on component dynamics.</li><li>Measured samples with CT and impact testing.</li></ul> Covid charge box <ul style="list-style-type: none"><li>Manufacturing of components for N-95 fiber charging box.</li></ul> Tombstone testing <ul style="list-style-type: none"><li>Compared damping properties between aluminum, cast iron, and several concrete mixes.</li></ul> GKN large format titanium additive <ul style="list-style-type: none"><li>Fixture design and machining for large scale titanium additive component.</li></ul>	
	<b>Project management</b> IMTS 2022 <ul style="list-style-type: none"><li>Defined project roles and responsibilities and created a project plan to fit stakeholder needs.</li><li>Performed project tracking through MS Project, communicated status to management.</li><li>Coordination with technical staff and outside vendors for machine shipping and set-up.</li><li>Coordination with leadership, communications groups, and the Association for Manufacturing Technology to develop themes and graphics for display at IMTS.</li></ul> Concrete machine tool <ul style="list-style-type: none"><li>Managed a team of internal and external manufacturing, electrical, and mechanical engineers and technicians to build a large electro-mechanical assembly (machining center) on an accelerated timeline.</li><li>Defined project roles and responsibilities and created project plan to fit stakeholder needs.</li></ul> Safety <ul style="list-style-type: none"><li>Wrote Standard Operating Procedure (SOPs) for the concrete machine tool and Haas TL-1.</li></ul>	

- Worked closely with operations support for documentation and approval for various projects.
- Principal investigator for the R&D machining and assembly shop.

#### **Business development**

- Bourn & Koch (InCompass) CRADA development.
- IMTS 2022 discussions with industry partners ranging from small shops to Fortune 500 companies.

#### **Oak Ridge Institute for Science and Education**

**May 2019 to October 2019**

*ORISE HERE Intern, Machining and Machine Tool Research group, Dr. Scott Smith*

- Supported the production of high priority additively manufactured components, including a first of its kind hypersonic rocket component. Worked closely with the main campus shop consulting on manufacturing strategies and component designers on identifying critical part features.
- Supported the transformational challenge reactor (TCR) project by solving the issue of poor build plate surface finish and long lead times.
- Investigated part geometries that aid the additive and machining processes, such as sacrificial stiffening structures, dynamic absorbers, and creative tool path to control start/stop defects and heat buildup.

#### **University of North Carolina, Charlotte**

**August 2018 to May 2019**

*Graduate Research Assistant, Machine Tool Research Center, Dr. Tony Schmitz*

- Designed and implemented an affordable hybrid manufacturing platform for aluminum and magnesium alloys using a wire arc additive process.
- Implemented structured light scanning to better understand printed part geometry variation and reduce the overbuild required for a viable final part.
- Compared the dynamic variability between nominally identical additively manufactured parts.

#### **Okuma America Corporation**

**May 2018 to August 2018**

*Manufacturing Engineering Intern*

- Designed and implemented modular and expandable sub-assembly workspaces.
- Collaborated with production and engineering to create an improved engineering change order process.
- Performed a trade study for the outsourcing of common electrical assembly components.
- Assisted applications engineering with IMTS preparations.

#### **University of Florida**

**February 2015 to January 2018**

*Teaching Assistant for Design and Manufacturing / Design Realization Labs*

- Mentored sophomore (DML) and senior (Design Realization) engineering students in logical decision-making, effective resource and team management, design for manufacturing / assembly principles, and design and manufacturing process documentation.
- Taught fundamentals of practical and cost-efficient part design, prototyping, assembly, and testing.
- Performed design reviews with professors and industry leaders evaluating designs and drawings for function, manufacturability, and tolerancing.
- Educated and trained students on traditional manufacturing processes and equipment, including milling, turning, drilling, sheet metal forming, welding, and plasma cutting, and associated safety protocols.
- Designed and manufactured facility improvement projects requiring advanced manual machine knowledge and CAD/CAM/CNC experience using milling machines and lathes.
- Designed and fabricated carbon fiber composite flexure hinges.

*MAE Student/Faculty Machine Shop*

- Assisted students, design teams, and research labs in manufacturing parts of various complexity.
- Evaluated parts and performed design reviews to achieve functional targets, increase manufacturability, and increase reliability.
- Created standard operating procedures for safe and effective allocation and operation of facility resources.

#### **E-ONE**

**May 2014 to October 2014**

*Applications Engineering Intern*

- Managed production issues and designed and implemented solutions.
- Worked with other engineering teams and suppliers to solve issues.
- Optimized designs for modularity and manufacturability.

#### **Honors**

##### **Special Event Award ORNL**

- Covid-19 N-95 fiber charging box, 2020

##### **Tennessee Top 100 Graduate Fellowship**

- University of Tennessee, Knoxville, 2019

- Publications** **Design and evaluation of an elevated temperature cutting force dynamometer for hybrid manufacturing**, Justin L. West, doctoral dissertation, University of Tennessee, Knoxville, 2023
- Limited-constraint WAAM fixture for hybrid manufacturing**, Justin L. West, Emma D. Betters, Tony L. Schmitz; *Manufacturing Letters*, Volume 37, 2023
- Rethinking production of machine tool bases: Polymer additive manufacturing and concrete**, Justin L. West, Emma D. Betters, Tony L. Schmitz, Scott Smith, Alex Roschli, David Nuttall, John Lindahl, Lonnie Love; *Manufacturing Letters*, Volume 31, 2022
- Joining technique for in-oven/autoclave molds manufactured by large scale polymer additive manufacturing**, Ahmed Arabi Hassen, Emma Betters, Nikolaos Tsiamis, Justin West, Tyler Smith, Kazi Md Masum Billah, David Nuttall, Vipin Kumar, Scott Smith, Vlastimil Kunc; *Manufacturing Letters*, Volume 32, 2022
- Polymer, Additives, and Processing Effects on N95 Filter Performance**, Gregory S. Larsen, Yongqiang Cheng, Luke L. Daemen, Tej N. Lamichhane, Dale K. Hensley, Kunlun Hong, Harry M. Meyer III, Steven J. Monaco, Alan M. Levine, Richard J. Lee, Emma Betters, Kim Sitzlar, Jesse Heineman, Justin West, Peter Lloyd, Vlastimil Kunc, Lonnie Love, Merlin Theodore, and Mariappan Parans Paranthaman, *ACS Applied Polymer Materials* 2021 3 (2), 1022-1031
- Accelerating large-format metal additive manufacturing: How controls R&D is driving speed, scale, and efficiency**, Brian T. Gibson, Paritosh Mhatre, Michael C. Borish, Justin L. West, Emma D. Betters, Scott S. Smith, Bradley S. Richardson, Lonnie J. Love, International Mechanical Engineering Conference and Exposition, 2020
- Dynamic stiffness modification by internal features in additive manufacturing**, Emma D. Betters, Justin West, Mark Noakes, Andrzej Nycz, Scott Smith, Tony L. Schmitz; *Precision Engineering*, Volume 66, 2020
- Platform for affordable hybrid manufacturing of light metals**, Justin West, Emma Betters, Tony Schmitz (University of Tennessee, Knoxville, TN), 2019 ASPE Annual Meeting, October 28- November 1, Pittsburg, PA
- Dynamic repeatability for hybrid manufactured structures**, Tony Schmitz, Justin West, Emma Betters (University of Tennessee, USA), S. Smith (Oak Ridge National Laboratory, USA), 69th CIRP General Assembly, August 18-24, 2019, Birmingham, UK
- Popular Press** **IMTS 2022 AMT Emerging Technology Center Annex**  
Justin West, Emma Betters, Scott Smith, AMT, 2022
- Inside Oak Ridge's 3D-Printed Machine Tool Moonshot**  
Brent Donaldson, Modern Machine Shop, 2020
- Chasing Gold in A&D Manufacturing**  
Ed Sinkora, SME Media, 2021
- The Building Blocks of Directed Energy Deposition Design**  
Laura Ely, Metal 3D Printing, 2021
- IMT 2020 ETC Talks – Moonshot**  
Tony Schmitz, Scott Smith, Justin West, Emma Betters, 2020
- Skills** Team and project management; identifying new areas for research and collaboration; creative problem solving; quick learner; self-starter; strong graphical, oral, and written communication; technical documentation; highly motivated to learn new things. Mechanical design, precision design, system design and integration, design for manufacturing and assembly, finite element analysis, drafting and evaluating technical drawings using TD&T and GD&T, CNC mill & lathe programming and operation, conventional milling and turning, MIG & TIG welding, wire arc additive manufacturing, hybrid manufacturing.
- SolidWorks, Fusion 360, Abaqus, MATLAB, nTopology, HyperMILL, G&M Code, MS Office

**Affiliations** Rabbit Hole Racing, 2023  
SME, 2020  
American Society of Mechanical Engineers, 2019  
American Society of Precision Engineering, 2018

**Web Sites** <https://www.ornl.gov/staff-profile/justin-west>  
<https://www.linkedin.com/in/west-ornl>  
<https://rabbitholeracing.com/pages/about-us>