

# Jakob D. Hamilton

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## Academic Appointments

### Assistant Professor

Aug. 2023 – Present

*Industrial and Manufacturing Systems Engineering, Iowa State University*

- Develop directed energy deposition (DED) for remanufacturing and repair.
- Construct autonomous manufacturing systems through in-situ sensing and closed-loop control.
- Invent and implement auxiliary systems for improved metal 3D printing capabilities.
- Employ novel manufacturing processes for producing additive manufacturing feedstock.

Instructor of Record:

*IE 248: Engineering System Design, Manufacturing Processes, and Specifications*

Fall 2023

*IE449/549: Computer Aided Design, Computer Aided Manufacturing*

Spring 2024

### Graduate Research Assistant

Aug. 2018 – Aug. 2023

*Industrial and Systems Engineering, Rochester Institute of Technology*

- Designed and fabricated DED subsystems for monitoring and improved process capabilities.
- Collaborated across universities to enable DED-based remanufacturing of cast iron components.
- Trained undergraduate and graduate students on CNC and DED equipment and characterization.

## Research Interests

**Metal Additive Manufacturing, Hybrid Manufacturing, Materials Science, In-situ Monitoring**

## Education

**Ph.D.**, *Mechanical and Industrial Engineering*

Aug. 2023

Rochester Institute of Technology, Rochester, NY

*Dissertation title: High Carbon Steel Repair Through Directed Energy Deposition and Ancillary Processing Modes*

**M.S.**, *Industrial and Systems Engineering*

Dec. 2019

Rochester Institute of Technology, Rochester, NY

*Thesis title: Additive Manufacturing Materials: Fabrication of Aluminum Matrix Composites*

**B.S.**, *Engineering Science*

May 2018

Wartburg College, Waverly IA

*Physics and Mathematics Minors, Summa Cum Laude*

## Technical Appointments

### RTX Process Intern

May 2021 – Aug. 2021

*Additive Manufacturing PCC | Raytheon Technologies Research Center | East Hartford, CT*

- Designed hardware and software for laser powder bed fusion (LPBF) subsystem monitoring.
- Developed operation procedures and trained employees on in-house monitoring equipment.

### UTC Process Intern

May 2019 – Aug. 2019

*Additive Manufacturing Center of Expertise | United Technologies Research Center | East Hartford, CT*

- Designed experiments to understand and predict spatter dynamics in LPBF.
- Collaborated to develop a model to predict spatter characteristics from process parameters.

### MIT Summer Research Intern

June 2018 – Aug. 2018

Lincoln Laboratory | Massachusetts Institute of Technology | Lexington, MA

- Worked in a team to reverse-engineer and improve a micro-unmanned aerial vehicle (UAV).
- Taught additive manufacturing principles at MIT Beaver Works Summer Institute.

### Publications

#### Peer-Reviewed Journal Articles

\* indicates corresponding authorship

- [1] A. Assad, B.D. Bevans, W. Potter, P. Rao, D. Cormier, F. Deschamps, **J.D. Hamilton\***, I.V. Rivero, *Monitoring and Detection of Incipient Process Instabilities in Laser Wire Directed Energy Deposition using Physics-based Machine Learning of Meltpool Images*. Virtual Phys. Prototyp. (under review).
- [2] **J.D. Hamilton**, D. Trauernicht, D. Cormier, I.V. Rivero\*, *Laser-based Directed Energy Deposition Remanufacturing of Gray Cast Iron using Stainless Steel 316L and Inconel 625 Filler Materials*. Adv. Eng. Mater. (2023). <https://doi.org/10.1002/adem.202301212>.
- [3] **J.D. Hamilton**, I.V. Rivero\*, *Visualization of Melt Pool Stability for Wire- and Powder-based Directed Energy Deposition Repair of Gray Cast Iron*. Int. J. Adv. Manuf. Technol. (2023). <https://doi.org/10.1007/s00170-023-12513-8>.
- [4] **J.D. Hamilton**, S. Sorondo, B. Li, H. Qin, I.V. Rivero\*, *Mechanical Behavior of Bimetallic Stainless Steel and Gray Cast Iron Repaired via Directed Energy Deposition Additive Manufacturing*. J. Manuf. Process. (2023). <https://doi.org/10.1016/j.jmapro.2022.12.029>.
- [5] **J.D. Hamilton**, S. Sorondo, A. Greeley, X. Zhang, D. Cormier, B. Li, H. Qin, I.V. Rivero\*, *Property-structure-process relationships in dissimilar material repair with directed energy deposition: Repairing gray cast iron using stainless steel 316L*. J. Manuf. Process. (2022). <https://doi.org/10.1016/j.jmapro.2022.06.015>.
- [6] E. Weflen, **J.D. Hamilton**, S. Sorondo, O.L.A. Harrysson, M. Frank, I.V. Rivero\*, *Evaluating Interlayer Gaps in Friction Stir Spot Welds for Rapid Tooling Applications*, IISE Trans. (2021). <https://doi.org/10.1080/24725854.2022.2091184>
- [7] X. Zhang, W. Shen, V. Suresh, **J.D. Hamilton**, L. Yeh, X. Jiang, Z. Zhang, Q. Li, B. Li, I.V. Rivero, H. Qin\*, *In situ Monitoring of Direct Energy Deposition Via Structured Light System and its Application in Remanufacturing Industry*, Int. J. Adv. Manuf. Tech. (2021). <https://doi.org/10.1007/s00170-021-07495-4>.
- [8] **J.D. Hamilton**, S. Ramesh, O.L.A. Harrysson, C.D. Rock, I. V. Rivero\*, *Cryogenic Mechanical Alloying of Aluminum Matrix Composites for Powder Bed Fusion Additive Manufacturing*, J. Compos. Mater. (2020). <https://doi.org/10.1177/0021998320957698>.

#### Peer-Reviewed Conference Proceedings

- [1] X. Zhang, W. Shen, V. Suresh, **J. Hamilton**, L. Yeh, X. Jiang, Z. Zhang, Q. Li, B. Li, I.V. Rivero, H. Qin\*, *In-situ Monitoring of Direct Energy Deposition via Structured Light System and its Application in Remanufacturing Industry*, SME North American Manufacturing Research Conference (2021).

[2] **J.D. Hamilton**, I. V. Rivero\*, Recycling Aluminum Chips: Production of Additive Manufacturing Powder through Cryomilling, IISE Annual Conference (2020).

[3] **J.D. Hamilton**, S. Sorondo, A. Greeley, B.E. Kahn, P. Cyr, D. Cormier, I.V. Rivero\*, Hybrid Manufacturing: Influence of Directed Energy Deposition Parameters on Microstructure and Layer Adhesion of Stainless Steel 316L, Heat Treating Society Conference and Exhibition (2019).

### Poster and Conference Presentations

#### **2024 IISE Annual Conference and Expo**

**May 2024**

W. Potter, **J.D. Hamilton**, *Exploration of a generalizable and open-source framework for real-time monitoring and control of localized additive manufacturing processes through ROS*

#### **2023 Solid Freeform Fabrication Symposium**

**August 2023**

**J.D. Hamilton**, A. Asad, B. Bevans, A. Cardinali, P. Rao, D. Cormier, I.V. Rivero, *Uncovering Fundamental Process Deficiencies in Wire-laser Directed Energy Deposition using In-situ High Speed Imaging*

A. Asad, B. Bevans, **J.D. Hamilton**, I.V. Rivero, P. Rao, *Monitoring of Process Stability in Laser Wire Directed Energy Deposition using Machine Vision*

#### **2022 Solid Freeform Fabrication Symposium**

**July 2022**

**J.D. Hamilton**, I.V. Rivero, *Visualization of Melt Pool Stability for Wire- and Powder-based Directed Energy Deposition Repair of Gray Cast Iron*

#### **2022 IISE Annual Conference and Expo**

**May 2022**

**J.D. Hamilton**, S. Sorondo, I.V. Rivero, *In-situ Visualization of Gas Escapement Phenomenon in Laser Cladding on Gray Cast Iron*

#### **2021 North American Research Conference**

**June 2021**

X. Zhang, W. Shen, V. Suresh, **J.D. Hamilton**, L. Yeh, X. Jiang, Z. Zhang, Q. Li, B. Li, I.V. Rivero, H. Qin, *In-situ Monitoring of Direct Energy Deposition via Structured Light System and its Application in Remanufacturing Industry*

#### **2021 IISE Annual Conference and Expo**

**May 2021**

**J.D. Hamilton**, S. Sorondo, X. Zhang, B. Li, H. Qin, I.V. Rivero, *Effects of Directed Energy Deposition Parameters on Bond Strength between Stainless Steel Deposition and Cast Iron Substrate*

S. Sorondo, **J.D. Hamilton**, A. Greeley, I.V. Rivero, *Substrate Core Attribute's Effect on Density and Distortion of Directed Energy Deposition of Stainless Steel 316L Components*

#### **2020 Materials Science and Technology Annual Meeting**

**November 2020**

**J.D. Hamilton**, S. Sorondo, A. Greeley, D. Cormier, I.V. Rivero, *Residual Stress Mitigation of Additive Manufactured Stainless Steel 316L Components through Directed Energy Deposition Inclusion of SiC Particles*

#### **2020 IISE Annual Conference and Expo**

**November 2020**

**J.D. Hamilton**, I.V. Rivero, *Recycling Aluminum Chips: Production of Additive Manufacturing Powder through Cryomilling*

#### **2019 RIT Graduate Showcase**

**November 2019**

**J.D. Hamilton**, I.V. Rivero, *Quantification of Statistical Error Components Derived from X-ray Diffraction Residual Stress Measurements Fabricated using Additive Manufacturing*

**2019 Heat Treating Society Conference and Exhibition** **October 2019**

**J.D. Hamilton**, S. Sorondo, A. Greeley, B.E. Kahn, P. Cyr, D. Cormier, I.V. Rivero, *Hybrid Manufacturing: Influence of Directed Energy Deposition Parameters on Microstructure and Layer Adhesion of Stainless Steel 316*

**2019 Materials Science and Technology Annual Meeting** **September 2019**

**J.D. Hamilton**, O.L.A. Harrysson, C.D. Rock, I.V. Rivero, *Additive Manufacturing Alloys: Influence of Powder Preparation Method in Aluminum Matrix Composites*

**2019 Solid Freeform Fabrication Symposium** **August 2019**

**J.D. Hamilton**, S. Sorondo, A. Greeley, D. Cormier, I.V. Rivero, *Hybrid Manufacturing: Role of Contoured Geometries in Directed Energy Deposition of Stainless Steel 316L*

**2019 IISE Annual Conference and Expo** **May 2019**

**J.D. Hamilton**, I.V. Rivero, *Additive Manufacturing Alloys: Reinforcement Homogeneity Determination of Aluminum Matrix Composites*

**2019 TMS Annual Meeting and Exhibition** **March 2019**

**J.D. Hamilton**, M. Tung, O.L.A. Harrysson, S. Gupta, I.V. Rivero, C.D. Rock, *Additive Manufacturing Alloys: Fabrication of Aluminum Matrix Composites*