Gerardo Andrés Mazzei Capote

45 N. Randall Ave, Apt. 109 • Madison, WI- 53715
(608) 622-4643 • mazzeicapote@wisc.edu
linkedin.com/in/gerardo-mazzei-capote
ORCID: 0000-0002-1951-6600

SUMMARY

Mechanical engineer with a minor in business. Specialized in polymer additive manufacturing technologies and polymer processing. Highly skilled in thermal analysis techniques, mechanical testing, composite theory, and failure criteria. Versatile communicator fluent in three languages.

EDUCATION

University of Wisconsin-Madison - *Madison, WI, U.S.A.*

- **PhD**: Mechanical Engineering — *2018 - present* (Expected September 2021)
- **MSc**: Mechanical Engineering — *2016 - 2018*.

Universidad Simón Bolívar - *Caracas, Venezuela*

- **BSc**: Materials Engineering — *2009 - 2016*.

PROFESSIONAL EXPERIENCE

Research Assistant Polymer Engineering Center, UW-Madison **August 2016 - Present**

– PhD Thesis — *Predicting Mechanical Properties of Fused Filament Fabrication (FFF) Parts*

- Predicted structural integrity of FFF parts through the use of failure criteria.
- Deployed a Machine Learning system capable of predicting mechanical properties of FFF parts based on slicing parameters and in-line measurements of process indicators.
- Extruded ABS based thermoplastic filament within 2% of target geometric values.

– MSc Thesis — *Defining a Failure Surface for Fused Filament Fabrication Parts Using a Novel Failure Criterion*

- Constructed a failure surface for Fused Filament Fabrication (FFF) parts, allowing part failure prediction if the mechanical requirements of the part are known.
- Designed custom test specimens based on mechanics of materials.
- Implemented toolpath solutions to produce test specimens with out of ordinary bead orientations using a 6-axis robotic printer.

– Production of Topological Crystal Insulators

- Collaborated with chemists and electrical engineers to refine the design of topological crystal insulators to improve manufacturability.
- Compounded a high dielectric thermoplastic material using a twin screw extrusion system.
- Implemented toolpath solutions to produce crystal insulators using diverse Additive Manufacturing techniques, such as Fused Filament Fabrication and Digital Light Synthesis.

– Extrusion of recycled PET filament for Fused Filament Fabrication

- Extruded a thermoplastic filament using recycled PET flakes as the parent material. Geometric tolerances within 2% of desired values.

SKILLS

Manufacturing techniques: Extrusion, Injection Molding, FDM/FFF, SLS, DLS
Analysis techniques: TGA, DSC, LFA, DMA, FTIR, Mechanical Testing, μCT, Metallography
Programming languages: MATLAB, Python, R, RAPID, G-code
Engineering software: Solidworks, EES, Origin, Moldflow, ANSYS, Minitab
Other software: Microsoft Office Suite, Adobe Animate
Languages: English, Spanish, Portuguese

continued

Gerardo Andrés Mazzei Capote

OTHER PROFESSIONAL EXPERIENCE

Lab Manager Polymer Engineering Center, UW-Madison **August 2017 - May 2019**
In charge of ordering lab supplies, ensuring proper adherence to safety guidelines dictated by the university, and coordinating installation and maintenance of machinery and lab equipment.

Teaching Assistant Mech. Eng. Department, UW-Madison **August 2017 - December 2020**
Responsible for the instruction and grading of 'ME370 - Energy Systems Lab', 'ME514 - Additive Manufacturing', and 'ME418 - Engineering Design with Polymers', all offered by the Mechanical Engineering Department. Consistently received high ratings from students.

Vice President Society of Plastic Engineers - Madison Chapter **August 2018 - May 2020**
Coordinated industry visits and outreach activities aimed at increasing the interest of engineering students in the field of polymer processing. Highlights include visits to the 3M campus in the Twin Cities - MN, and to the Trek facilities in Waterloo - WI.

TECHNICAL PRESENTATIONS

1. *A Novel Failure Criteria Applied for Fused Filament Fabrication Parts*. AMUG - Chicago, IL - 2019.
2. *A Tensor Based Failure Criterion for FFF Manufactured Parts*. RAPID - Fort Worth, TX - 2018.
3. *Towards a Robust Production of FFF End-User Parts with Improved Tensile Properties*. SFF - Austin, TX - 2017.

PUBLICATIONS

1. T Pfeifer et al. "Optimization of the FDM™ additive manufacturing process". In: *74th Annual Technical Conference and Exhibition of the Society of Plastics Engineers, Indianapolis 2016* (2016), pp. 22–26. URL: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85010644519{\&}partnerID=40{\&}md5=1f4521e160fe433ad37ef9bb587ee72e
2. Gerardo A. Mazzei Capote et al. "Towards a Robust Production of FFF End-User Parts with Improved Tensile Properties". In: *Proceedings of the 28th Annual International Solid Freeform Fabrication Symposium – An Additive Manufacturing Conference*. Austin, TX, 2017, pp. 507–518
3. Gerardo A. Mazzei Capote et al. "Failure surface development for ABS fused filament fabrication parts". In: *Additive Manufacturing* 28.April (2019), pp. 169–175. ISSN: 22148604. DOI: 10.1016/j.addma.2019.05.005. URL: https://doi.org/10.1016/j.addma.2019.05.005
4. J.L. Colón Quintana et al. "Viscoelastic properties of fused filament fabrication parts". In: *Additive Manufacturing* 28 (2019). ISSN: 22148604. DOI: 10.1016/j.addma.2019.06.003
5. Gerardo A. Mazzei Capote, Alec Redmann, and Tim A. Osswald. "Validating a Failure Surface Developed for ABS Fused Filament Fabrication Parts through Complex Loading Experiments". In: *Journal of Composites Science* 3.2 (2019). DOI: https://doi.org/10.3390/jcs3020049
6. P. V. Osswald et al. "Failure Criterion for PA 12 Multi-Jet Fusion Additive Manufactured Parts". In: *Additive Manufacturing* July (2020). ISSN: 2214-8604. DOI: 10.1016/j.addma.2020.101668. URL: https://doi.org/10.1016/j.addma.2020.101668
7. Jose L. Colon Quintana et al. "Application of the stress interaction failure criterion in platelet composite compression molded parts". In: *Polymer Composites* November 2020 (2021), pp. 1–12. DOI: 10.1002/pc.26084
8. Gerardo A. Mazzei Capote et al. "Trends in Force and Print Speed in Material Extrusion". In: *Additive Manufacturing* 46 (2021). DOI: https://doi.org/10.1016/j.addma.2021.102141. URL: https://www.sciencedirect.com/science/article/pii/S2214860421003055