SEYMUR HASANOV, PhD

Wilson Hall 143, 301 Sparkman Dr. | Huntsville, Al, 35899
(256) 834-6431 | seymur.hasanov@uah.edu

AREAS OF RESEARCH INTEREST

Advanced Manufacturing, Multi-Material Additive manufacturing, Functionally Graded Materials (FGMs)|metals-ceramics-thermoplastics-composites, Fiber Reinforced Composite Materials, Fatigue modeling and characterization, Fracture mechanics, Machine Learning in AM, Lightweight/lattice design and manufacturing, applications in biomedical and aerospace field, Smart Manufacturing, Digital Manufacturing, Bio mimic design and characterization of multi-material composites with the help of machine learning techniques and the finite element method.

Major Skills: Computational Modeling of Fiber reinforced composite, Design for Additive Manufacturing, Experimental Design and Characterization, Finite Element Modeling, Machine learning.

EDUCATION

Tennessee Tech University (TTU)   **Cookeville, TN**
Doctor of Philosophy (PhD) in Engineering ~ Mechanical Engineering   *Aug 2018 - July 2021*

Dissertation:
►*Numerical Modeling and Experimental Characterization of Functionally Graded Materials Manufactured by the Fused Filament Fabrication Process*◄

Coursework ~ GPA: 4.0/4.0
Advanced Finite Element Methods/Analysis, Design of Experiments, Fiber Reinforced Composite Materials, Multivariate Applied Statistical Methods, Fatigue and Wear in Mechanical Design, Digital Manufacturing Techniques

Qafqaz University (Baku Engineering University)   **Baku, Azerbaijan**
Master of Science (MSc) in Industrial Engineering ~ Design and Manufacturing   *Sep 2013 - June 2015*
GPA: 4.0/4.0 (With distinction)

Qafqaz University (Baku Engineering University)   **Baku, Azerbaijan**
Bachelor of Science (BSc) in Industrial Engineering   *Sep 2007 - June 2012*
GPA: 4.0/4.0 (With honors)

ACADEMIC WORK EXPERIENCE

Assistant Professor (Clinical) – Engineering Technology, Professional Studies Department, CPS.

University of Alabama, Huntsville (UAH), Huntsville, AL, USA   **Aug 2021 – present**

o   Designing and implementing new lab in WIL 215 for engineering technology students.
o   Working towards ABET accreditation and addition of a stand-alone major for engineering technology.
o   Provide Laser/Lab Safety Training for faculty/students.
o   Develop online/hybrid courses - UAH QEPO (Quality Education Practices Online) Certified Instructor.
Classes Taught:
o   Fundamentals of Engineering - ET 301 & ET 302 **–** Fall 2021 (Asynchronous)
o   Engineering Mechanics: Dynamics ET 336 **–** Fall 2021 (Synchronous online)
o   Manufacturing Processes ET 431 – Spring 2022 (Traditional/Hybrid)

- o Computer Aided Design ET 310 – Spring 2022 (Traditional/Hybrid)
- o Engineering Mechanics: Dynamics ET 336 – Spring 2022 (Synchronous online)

Courses Developed:
- o Quality Control Techniques ET 314 – Spring 2022 – (Hybrid)

Research Assistant – Center for Manufacturing Research, College of Engineering

Tennessee Tech University, Cookeville, TN, USA   **Aug 2018 – Jul 2021**

Research accomplishments:
- o Designed and fabricated functionally graded composite structures using AM technology
- o Implemented data-driven statistical modeling and finite element method to characterize the FGMs
- o Computational modeling composite FGMs using ANSYS Material Designer
- o Developed high-performance (thermally stable) composite material for the fused filament fabrication (FFF) process
- o Analytical and numerical modeling short carbon fiber reinforced composites (FFF-made) using asymptotic homogenization along with FE implementation and classical lamination theory (CLT).
- o Mechanical and thermal analysis of metal powder infused PLA polymer using metal based additive manufacturing.
- o Supported data collection activities for **Wohler's Report, for 2019, 2020** editions.

National Science Foundation (NSF) funded projects:
- o Assisted and organized the AM-WATCH (am-watch.org) and MANEUVER – in collaboration with Purdue University (nsfmaneuver.org), NSF funded projects' dissemination activities.
- o Performed VR workshop for community college and high school teachers, MANEUVER (nsfmaneuver.org).
- o Developed educational modules in "Magnetic Materials produced by Additive Manufacturing Technologies" for MatEdu (materialseducation.org), NSF funded project housed at Edmonds College.

Industrial funded project (Flowserve Corporation):

- Design and implementation of low-cost mold patterns for industrial size FFF-technology.
- Experimental optimization of processing parameters of FFF made **mold patterns using** Design of Experiments (DoE). Factorial design method was applied for initial screening of unnecessary parameters. Response surface methodology (RSM) was applied to define optimal fabrication parameters.

Undergraduate/graduate student supervision:

- Supervised undergraduate students for the printing of concrete/clay materials using TechBot mobile multi-material 3D printer.
- Tyler Edward – Master Student, Mechanical Engineering, TTU, Sept 20 – May 21.
  | Process – Structure – Property characterization of SLA and FFF-made components |

- Galbraith Claude – Master Student, Mechanical Engineering, TTU, May 21 – Aug 21.
  | Experimental design of processing parameters of the industrial FFF process for the fabrication of composite mold patterns |

- David Bradford – Undergraduate, Manufacturing and Engineering Technology, TTU, April 21 – Aug 21.
  | Design and fabrication of multi-functional ratchet mechanism for prosthetic composite arm |

Graduate Teaching Assistant – Manufacturing and Engineering Technology Department

Tennessee Tech University, Cookeville, TN, USA   **Jan 2020 –May 2020**

- o Delivered "CAD for Technology" course for Manufacturing Engineering and Technology (MET) students covering the industrial practice of solid modeling techniques.

- o Developed and delivered online and blended courses.
- o Organized the lab work for the use of additive manufacturing technologies.
- o Supported the MET department in organizing paperwork regarding ABET accreditation.

Lecturer – Mechanical Engineering Department

Baku Engineering University, Khirdalan, Azerbaijan   **Jan 2017 – Jul 2017**

- o Developed and designed curriculum plans to foster student learning and stimulated class discussions.
- o Attended weekly department meetings and worked with accreditation documentations.
- o Supervised engineering students and advised for career development in the engineering field.
- o Taught courses: Manufacturing Processes, 3D Solid modeling using SolidWorks, CAD/CAM

Teaching and Research Assistant – Mechanical Engineering Department

Qafqaz University, Khirdalan, Azerbaijan   **Oct 2013 – Dec 2016**

- Worked on a project in collaboration with Azersun company - designed and fabricated plastic bottle prototypes
- Handled the lab classes regarding CNC programming and machining for mechanical engineering students.
- Prepared and assessed assignments for CAD/CAM and Engineering Graphics course
- Maintained and assisted students in material testing and rapid prototyping lab.

INDUSTRIAL WORK EXPERIENCE

Mechanical Engineer – PMD Projects LLC, Baku, Azerbaijan   **Aug 2017 – Aug 2018**

- o Performed engineering calculations to identify heating & cooling loads for buildings, designed duct systems, calculated pressure drops for ducts and pipes, verified pump sizing calculations.
- o Inspected mechanical documentation, analyzed detailed design drawings, and identified various problems regarding HVAC systems.
- o Designed testing procedures and control equipment to accurately assess products and identify areas that require modification and further testing.
- o Analyzed HVAC systems and equipment to find inefficiencies or malfunctions and create solutions to optimize performance and increase the efficiency operation.

Design Engineer Internship – Sumgait Technological Parks, Sumgait, Azerbaijan   **Mar 2015 – May 2015**

- o Worked in the design of mold patterns, designed virtual molded parts.
- o Provided design for manufacturability to customers.
- o Utilized virtual molding software to simulate molding processes.
- o Performed simulations using MasterCAM and generate NC codes for CNC machining.

Engineering Internship – Boytas Mobilya Sanayi ve Ticaret AS, Kayseri, Turkey   **Jul 2010 – Aug 2010**

- Worked with experienced engineers to improve the efficiency of each production processes.
- Worked with quality control systems, time study, various metal manufacturing processes.
- Performed time studies and applied the KAIZEN system in the factory.

JOURNAL PUBLICATIONS

UNDER REVIEW

- **S. Hasanov,** S. Alkunte, M. Rajeshkire, A. Gupta, O. Huseynov, I. Fidan, F. Alifui-Segbaya, A. Rennie, "Review on Multi-Material Additive Manufacturing Parts: Progress and Challenges", *Journal of Manufacturing and Materials Processing, Special Issue*, under review, Nov 2021.

- A. Gupta, **S. Hasanov,** I. Fidan, "Thermal characterization of short carbon fiber reinforced high temperature polymer material produced using the fused filament fabrication process", *Journal of Manufacturing Processes*, Under review, Oct 2021. **| IF – 5.1**

PUBSLISHED

- A. Gupta, **S. Hasanov,** I. Fidan, "Homogenized modeling approach for effective property prediction of 3D-printed short fibers reinforced polymer matrix composite material", *Journal of Advanced Manufacturing and Technology*, Oct 2021. **| IF – 3.226**

- **S. Hasanov**, A. Gupta, F. Alifui-Segbaya, I. Fidan, "Hierarchical Homogenization and Experimental Characterization of Functionally Graded Composites Manufactured by the Fused Filament Fabrication process", *Composite Structures*, Aug 2021. **| IF – 5.4**

- **S. Hasanov**, A. Gupta, A. Nasirov, I. Fidan, "Mechanical characterization of functionally graded materials produced by the fused filament fabrication process", *Journal of Manufacturing Processes*, Sep 2020. **| IF – 5.1**

- A. Nasirov, A.Gupta, **S. Hasanov**, I.Fidan, "Three-scale asymptotic homogenization of short fiber reinforced additively manufactured polymer composites," *Composites Part B: Engineering*, Aug 2020. **| IF – 9.078**

- A.Gupta, I.Fidan, **S.Hasanov**, A. Nasirov, "Processing, mechanical characterization, and micrography of 3D printed short carbon fibers reinforced polycarbonate polymer matrix composite material", *International Journal of Advanced Manufacturing Technology* , Apr 2020. **| IF – 3.226**

- M. Mohammadizadeh, H. Lu, I. Fidan, K. Tantawi, A. Gupta, **S. Hasanov**, Z. Zhang, F. Alifui-Segbaya, A. Rennie, " Mechanical and thermal analysis of metal-PLA components fabricated by metal material extrusion", *Inventions*, Sep 2020.

- I.Fidan, A. Imeri, A. Gupta, **S.Hasanov**, A.Nasirov, A.Elliott, F.Alifui-Segbaya, N.Nanami, "The trends and challenges of fiber reinforced additive manufacturing", *International Journal of Advanced Manufacturing Technology*, Jan 2019. **| IF – 3.226**

CONFERENCE PUBLICATIONS

- I. Fidan, G. Chitiyo, P. Fidan, A. Gupta**, S. Hasanov**, Z. Zhang, "Innovative Delivery of 3D Printing," *ASEE 2021*.

- A. Gupta, **S. Hasanov**, I Fidan, "Processing and characterization of 3D-printed polymer matrix composites reinforced with discontinuous fibers", in *Proceedings of Solid Freeform Fabrication Symposium*, Aug 2019.

- A. Nasirov, **S. Hasanov**, and I.Fidan, "Prediction of, mechanical properties of fused deposition modeling made parts using multiscale modeling and classical laminate theory," in *Proceedings of Solid Freeform Fabrication Symposium*, Aug 2019.

BOOK CHAPTERS / EDUCATIONAL MODULES

- F. Alifui-Segbaya, Flores-Ituarte I., **S. Hasanov**, A. Gupta, I. Fidan, "Opportunities and limitations of Additive Manufacturing", book chapter, *Additive Manufacturing book*, Springer, July 2021 – under review.

- **S. Hasanov**, A. Gupta, F. Alifui-Segbaya, I. Fidan, "Environmental health and safety concerns in additive manufacturing", book chapter, *Additive Manufacturing book*, Springer, July 2021 – accepted.

- A. Gupta, **S. Hasanov**, F. Alifui-Segbaya, I. Fidan, "Fiber-reinforced additively manufactured polymer composites", book chapter, *Additive Manufacturing book,* Springer, June 2021 – accepted.

- **S. Hasanov**, I. Fidan, "Manufacturing of soft magnets using the fused filament fabrication process", *Educational Module (Materials Education)*, April 2021, – NSF Project – Edmonds CC | https://par.nsf.gov/biblio/10299364

- **S. Hasanov**, I. Fidan, "Additive manufacturing of magnetic composites", *Educational Module (Materials Education)*, April 2021, – NSF Project – Edmonds CC | https://par.nsf.gov/biblio/10299365

AWARDS

- TTU Research and Inquiry Day Award, Best Research Poster in Manufacturing Engineering **March 2021**

- Eminence Award, The Doctor of Philosophy Best Paper, TTU **March 2021**

- Collage of Engineering Kinslow Research Award 2021, TTU | **$1000** **Feb 2021**

- Precision Metalforming Association Educational Foundation (PMAEF) scholarship award | **$1000** **Dec 2020**

- Winner of "UX Design Award" – designed a prototype model for foggy goggles project for COVID19, America Maker Challenge **May 2020**

- "Lightning Round Seminar Award" – for the best research presentation, TTU | **$500** **Nov 2019**

- "Top Poster Presentation Award" – "Multi-Material Mobile 3D printer", MSTEM, Colorado School of Mines **Nov 2019**

- Society of Manufacturing Engineers (SME) Lee Severy Award | **$1500** **Jun 2019**

INVITED TALKS/SEMINARS/PRESENTATIONS

- <u>Nov 2021</u> Topic – *"Mechanical Application of Functionally Graded Composite Parts Manufactured by the Fused Filament Fabrication Process"* – Additive Manufacturing Day, **Tennessee Tech University**

- <u>Jan 2021</u> Topic – *"Fundamentals of Design – Solid Modeling, Reverse Engineering, Design for Additive Manufacturing"* – AM Workshop, AM-WATCH NSF Project, **Tennessee Tech University**

- <u>Oct 2020</u> Topic – *"Functionally Graded Composite Materials Produced by The Fused Filament Fabrication process"* – Manufacturing Day, online presentation, **Georgia Southern University**

- Oct 2020   Topic – *"Design, Fabrication and Characterization of Functionally Graded Structures Fabricated by the Fused Filament Fabrication process"* – 2020 Design Doctoral Symposium & Additive Manufacturing Open Day, online presentation, **Brunel University London**

- Nov 2019   Topic – *"Multi-Material Additive Manufacturing of Functionally Graded Materials"* – Lightning Round Seminars, Center for Manufacturing Research, **Tennessee Tech University**

- Nov 2019   Topic – "Techbot Mobile Multi-Material 3D Printer", MSTEM, **Colorado School of Mines**

- Aug 2019   Topic – *"Extending Multi-Material Additive Manufacturing capabilities to produce Functionally Graded Composite Structures"* – IACMI-The Composites Institute, **University of Tennessee Knoxville**

- May 2019   Topic – "*Towards the Knowledge Base development of 3D printed Short Fiber reinforced Polymer Matrix Composites*" – poster presentation, **RAPID + TCT 2019, Detroit, Michigan**

ACADEMIC PEER REVIEW SERVICES

- Additive Manufacturing Journal (*IF: 10.998*) – Elsevier Reviewer Recognition
- Mechanics of Advanced Materials and Structures (*IF: 4.03*)
- Rapid Prototyping Journal (*IF: 3.098*)
- Journal of Engineering Technology
- Performed technical review for SME NAMRC 47 & 48 Conference Proceedings
- Performed technical review for Solid Freeform Fabrication (SFF) Symposium Conference Proceedings
- IEEE Transaction on Components, Packaging and Manufacturing Technology
- The Journal of Rapid Manufacturing (IJRAPIDM)

SOFTWARE/PROGRAMMING SKILLS

ANSYS	Finite element modeling package, proficiency in Static Structural, Material Designer, Topology Optimization modules.	*Proficient*
SpaceClaim	Used to generate lattice structures and triply periodic minimal surfaces (TPMS). Used to modify topologically optimized structures using various meshing strategies	*Proficient*
Matlab	Mainly used for programming numerical methods. Focused on finite element modeling/programming	*Proficient*
Paraview	Used for FEA post processing to visualize the results and interpret them	*Proficient*
R	Used for data analysis, statistical modeling, and optimization of process parameters, response surface methodology	*Proficient*
Python	Used for data analysis and machine learning applications	*Proficient*
Solidworks	Used for complex mechanical design, assemblies, surfacing, modeling making, sheet metal design, weldments, and drawing tools.	*Expert*
Inkspace	Used to create scientific figures, graphs, and diagrams	*Expert*

InspireCast	Used for simulation of mold processes: Gravity tilting and investment casting.	*Experienced*
AutoCAD	Used for 3D solid modeling, 2D drawing, Surface modeling, Mesh modeling	*Expert*
Fusion 360	3D Modeling, Generative Design, Shape/Topology Optimization	*Proficient*
Hyperworks	Hypermesh used for meshing 3D objects	*Intermediate*
Creo PTC	3D part and modeling	*Proficient*
Meshmixer	Used for Mesh modeling and modification	*Proficient*
MasterCAM	Used for generating NC codes for CNC machining	*Proficient*
Voxelizer	Used for multi-material printing	*Expert*
Cura	Used as slicer for 3D printing	*Expert*
Simplified 3D	Used as slicer for 3D printing	*Expert*
Revit MEP	Used to design ductworks for commercial and residential HVAC systems	*Proficient*
Revit Arc. /Str	Used for design/modification of architectural parts	*Proficient*
HAP	Used to calculate heating and cooling loads of commercial buildings	*Proficient*

CERTIFICATES

- Solidworks Certified Expert in Mechanical Design (Certificate ID: C-VXGUM39JYH) **March 2021**

- Certified Solidworks Professional Mechanical Design (ID: C-UMRWY9XNZS) **May 2020**

- Certified Solidworks Advanced Drawing Tools Professional (ID: C-APC685KQDN) **May 2020**

- Certified Additive Manufacturing Associate (ID: C-9E5N3UHG2K) **May 2020**

- Certified Solidworks Advanced Surfacing Professional (ID: C-BZTRD5XEMY) **June 2020**

- Certified Solidworks Advanced Sheet Metal Professional (ID: C- C-KQE2UPWBHV) **June 2020**

- Certified Solidworks Advanced Weldments Professional (ID: C- C-VMNJFA4HZY) **July 2020**

- Certified Solidworks Advanced Mold Making (Certificate ID: C- C-69AK3RHCZ8) **July 2020**

LinkedIn Learning Certifications:
- Using Python with Excel **Aug 2020**
- Introduction to Geomterical Dimenioning and Tolerancing **Aug 2020**
- Introduction to Composite Manufacturing **Mar 2020**
- NumPy: Data Science Essential Training **Feb 2020**

HANDS-ON EXPERIENCE

- *Additive Manufacturing technologies*   ~ Proficient to use/operate/troubleshoot industrial-size and desktop 3D printers.

- *CNC machining processes*   ~ Proficient with milling and turning machining processes.

- *PLC machines/automation*   ~ Worked with PLC machines to program conveyor belt systems.

- *Microstructural Characterization*   ~ Scanning Electron Microscopy **(SEM)**, Optical Microscope **(OM),** X-Ray Diffraction **(XRD).**

- *Thermal Property Characterization*   ~ Thermogravimetric analysis **(TGA)**, Differential Scanning Calorimetry **(DSC)**.

- *Mechanical Property Characterization*   ~ Universal Tensile Machine (UTM), Compression Testing Machine, Flexural Testing, Hardness Tester.

- *Laser Cutter (Glowforge)*   ~ Used for cutting various materials including acrylic, hardwood, and plywood

PROFESSIONAL MEMBERSHIPS

- Society of Manufacturing Engineering (SME) – TTU Student Chapter – Vise President   Aug 18 – Aug 21.
  – Alabama Chapter   Oct 21 – present.
- American Society of Mechanical Engineers (ASME) – TTU Student Chapter   Aug 19 – present.
- Member of Precision Metal Forming Association (PMA)   Aug 19 – present.
- National Society of Black Engineers (NSBE)   Mar 21 – present.