

MD ABDUL KARIM

Assistant Professor, Mechanical Engineering

University of South Carolina Aiken

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EDUCATION

<i>Ph.D., Mechanical Engineering</i>	Tennessee Tech University, USA	[Jul. 2025]
<i>M.S., Mechanical Engineering</i>	Dhaka University of Engineering and Technology, Bangladesh	[Jul. 2022]
<i>M.S., Materials Engineering</i>	Dong-Eui University, South Korea	[Feb. 2020]
<i>B.S., Mechanical Engineering</i>	International University of Business Agriculture and Technology, Bangladesh	[Dec. 2012]

EMPLOYMENT HISTORY

<i>Assistant Professor</i>	Mechanical Engineering University of South Carolina Aiken, USA	[Aug. 2025 – present]
<i>Graduate Teaching Assistant (Instructor)</i>	Manufacturing and Engineering Technology Tennessee Tech University, USA	[Aug. 2024 – May 2025]
<i>Graduate Research Assistant</i>	Mechanical Engineering Tennessee Tech University, USA	[Aug. 2022 – Jul. 2025]
<i>Assistant Professor</i>	Mechanical Engineering International University of Business Agriculture and Technology, Bangladesh	[Mar. 2020 – Jul. 2022]
<i>Graduate Research Assistant</i>	Mechanical Engineering Dhaka University of Engineering and Technology, Bangladesh	[Mar. 2020 – Jun. 2022]
<i>Graduate Research Assistant</i>	Advanced Materials Engineering Dong-Eui University, South Korea	[Mar. 2018 – Feb. 2020]
<i>Lecturer</i>	Mechanical Engineering International University of Business Agriculture and Technology, Bangladesh	[Mar. 2013 – Feb. 2018]
<i>Service Engineer (Internship)</i>	Vehicle Servicing Runner Motors Limited, Bangladesh	[May 2012 – Aug. 2012]

TEACHING INTERESTS

Undergraduate Courses: Statics, Solid Mechanics, Manufacturing Processes, Engineering Materials, Materials Science, Metallurgy, Thermodynamics, Heat Transfer, Fluid Mechanics, Numerical Methods, Mechatronics, and Machine Design
Graduate Courses/Special Topics: Advanced/Additive Manufacturing, Mechanical Properties of Materials, Advanced Mechanics of Materials, Theory of Elasticity, Theory of Plasticity, Fracture Mechanics, and Corrosion Engineering

RESEARCH INTERESTS

Present research: Metal additive manufacturing/3D-printing, advanced materials, microstructure and mechanical properties characterization, corrosion of metal components, post-fabrication treatments of metal components, in-situ data monitoring and acquisition, and computational modeling

General interests: Advanced materials, additive manufacturing, Industry 4.0, Industry 5.0, smart manufacturing, data analytics, machine learning, computational modeling, welding, mechanical joining, corrosion, and sustainable energies

PUBLICATIONS

- 2025**
1. **Md Abdul Karim**, G Tanvir, S Jadhav, S Islam, Y-M Kim, H V Gomez, H-J Lee, Y Jeon, and D B Kim (2025), "Tailoring porosity and mechanical properties of wire-based directed energy deposited molybdenum alloys through hot isostatic pressing", *Applied Materials Today*, 42, 102618
 2. **Md Abdul Karim**, M S Bajestani, Y Jeon, and D B Kim (2025), "Mechanical Performance enhancement of wire-arc directed energy deposited tungsten/steel multi-material structures through heat treatments", *Journal of Material Research and Technology*, 39, 1396-1413
 3. S Islam, **Md Abdul Karim**, G Tanvir, S Jadhav, E A Payzant, J R Bunn, Y Lee, D-G Ahn, and D B Kim (2025), "Investigation of residual stress distribution in wire-arc directed energy deposited refractory molybdenum alloy utilizing numerical thermo-mechanical analysis and neutron diffraction method", *International Journal of Refractory Metals and Hard Materials*, 130, 107149
 4. G Tanvir, **Md Abdul Karim**, N Kim, and D B Kim (2025), "High-cycle tensile-fatigue performance of niobium alloy: conventional vs wire-arc additive manufacturing", *Journal of Material Research and Technology*, 35, 98-109
 5. G Tanvir, M S Bajestani, **Md Abdul Karim**, S Islam, Y Jeon, and D B Kim (2025), "Heat treatments for microstructure modification and mechanical properties enhancement of wire-arc additively manufactured tungsten-Inconel bimetallic structures", *International Journal of Fatigue*, 109315
 6. S Islam, **Md Abdul Karim**, S-Y Lee, Y Ha, J Kwon, K Song, H Lim, T Park, Y Jeon, and D B Kim (2025), "Crystal plasticity approach for predicting mechanical responses in wire-arc directed energy deposited Al4043 structures considering porosity", *International Journal of Plasticity*, (under review)
 7. G Tanvir, S Islam, **Md Abdul Karim**, B Bates, Y Jeon, and D B Kim (2025), "Creep properties of refractory niobium alloy at low temperature: powder metallurgy vs wire-arc additive manufacturing", *Journal of Material Research and Technology*, (under review)
 8. S Islam, G Tanvir, **Md Abdul Karim**, Y Jeon, and D B Kim (2025), "Crystal plasticity approach for predicting deformation in wire-arc directed energy deposited SS316L, In625, and SS316L-In625 bimetallic structures", *Journal of Materials Science & Technology*, (submitted to the journal)
- 2024**
9. **Md Abdul Karim**, S Jadhav, R Kannan, D Pierce, Y Lee, P Nandwana, and D B Kim (2024), "Investigating stainless steel/aluminum bimetallic structures fabricated by cold metal transfer (CMT)-based wire-arc directed energy deposition", *Additive Manufacturing*, 81, 104015
 10. **Md Abdul Karim**, S Islam, G Tanvir, S Jadhav, Y-M Kim, Y Jeon, and D B Kim (2024), "Wire-arc directed energy deposition of steel onto tungsten substrate: fabricability and mechanical performance of synergistic structures", *Virtual and Physical Prototyping*, 20(1), 2443578
 11. **Md Abdul Karim**, Y Jeon, and D B Kim (2024), "Trailblazing multi-material structure: Niobium alloy to tungsten-copper composite using wire-arc additive manufacturing", *Material Letters*, 375, 137246
 12. G Tanvir, **Md Abdul Karim**, S Jadhav, S Islam, Y-M Kim, HJ Ryu, and D B Kim (2024), "Effect of hot isostatic pressing on porosity of wire-arc directed energy deposited TZM/NbZr bimetallic structure", *Virtual and Physical Prototyping*, 19(1), 2404989
 13. S Jadhav, **Md Abdul Karim**, and D B Kim (2024), "Bimetallic structure of TZM and NbZr1 fabricated by wire-arc directed energy deposition", *Material Letters*, 356, 135605
 14. S Jadhav, G Tanvir, **Md Abdul Karim**, S Islam, SD Noh, and D B Kim (2024), "Microstructures and mechanical behavior of bimetallic of tungsten alloy (90WNiFe) and nickel alloy (In625) fabricated by wire-arc directed energy deposition", *Virtual and Physical Prototyping*, 19(1), 2370957
 15. R Kannan, D Pierce, S Nayir, RU Ahsan, DB Kim, K Unocic, S Jadhav, **Md Abdul Karim**, and P Nandwana (2024), "wire-arc directed energy deposition of steel-aluminum structures using cold metal transfer", *Journal of Material Research and Technology*, 29, 4537-4556

- 2023** 16. **Md Abdul Karim**, S M Manladan, H M M Afroz, W Jin, T Krishna, C Ji, D B Kim and Y-D Park, (2023), "Critical effect of heat input on joint quality in resistance element welding of Al and steel", *Journal of Manufacturing Processes*, 95, 106934
17. S Jadhav, M S Bajestani, S Islam, **Md Abdul Karim**, C J Kim, H-J Lee, Y T Cho, D B Kim (2023), "Materials characterization of Ti6Al4V to NbZr1 bimetallic structure fabricated by wire arc additive manufacturing", *Materials Today Communications*, 36, 91-104
- 2022** 18. **Md Abdul Karim**, S P Murugan, J W Kim, T-E Jeong, W Noh, D-H Kam, Y G Back, C Kim, W Jang, D B Kim and Y-D Park, (2022), "Effect of top sheet materials on joint performance of self-piercing riveting (SPR)", *Journal of Welding and Joining*, 40(6), 512-524
- 2021** 19. T-Y Kang, H-J Lee, **Md Abdul Karim**, D-G Nam, B-R Lee, J-M Choi, Y-D park, (2021), "Study on effect of process variable on fastening quality using process monitoring data of flow drill screwed 590DP steel/AA5052 combination", *Journal of Welding and Joining*, 40(3), 256-264
- 2020** 20. **Md Abdul Karim**, T-E Jeong, W Noh, G-Y Park, D-H Kam, C Kim, D-G Nam, H Jung and Y-D Park, (2020), "Joint quality of self-piercing riveting (SPR) and mechanical behavior under the frictional effect of various rivet coatings", *Journal of Manufacturing Processes*, 58, 466-477
21. **Md Abdul Karim**, J-H Bae, D-H Kam, C Kim, W-H Choi and Y-D Park, (2020), "Assessment of rivet coating corrosion effect on strength degradation of CFRP/aluminum self-piercing riveted joints", *Journal of Surface and Coatings Technology*, 393, 125726
22. **Md Abdul Karim**, Y-D Park, (2020), "A review on welding of dissimilar metals in car body manufacturing", *Journal of Welding and Joining*, 38(1), 8-23
- 2019** 23. **Md Abdul Karim**, J-H Bae, D-H Kam, C Kim, and Y-D Park, (2019), "Critical influence of rivet head height on corrosion performance of CFRP/aluminum self-piercing riveted joints", *Corrosion Science and Technology*, 18(3), 92-101
- 2016** 24. A. Z. A. Saifullah, **Md Abdul Karim**, M R Karim, (2016), "Advancement of biodiesel in Bangladesh", *IOSR Journal of Engineering*, 6(6), 59-64
25. A. Z. A. Saifullah, **Md Abdul Karim**, M R Karim, (2016), "Wind energy potential in Bangladesh", *American Journal of Engineering Research*, 5(5), 124-134
- 2014** 26. A. Z. A. Saifullah, **Md Abdul Karim**, A A Yazid, (2014), "Microalgae: an alternative source of renewable energy", *American Journal of Engineering Research*, 3(3), 330-338

RESEARCH EXPERIENCES IN FUNDED PROJECTS

1. **NRF, Korea: Wire arc additive manufacturing of tungsten-based multi-material structures**[Aug. 2024 – Jul. 2025]
Funding: National Research Foundation of Korea (NRF), South Korea
2. **NSF CAREER: Wire arc additive manufacturing of molybdenum alloys for high-temperature applications - Residual stresses and porosity considering ductile-to-brittle transition temperature** [Aug. 2023 – Jul. 2024]
Funding: National Science Foundation (NSF), USA
3. **NSF-CMMI-Advanced Manufacturing: Investigations into design rules for the control of wire arc additive manufacturing** [Aug. 2022 – Jul. 2023]
Funding: National Science Foundation (NSF), USA
4. **DoE-US: Wire arc additive manufacturing of steel/aluminum multi-material structures** [Aug. 2022 – Jul. 2023]
Collaborator: Oak Ridge National Laboratory (ORNL)
Funding: US Department of Energy, USA
5. **Multi-materials integration technologies for 40% weight reduction of car front body compared with when using low carbon steel** [Mar. 2018 – Feb. 2019]
Funding: Ministry of Education, South Korea
6. **Development of multi-materials forming and joining technologies for 15% weight reduction of core module (front/side module) of car body** [Mar. 2018 – Feb. 2020]
Funding: Ministry of Education, South Korea
7. **Development of dissimilar metal joining technology for eco-friendly automobile body parts lightening** [Mar. 2018 – Feb. 2020]
Funding: Ministry of Trade, Industry and Energy, South Korea

CONFERENCE PRESENTATIONS [Presenter (*)]

1. **Md Abdul Karim***, Y-D Park, “Comparative Study on Mechanical and Corrosion Behavior of Resistance Element Welding (REW) and Self-piercing Riveting (SPR) for Steel/Aluminum”, KWJS 2021 Spring Conference, The Korean Welding and Joining Society, Seoul, Korea, Nov 11-12, 2021
2. **Md Abdul Karim***, Y-D Park, “Critical Effect of Heat Input on the Joint Quality of Resistance Element Welding (REW)”, KWJS 2021 Spring Conference, The Korean Welding and Joining Society, Seoul, Korea, Nov 11-12, 2021
3. **Md Abdul Karim***, R Ahmed, M S Islam, S H Dristi, “Sensor Based Global Positioning System (GPS) for Fecal Sludge Management - Impact on Manual Monitoring Improvement by Technological Support”, 13th International Conference on Sustainable Waste Management towards Circular Economy, Jadavpur University, West Bengal, India, Dec. 02-07, 2020
4. **Md Abdul Karim***, J-H Bae, Y-D Park, “Effect of Rivet Coating Corrosion Behavior on Mechanical Performance: CFRP to Aluminum Self-piercing Riveted Joints” International Corrosion Engineering Conference (ICEC 2019), Incheon, Korea, Oct 13-17, 2019
5. **Md Abdul Karim**, J-H Bae, T Jeong, D-H Kam, C Kim, Y-D Park*, “Effect of Rivet Coating on Joint Quality and Load Bearing Capacity of Self-piercing Riveted Joints”, 72nd IIW Annual Assembly and International Conference, International Institute of Welding, Bratislava, Slovakia, July 7-12, 2019
6. **Md Abdul Karim***, J-H Bae, D-H Kam, C Kim, Y-D Park, “Friction Effect of Rivet Coatings on Joint Quality and Mechanical Performance of Self-piercing Riveted Joints”, KWJS 2019 Spring Conference, The Korean Welding and Joining Society, Yeosu, Korea, May 16-17, 2019
7. **Md Abdul Karim***, J-H Bae, D-H Kam, N-K Jeon, C Kim, C Jeong, Y-D Park, “Assessment of Corrosion Behavior of CFRP/Aluminum Self-piercing Riveted Joints for Different Rivet Coatings”, KSAE 2018 Annual Autumn Conference and Exhibition, The Korean Society of Automotive Engineers, Gwangwondu, Korea, Nov 14-17, 2018
8. **Md Abdul Karim***, J-H Bae, D-H Kam, N-K Jeon, C Kim, C Jeong, Y-D Park, “Effect of Rivet Coating Types on Joint Integrity and Corrosion Behavior for CFRP to Aluminum Self-piercing Rivet Joints”, The CSSK Autumn Meeting & Power Plant Symposium-Forum Abstracts 2018, Daejeon, Korea, Oct 24-25, 2018
9. **Md Abdul Karim**, J-H. Bae*, D-H Kam, C Jeong, and Y-D Park, “A Comparative Study on the Corrosion Behavior of Self-Piercing Riveted CFRP/Steel and CFRP/Al Joints”, AiMES 2018 Meeting, The Electrochemical Society, Cancun, Mexico, Sep. 30 – Oct. 4, 2018
10. **Md Abdul Karim***, M R Karim, and A Z A Saifullah, “Feasibility of Wind Power for St. Martin’s Island of Bangladesh”, 13th International Knowledge Globalization Conference, IUBAT, Dhaka, Bangladesh, Feb. 23-26, 2018

POSTER PRESENTATIONS

1. **Md Abdul Karim** and D B Kim, “CNN-based anomaly detection from voltage waveform data in wire-arc additive manufacturing”, 18th Research and Creative Inquiry Day, Tennessee Tech University, Tennessee, USA, April 15, 2023
2. **Md Abdul Karim**, J-H Bae, T-Y Kang, T Jeong, D-H Kam, C Kim, Y-D Park, “Role of Rivet Head Height on Corrosion Performance: CFRP/Aluminum Self-piercing Riveted Joints”, KWJS 2019 Autumn Conference, The Korean Welding and Joining Society, Daejeon, Korea, Nov 16-17, 2019
3. **Md Abdul Karim**, T-Y Kang, and Y-D Park, “Influence of Flow Drilling Screw (FDS) Process Variables on Joint Characteristics”, KWJS 2019 Autumn Conference, Daejeon, Korea, Nov 16-17, 2019

FELLOWSHIPS & AWARDS

1. Eminence Award for Exceptional Teaching Assistant: College of Engineering, Tennessee Tech University, USA, 2022
2. Eminence Award for Doctor of Philosophy Best Paper: College of Engineering, Tennessee Tech University, USA, 2022
3. College of Engineering Distinguished Fellowship: College of Engineering, Tennessee Tech University, USA, 2022
4. Best Paper – Journal of Welding and Joining: Sheet material effects on performance of self-piercing riveting, 2022
5. Conference’s Best Presenter: Friction effect of rivet coatings on joint quality and mechanical performance of self-piercing riveted joints (presentation title), KWJS 2019 Spring Conference, South Korea, 2019
6. Academic Excellence: Department of Mechanical Engineering, International University of Business Agriculture & Technology, Bangladesh