DR. ZAFAR ALAM

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Department of Mechanical Engineering
Indian Institute of Technology (Indian School of Mines)
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ACADEMIC QUALIFICATION

Doctor of Philosophy [2019]
Department of Mechanical Engineering, Indian Institute of Technology Delhi, India

Master of Technology [2014]
Department of Mechanical Engineering, Indian Institute of Technology Delhi, India

Bachelor of Technology [2012]
Faculty of Engineering & Technology, Jamia Millia Islamia, New Delhi, India

Senior Secondary Examinations [2008]
Senior Secondary School, Jamia Millia Islamia, New Delhi, India

Higher Secondary Examinations [2006]
St. Anthony's School, Darjeeling, West Bengal, India

TEACHING AND RESEARCH INTEREST

Teaching Interest

- Manufacturing technology/science
- Conventional and advanced machining processes
- Computer aided manufacturing
- Industrial automation

Research Interest

- Magnetic field assisted finishing/polishing
- Magnetorheological finishing/polishing
- Laser assisted post-processing of additively manufactured parts
- Automation in manufacturing
- Customized CNC controller development
- Cyber-physical systems

AWARDS AND ACHIEVEMENTS

1. "*Gandhian Young Technological Innovation (GYTI) Award - 2023*" at the India International Centre, New Delhi, India. [05th November, 2024]

2. "*Best Paper Award*" at International Conference on Industrial and Manufacturing Systems (CIMS) held at NIT Jalandhar, India. [09th - 11th October, 2020]

3. "*Best Paper/poster Award*" at 7th International and 28th All India Machine Tool Design and Research (AIMTDR) Conference held at Anna University, India. [13th - 15th December, 2018]

4. "*Gandhian Young Technological Innovation (GYTI) Award - 2017*" at the Festival of Innovation held at Rashtrapati Bhawan, New Delhi, India. [05th March, 2017]

5. Winner of the "*Best Project in Mechanical Engineering at National Level*" at the ISSRD Engineering Students Innovation Challenge. [27th & 28th January, 2017]

6. Winner of the "*National Technical Institutes Competition*" at the Manufacturing Today Conference & Awards sponsored by Aditya Birla Group and hosted by ITP publishing company in Pune, India. [02nd September, 2016]

SPONSORED PROJECTS

1. "*Development of Algorithms for Collaborative Dual Arm Manipulation and Control*" sponsored by DRDO R & DE (Engineers) for INR 285.00 lacs. [Role: Co-PI; Status: Ongoing]

2. "*Design and Development of Quadruped Robot for Mining Application*" sponsored by TexMin TIH for INR 45.00 lacs. [Role: Co-PI; Status: Completed]

3. "*Design and Development of Hardware for Controls using Ball Screw/Belt Type Linear Actuators*" sponsored by Janatics India Pvt. Ltd. for INR 38.44 lacs. [Role: Co-PI; Status: Completed]

CONFERENCES/SEMINARS/WEBINARS ORGANIZED

1. Two-day International conference on "*Industrial Problems on Machines and Mechanisms (IPRoMM)*" at the Department of Mechanical Engineering, IIT (ISM) Dhanbad, India. [22nd & 23rd December, 2022]

2. Two-day lecture series on "*Advances and Engineering Challenges in Medical Robotics*" at the Department of Mechanical Engineering, IIT (ISM) Dhanbad, India. [23rd & 28th September, 2021]

3. Two-day webinar on "*Robotics and Automation*" at the Department of Mechanical Engineering, IIT (ISM) Dhanbad, India. [06th & 07th February, 2021]

4. Four-day webinar on "*Mechanical Engineering Solution to Biomedical Problems*" at the Department of Mechanical Engineering, IIT (ISM) Dhanbad, India. [24th - 27th September, 2020]

EXPERT/GUEST LECTURES DELIVERED

1. *"Pneumatic & Electro-pneumatic Automation*" at the e-STC on Advanced Manufacturing and Industrial Automation held at NIT Hamirpur, India. [30th January, 2024]

2. "*Automated Finishing of Femoral Knee Implant Component by Ball End Magnetorheological Finishing Process*" at the e-Workshop titled Materials and Manufacturing: Insights to Modern Technologies held at Birla Institute of Technology Sindri, India. [03rd August, 2022]

3. "*Manufacturing Automation*" at the webinar titled Low-Cost Automation held at Zakir Hussain College of Engineering and Technology, Aligarh Muslim University, India. [25th July, 2022]

4. "*Low-Cost Automation*" at the faculty development program titled Application of Robotics in Enhancing Learning Contents held at NIT Agartala, India. [07th July, 2021]

5. "*Circuit Design for Pneumatic & Electro-pneumatic Systems*" at the e-workshop titled Condition Monitoring and Industrial Automation held at NIT Hamirpur, India. [26th March, 2021]

6. "*Low-Cost Automation (Pneumatic/Hydraulic Systems)*" at the e-workshop titled Condition Monitoring and Industrial Automation held at NIT Hamirpur, India. [25th March, 2021]

7. "*Automated Finishing of Femoral Knee Implant Component by Ball End Magnetorheological Finishing Process*" at the webinar titled Mechanical Engineering Solution to Biomedical Problems held at IIT (ISM) Dhanbad, India. [26th September, 2020]

8. "*Ball End Magnetorheological Finishing*" at the short-term course titled Advanced Manufacturing Processes held at Katihar Engineering College, India. [12th September, 2020]

PATENTS

1. "*Multi-magnet tool for improved magnetorheological finishing*" Indian Patent No. 549836 [Granted on 09th September, 2024]

2. "*A battery-free solar iron press and the heating system thereof*" Indian Patent No. 516587 [Granted on 28th February, 2024]

3. "*Magnetorheological finishing tool with electromagnet cooling*" Indian Patent No. 490546 [Granted on 28th December, 2023]

4. "*System for supplying polishing fluid*" Indian Patent No. 468576 [Granted on 13th November, 2023]

5. "*A system and method to control a pneumatic medical bed through electroencephalography signals*" Indian Patent Application No. 202231048536 [Filed: 25th August, 2022 and Published: 09th September, 2022]

6. "*System and method for flexible honing of internal surface of elongated cylindrical workpiece longitudinally*" Indian Patent Application No. 202231011033 [Filed: 01st March, 2022 and Published: 01st September, 2023]

PUBLICATIONS

JOURNAL PAPERS

1. M. Kumar and **Z. Alam**, "*Design and development of a novel MR finishing method for hollow cylindrical surfaces*" Materials and Manufacturing Processes, 39/16, pp: 2279-2290. [2024]

2. S. Maheshwari, A. Kumar, P.S. Chaurasia, T. Niranjan, **Z. Alam**, and Sarthak S. Singh, "*Temperature and strain rate-dependent compression properties of 3D-printed PLA: an experimental and modeling analysis*" Rapid Prototyping Journal, 30/7, pp: 1462-1475. [2024]

3. S. Maheshwari, **Z. Alam**, and Sarthak S. Singh, "*Investigating the large strain compression properties of PLA parts manufactured by FDM using experiments and constitutive modeling*" Rapid Prototyping Journal, 30/3, pp: 555-570. [2024]

4. S. Maheshwari, A. Kar, **Z. Alam**, and L. Kumar, "*Deep neural network-based approach for modeling, predicting, and validating weld quality and mechanical properties of friction stir welded dissimilar materials*" JOM, 75/11, pp: 4562-4578. [2023]

5. F. Iqbal, **Z. Alam**, D.A. Khan and S. Jha, "*Automated insular surface finishing by ball end magnetorheological finishing process*" Materials and Manufacturing Processes, 37/4, pp: 437-447. [2021]

6. F. Iqbal, **Z. Alam** and S. Jha, "*Modelling of transient behaviour of roughness reduction in ball end magnetorheological finishing process*" International Journal of Abrasive Technology, 10/3, pp: 170-192. [2020]

7. **Z. Alam,** D.A. Khan and S. Jha, "*MR fluid-based novel finishing process for nonplanar copper mirrors*" International Journal of Advanced Manufacturing Technology, 101/1-4, pp: 995-1006. [2019]

8. **Z. Alam,** F. Iqbal, S. Ganesan and S. Jha, "*Nanofinishing of 3D surfaces by automated five axis CNC ball end magnetorheological finishing machine using customized controller*" International Journal of Advanced Manufacturing Technology, 100/5-8, pp: 1031-1042. [2019]

9. A. Kumar, **Z. Alam,** D.A. Khan and S. Jha, "*Nanofinishing of FDM-fabricated components using ball end magnetorheological finishing process*" Materials and Manufacturing Processes, 34/2, pp: 232-242. [2019]

10. F. Iqbal, **Z. Alam**, D.A. Khan and S. Jha, "*Constant work gap perpetuation in ball end magnetorheological finishing process*" International Journal of Precision Technology, 8/2-4, pp: 397-410. [2019]

11. D.A. Khan, **Z. Alam**, F. Iqbal and S. Jha, "*Experimental investigations on the effect of relative particle sizes of abrasive and iron powder in polishing fluid composition for ball end MR finishing of copper*" International Journal of Precision Technology, 8/2-4, pp: 354-364. [2019]

12. **Z. Alam**, D.A. Khan, F. Iqbal and S. Jha, "*Effect of polishing fluid composition on forces in ball end magnetorheological finishing process*" International Journal of Precision Technology, 8/2-4, pp: 365-378. [2019]

13. **Z. Alam,** D.A. Khan and S. Jha, "*A study on the effect of polishing fluid volume in ball end magnetorheological finishing process*" Materials and Manufacturing Processes, 33/11, pp: 1197-1204. [2018]

14. **Z. Alam** and S. Jha, "*Modeling of surface roughness in ball end magnetorheological finishing (BEMRF) process*" Wear, 374-375C, pp: 54-62. [2017]

15. **Z. Alam,** F. Iqbal and S. Jha, "*Automated control of three axis CNC ball end magneto-rheological finishing machine using PLC*" International Journal of Automation and Control, 9/3, pp: 201-210. [2015]

CONFERENCE PAPERS

1. D.A. Khan, **Z. Alam**, F. Iqbal and S. Jha, "*Experimental investigations into nanofinishing of aluminium using ball end magnetorheological finishing process*" 20th International Conference on Manufacturing Research (ICMR), Aberystwyth University, U.K. [6th - 8th September, 2023]

2. S. Maheshwari, A. Siddharth and **Z. Alam**, "*Control of pneumatically actuated hospital bed using EEG signal*" 2nd International and 14th National Conference on Industrial Problems on Machines and Mechanisms (IPRoMM), Indian Institute of Technology (Indian School of Mines) Dhanbad, India. [22nd & 23rd December, 2022]

3. **Z. Alam**, D.A. Khan, F. Iqbal and S. Jha, "*A theoretical and experimental study on forces in ball end magnetorheological finishing process*" 8th International and 29th All India Manufacturing Technology, Design and Research (AIMTDR) Conference, PSG College of Technology, India. [9th - 11th December, 2021]

4. M. Osama, F. Iqbal, D.A. Khan and **Z. Alam**, "*Design and development of novel multipoint epicyclic superfinishing tool*" International Conference on Industrial and Manufacturing Systems (CIMS), NIT Jalandhar, India. [9th - 11th October, 2020]

5. M.O. Qidwai, F. Iqbal and **Z. Alam**, "*Thermal analyses of ball end magnetorheological finishing tool*" International Conference on Industrial and Manufacturing Systems (CIMS), NIT Jalandhar, India. [9th - 11th October, 2020]

6. **Z. Alam**, D.A. Khan, F. Iqbal, A. Kumar and S. Jha, "*Design and development of cartridge-based automated fluid delivery system for ball end magnetorheological finishing process*" 7th International and 28th All India Manufacturing Technology, Design and Research (AIMTDR) Conference, Anna University, India. [13th - 15th December, 2018]

7. D.A. Khan, **Z. Alam**, F. Iqbal and S. Jha, "*Design and development of improved ball end MR finishing tool with efficacious cooling system*" 7th International and 28th All India Manufacturing Technology, Design and Research (AIMTDR) Conference, Anna University, India. [13th - 15th December, 2018]

8. F. Iqbal, **Z. Alam**, D.A. Khan and S. Jha, "*Part program-based process control of ball-end magnetorheological finishing*" 7th International and 28th All India Manufacturing Technology, Design and Research (AIMTDR) Conference, Anna University, India. [13th - 15th December, 2018]

9. **Z. Alam**, D.A. Khan, F. Iqbal and S. Jha, "*Effect of polishing fluid composition on forces in ball end magnetorheological finishing process*" 10th International Conference on Precision, Meso, Micro and Nano Engineering (COPEN), IIT Madras, India. [7th - 9th December, 2017]

10. D.A. Khan, **Z. Alam**, F. Iqbal and S. Jha, "*Experimental investigations on the effect of relative particle sizes of abrasive and iron powder in polishing fluid composition for ball end MR finishing of copper*" 10th International Conference on Precision, Meso, Micro and Nano Engineering (COPEN), IIT Madras, India. [7th - 9th December, 2017]

11. F. Iqbal, **Z. Alam**, D.A. Khan and S. Jha, "*Constant work gap perpetuation in ball end magnetorheological finishing process*" 10th International Conference on Precision, Meso, Micro and Nano Engineering (COPEN), IIT Madras, India. [7th - 9th December, 2017]

12. **Z. Alam**, D.A. Khan, F. Iqbal and S. Jha, "*Analysis of forces in ball end magnetorheological finishing process*" 39th International MATADOR Conference on Advanced Manufacturing, University of Manchester, U.K. [5th - 7th July, 2017]

13. D.A. Khan, **Z. Alam**, F. Iqbal and S. Jha, "*A study on the effect of polishing fluid composition in ball end magnetorheological finishing of aluminum*" 39th International MATADOR Conference on Advanced Manufacturing, University of Manchester, U.K. [5th - 7th July, 2017]

14. F. Iqbal, **Z. Alam**, D.A. Khan and S. Jha, "*Localized finishing by ball end magnetorheological finishing process using integrated confocal sensor for in-situ surface roughness measurement*" 39th International MATADOR Conference on Advanced Manufacturing, University of Manchester, U.K. [5th - 7th July, 2017]

15. D.A. Khan, **Z. Alam** and S. Jha, "*Nanofinishing of copper using ball end magnetorheological finishing (BEMRF) process*" ASME International Mechanical Engineering Congress and Exposition (IMECE), Phoenix, Arizona, U.S.A. [11th - 17th November, 2016]

BOOK CHAPTERS

1. M. Kumar, S. Maheshwari and **Z. Alam**, "*Advanced finishing processes for internal cylindrical surfaces: A review*" In: F. Iqbal, D.A. Khan and Z. Alam (ed) Nanofinishing of Materials for Advanced Industrial Applications, CRC press. [2024]

2. S.S. Rathore, V. Sharma, F. Iqbal, D.A. Khan, **Z. Alam** and N. Arora, "*Process automation for abrasive-based precision-finishing techniques*" In: F. Iqbal, D.A. Khan and Z. Alam (ed) Nanofinishing of Materials for Advanced Industrial Applications, CRC press. [2024]

3. A. Bhatnagar, **Z. Alam**, D.A. Khan and F. Iqbal, "*Nanofinishing in light of optimization and sustainability*" In: F. Iqbal, D.A. Khan and Z. Alam (ed) Nanofinishing of Materials for Advanced Industrial Applications, CRC press. [2024]

4. S. Maheshwari, A. Siddharth, **Z. Alam**, F. Iqbal and D.A. Khan, "*Laser-based post-processing technologies for additive manufactured parts*" In: A. Kar and Z. Alam (ed) Solid-State Additive Manufacturing, CRC press. [2023]

5. F. Iqbal, **Z. Alam** and D.A. Khan, "*Additive Manufacturing and Post-processing: An Introduction*" In: Z. Alam, F. Iqbal and D.A. Khan (ed) Post-processing Techniques for Additive Manufacturing, CRC press. [2023]

6. **Z. Alam**, F. Iqbal and S. Jha, "*Modeling and analysis of forces and finishing spot size in ball end magnetorheological finishing (BEMRF) process.*" In: A. Pramanik (ed) Machining and Tribology: Processes, Surfaces, Coolants, and Modeling, Elsevier. [2022]

7. F. Iqbal, **Z. Alam**, M. Shukla, J. Malhotra and S. Jha, "*Transforming standalone machine tool to a cyber-physical system: A use case of BEMRF machine tool to tackle COVID-19 restrictions*" In: T. Semwal and F. Iqbal (ed) Cyber-Physical Systems: Solutions to Pandemic Challenges, CRC press. [2022]

8. S. Maheshwari, A. Siddharth and **Z. Alam**, "*Role of additive manufacturing cyber-physical system during COVID-19 pandemic*" In: T. Semwal and F. Iqbal (ed) Cyber-Physical Systems: Solutions to Pandemic Challenges, CRC press. [2022]

BOOKS

1. F. Iqbal, D.A. Khan and **Z. Alam**, "*Nanofinishing of Materials for Advanced Industrial Applications*" CRC press. [2024]

2. A. Kar and **Z. Alam**, "*Solid State Additive Manufacturing*" CRC press. [2023]

3. **Z. Alam**, F. Iqbal and D.A. Khan, "*Post-processing Techniques for Additive Manufacturing*" CRC press. [2023]

4. D.A. Khan, **Z. Alam** and F. Iqbal, "*Magnetic Field Assisted Finishing: Methods, Applications and Process Automation*" CRC press. [2022]

[Updated on 18th January, 2025]