RAMESH KUMAR SINGH

COMMUNICATION ADDRESS

G. K. Devarajulu Chair Professor
Department of Mechanical Engineering
Indian Institute of Technology Bombay
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EDUCATION

Doctor of Philosophy in Mechanical Engineering *2007*
Georgia Institute of Technology**,** Atlanta, Georgia, USA
- Major: Manufacturing
- Minor: Materials
- Ph.D. Dissertation Title: *Laser Assisted Mechanical Micromachining of Hard-to-Machine Materials*

Master of Science in Mechanical Engineering *2002*
Graduate Certificate in Manufacturing Engineering *2002*
Tufts University, Medford, Massachusetts, USA
- Major: Manufacturing
- Minor: Materials
- M.S. Thesis Title: *Impact Modeling of Composite Polymeric Enclosures*

Bachelor of Engineering in Mechanical Engineering *1997*
Birla Institute of Technology, Ranchi, India
- Major: Mechanical Engineering

RESEARCH EXPERIENCE

Research Areas
- Additive Manufacturing, Finite Element Modeling, Dynamics of High-speed Micromachining, Systems Integration, and Special Purpose Machine Development

Funded Projects
- *Fully Automated Continuous Jacketed Dosing System* (2023-25, PI, Jay Chemicals-**INR 6 million**)
- *Multifunctional Additive and Ablative Materials Processing via Quasi-Continuous Wave Fiber Laser for Novel Industrial Applications* (2023-26, PI, Funded by Imprint IIC2:ANRF, Bharat Forge and Aditya Birla Science and Technology Company- **INR 16 million)**
- *Metal Matrix Composite Cladding via Directed Energy Deposition for Tailored Thermophysical Response*, (2021-25, PI, Funded by VAJRA Faculty Scheme ANRF- **INR 2.8 million)**
- *Hybrid Additive-Subtractive Manufacturing technology development,* (2020-24, Co-PI, Funded by UAY, MHRD, Industry -**INR 24 million**)
- *Design Development and Experimental Investigation of Axial Superconducting Magnetic Bearing (SMB),* (2018-22, Co-PI, Funded by BRNS- **INR 8.3 million)**
- *Towards Sustainable Manufacturing at the Microscale: Addressing Some Scientific and Technological Issues*, Swarna Jayanti Fellowship in Engineering Sciences **(most selective and highly prestigious research grant in India awarded to 2 or 3 researchers in all of Engineering Sciences**

every year, 2016-2021, PI, Funded by DST- **INR 30 million)**

- *In-situ Robotic Restoration System Based on Laser Cladding* (2016-2020, PI, funded by AMT, DST- **INR 20 million**)
- *Development of Robotic system for Automated Cleaning of Solar Photovoltaic (PV) Panel Grids in Indian/tropical Conditions* (2016-2019, Co-PI, PI Prof. Abhishek Gupta and Co-PI Prof. V. Kartik, NTPC- **INR 25.5 million**)
- *Investigation into High Speed Micro-grinding Process for Difficult to Machine Materials* (2016-2019, Co-PI, PI Prof. Rakesh Mote, DST- **INR 3.5 million**)
- *Finite Element Modelling of Ring Rolling Process for Aerospace Alloys* (2017-2020, Co-PI, PI Prof. K. Narasimhan, ARDB-**INR 8.5 million**)
- *Development of Robust and Accurate Techniques for Measurement of Damage Induced Ultrasonic Nonlinearity in Solids* (2017-2020, Co-PI, PI Prof. Salil Kulkarni, ARDB-**INR 2.84 million**)
- *Flexible Reconfigurable Fiber Laser-Assisted Manufacturing at Microscale* (2008-11, PI, Funded by DST- **INR 4 million)**
- *Micro/Nano Technology Development: Nano-polishing of Semi-spherical Single Crystals and Arrayed Microstructure Fabrication by Excimer Laser LIGA* (Co-PI, Funded by BARC-**INR 6.6 million**)
- *Novel Process Variants of Micro-EDM* (Co-PI, Funded by DST-**INR 3.5 million**)
- *Engineered Surfaces for Desired Functional Response* (Co-PI, Funded by ISRO-INR **2.6 million**; PI, CSIR – INR **2.0 million**)

Funded Research Facility

- Precision Metrology Facilities in Machine Tools Lab (**INR 50 million, Co-PI**)
- Micromachining and Micrometrology Facilities (PI, funded by RIFC, IITB and NCAIR, **INR 18.8 million**)
- Surface Characterization Facility (funded by IIT Bombay and COEST, **INR 11 million**)

STARTUP MENTORSHIP

- *Micromach Innovations Pvt. Ltd.* (Co-founded by PhD students and me to commercialize High-speed Micromachining Centers and Special Purpose Machines developed in the lab)
- *Idris Automation* (Provide mentorship and technical advice to the company started by alumni of IIT Bombay)

CONSULTING EXPERIENCE

- *Water Resources Department* (INR 9 million): Non-Destructive Testing and Health Monitoring of Radial Gate Drive Components and Redesign of Gate Guide Mechanism of KDPH stop log gate at Koyna Dam
- *Tata Advanced Systems Limited* (INR 1.42 million): Regarding Third Party Audit - NMMC - CCTV project
- *JSW* **(INR 2.9 million):** BFNV wagon failure analysis
- *Technocraft Industries* (**INR 0.6 million**): Design of submarine shutter assembly
- *Tata Power, India* **(INR 1 million):** Assessment of residual life due to frequent cycling in the PLF of U5 O/L FSH
- *Jay Chemicals, India* **(INR 1.8 million)**: Design and development of a jacketed dosing system
- *Indian Institute of Technology Bhilai, India* (**INR 10.2 million)**: Development of high-speed micromachining center
- *Bharat Forge, India* (**INR 0.7 million**): Characterization of wear and erosion of different coatings under thermal shock loading

- *Larsen & Toubro Defense, India* (**INR 0.6 million**): Study of laser material interaction
- *T-Rish Gems, India* (**INR 1.0 million**): Development of micromachined QR codes for jewelry
- *Ceat Tyres, Halol, India* (**INR 6.0 million**): Development of laser based robotic vent cleaning system
- *Ceat Tyres, Halol, India* (**INR 1.5 million**): Development of vision-based metrology system for tyre centering
- *Ordnance Factory, Ambernath, India* (**INR 3.0 million**): Development of Safe and Arm Device
- *Navaratna Industries, Nagpur, India* (**INR 0.8 million**): Design of fall arrester
- *Pest Control India, Mumbai, India* (**INR 1.2 million**): Design of 1500 cuft sterilizer
- *Bond Safety Belts, Mumbai, India* (**INR 0.7 million**): Design for manufacture of ELR mechanism

INDUSTRIAL EXPERIENCE

Project Engineer *1999-2000*
Engineers India Ltd., New Delhi, India
- Technical supervision of project execution for petrochemical projects at different sites in India
- Handled planning, scheduling and billing

Rotating Equipment Engineer *1997-1999*
Engineers India Ltd., New Delhi, India
- Application engineering for pumps, compressors and gas turbines in the field of petrochemical, oil refineries, power plants and metallurgical operations
- Coordination with other engineering departments such as Process, Piping and Structures
- Erection of new units, alignment and commissioning at various installation sites

TEACHING EXPERIENCE

Professor, Indian Institute of Technology Bombay *2018-*
Associate Professor, Indian Institute of Technology Bombay *2014-18*
Assistant Professor, Indian Institute of Technology Bombay *2008-2014*
Instructor, Georgia Institute of Technology, Atlanta *2007*

Student Guidance

- Masters (M.Tech. + Dual Degree) – **75 graduated** + 3 in progress
- PhD– **19 graduated** + 8 in progress
- Postdoctoral Fellows- **6 finished**, 1 under progress

List of Guided Students

- ***Doctor of Philosophy***
  1. Vishnu Narayanan (2024), Computational Modelling and Experimental Analysis of Nanosecond Pulsed Laser Cleaning of Rust
  2. Sachin Alya (2023), Development of Laser Directed Energy Deposition Based Robotic Restoration System
  3. Chaitanya Vundru (2021), Modeling of Laser Directed Energy Deposition
  4. Karuna Dhale (2021), Study of the deformation behaviour of metallic glasses and its implementation in machining operation at the micro-scale
  5. Abhishek Mukherjee (2020), Modelling cancer mechanics across multiple length scales: from basic understanding to applications

6. Anandita Singh (2020), Study of Process Characteristics of Microgrinding
7. Abhishek Kumar Singh (2020), Flow forming studies of Titanium alloys
8. Jacob James (2020), Process development and modeling of 3-D free-form excimer laser micromachining from HBNI
9. Rinku Kumar Mittal (2019), Investigation of tribological effects on the dynamic stability in high-speed micromilling of Ti-6Al-4V
10. Suryawanshi Pradeepkumar Pandurang (2019), A novel mass spring model for simulating transversely isotropic materials under in-plane loading
11. Kundan Kumar Singh (2018), Modeling and experimental analysis of dynamic stability in high speed micromilling process
12. Gulshan Kumar (2017), Residual stresses in zirconium: a combined experimental and numerical study
13. Santanu Paul (2017), Laser surface cladding for structural repair
14. Sumit Tripathi (2017), High internal phase emulsions: interfacial, rheological and transport studies
15. Dattatraya Parle (2016), Modeling of size effect in micro-cutting considering fracture and microstructure
16. Sachin Adinath Mastud (2014), Development and modeling of reverse micro-EDM for fabrication of high aspect ratio features and textured surfaces
17. Ganesh Soni (2014), Novel multiscale modeling schemes of damage evolution in composite laminates
18. Dongre Ganesh Govardhan (2014), Efficient slicing of silicon ingots by wire-EDM process with focus on photovoltaic applications
19. Vivek Bajpai (2013), Characterization and modeling of pyrolytic carbon micromachining for creation of engineered features

- ***Masters (Dual Degree, B.Tech.+ M.Tech.)***

1. Jayendra Singh (2025), Modular Interface System Design for Hybrid Manufacturing
2. Mohit Jaroyia (2025), Development of Real-Time Autonomous Damage Detection System for Robotic Restoration
3. Prince Sahu (2022), Development and Integration of 5-Axis CNC system for Micro-Milling Application
4. Shobhit Agrawal (2022), Microstructure and Mechanical properties of Inconel 718/Yttrium-Stabilized Zirconia (YSZ) Metal Matrix Composite Coating produced by Laser Direct Energy Deposition
5. Divyanshu Solanki (2021), Design of Gripper for Modular-Head Docking System
6. Rohit Sencha (2021), Ablative Materials Processing via Q.C.W. Fibre Laser
7. Mayur Vinayak Gaikwad (2021), Development of autonomous damage detection systems for robotic restoration systems based on laser additive manufacturing
8. Pranjal Amule (2018), Design of fixture for free-form holding
9. Akash Kishore (2018), Development of software for dynamic stability analysis in micromachining
10. Rajendra Thathe (2017), Molecular dynamics simulation of gas-assisted excimer laser micromachining
11. Anurag Malviya (2017), Laser cleaning of tire mold vents
12. Patel Swapnil Shailesh (2016), Effect of micro tool coatings on cutting force and surface topography in high speed micromilling of Ti6Al4V
13. Rik Chatterjee (2016), Parallel manipulators for free form laser cladding applications
14. Ravalia Sugat Shamjibhai (2016), Modeling of dynamic stability in high speed micromilling
15. Bhag Chand Meena (2016), Effect of micro engineered texture surface of Ti-alloy on wettability and corrosion behavior

16. Ashwin Uttam Ahire (2015), Modeling of drilling induced damage in composite laminates
17. Shubham Yadav (2015), Burr formation modelling & analysis in microdrilling of Titanium alloys
18. Ashutosh Unhale (2015), Microscale damage detection in a composite laminate using representative volume element
19. Kumar Keshav (2015), Laser cladding: free form deposition
20. Vijay Mahawar(2014), Micro machining characterization of ultra-thin membranes
21. Sebastrian Bala (2014), Designing of rail guided fall arresters
22. Surendra Kumar Meena (2013), Tensile and delamination testing of composite materials
23. Abhishek Shrivastav (2013), Modeling of laser surface cladding
24. Parth Choksi (2013), Tensile failure in unidirectional composite materials
25. Kulkarni Anish Ajit (2012), Modeling of laser ablation and fabrication of microstructures
26. Purushottam Meena (2012), Experimental investigation and finite element modeling of cross-ply glass fiber/epoxy laminates
27. Bhaskar Chandra Bharti (2012), Design and development of desktop high speed micromilling machine
28. Mohit Janoiya (2012), Laser surface cladding using coaxial powder feeder mechanism
29. Prashant Kumar (2011), Design and development of conformal hydrodynamic nanopolishing machine and process for polishing single crystal sapphire
30. Gupta Ishank Manoj (2011), Laser surface cladding
31. Mayank Garg (2011), Numerical simulation of bulk flow over textured surfaces
32. Piyush Anand (2011), Laser surface texturing
33. Akshay Shrivastava (2011), Process characterization of reverse micro EDM
34. Arvind Krishna (2011), Modeling of residual stresses at elevated temperatures
35. Jagdish Prasad Meena (2011), Fabrication of PDMS arrayed micro structures using silicon etching-LIGA
36. Gurpreet Singh Bhatti (2010), Finite element modeling of laser assisted machining of AISI D2
37. Rishabh Bhandari (2010), Anti-lock brake system for two wheelers
38. Rinku Kumar Mittal(2010), Characterization and modeling of hydrodynamic nanopolishing process
39. Prithvi Raj (2010), Design and fabrication of super-hydrophobic surface for single-droplet
40. Gautam Vijay Salhotra, (2010), Modelling the machining characteristics of pyrolytic graphite
41. Ashish Mall (2010), Design and fabrication of superhydrophobic surfaces for bulk flow
42. Lohit Dhamija (2010), Design and analysis of rod cutter for biomedical application
43. Mrinal Joshi (2009), Hydrodynamic polishing of hardened steels
44. Nikhil Jain (2009), A statistical approach for integrating analytical and finite element models in micromachining applications

- ***Masters (M. Tech)***

45. Preeti Banzare (2025), Optimizing Material Selection for Thrust Washer Bearings in Drivetrain Applications for Optimum Wear Using Simulation and Physical Testing
46. Md. Selim (2024), Development of a Multi-Track Multi-Layer FE Model to Predict and Mitigate Defects in Laser DED
47. Almigdad Ali (2022), Characterization of Surface Cleaning and Corrosion Properties of Low Carbon Steel by Nanosecond Pulsed Laser
48. Prakhar Jain (2022), Numerical Modeling of Laser Directed Energy Deposition
49. Sandesh Birla (2021), Development of Real-Time Autonomous Damage Detection System for Robotic Restoration

50. Parmar Parth Vinodbhai (2020), Development of a Thermal Barrier Coating via Directed Energy Deposition
51. Kevin Chandrakant Prajapati (2020), Development of 5 Axis High-Speed Micro Machining Center
52. Mehta Prem Manojkumar (2019), Development and integration of translation and rotary micro positioning stages for mechanical machining with closed loop feedback
53. Rushikesh Ingle (2018), Design and development of 5-axis CNC system for micro-milling application
54. Shyam Dutt Shukla (2017), Experimental characterization of minimum quantity lubrication in highspeed micromilling
55. Ishan Ravindra Barai (2016), Development of a 3D thermo-mechanical elastic plastic Finite element model for the ring rolling process
56. Meenakshi Singh (2015), Finite element simulation of bursting of clad tubes used in nuclear reactors
57. Sandip Kumar Balo (2015), 3D finite element simulation of cold pilgering of Zirconium tubes for nuclear applications
58. Phapale Kamlesh Ashok (2015), Study of drilling induced delamination in carbon fiber reinforced polymer materials via conventional and non-conventional drilling techniques
59. Yetalkar Ashutosh Digambar (2014), Laser micro-drilling
60. Badwar Pritam Ganpatrao (2014), Design, Fabrication and control of haptic interface for virtual reality surgical simulator
61. Ashish Hiralal Dhoble (2014), Finite element simulation of pilgering process for nuclear applications
62. Neeraj Gupta (2013), Laser based surface modification of engineering materials
63. Shinde Hemant Popatrao (2013), Finite element analysis of flow forming process
64. Waghmare Kiran Kishor (2013), Brazing of metals and ceramics
65. Avik Samanta (2012), Characterization of residual stresses in laser assisted mechanical micromachining of Inconel 625
66. Kaunain Ashraf (2012), Thermomechanical modeling of laser surface cladding
67. Ravikumar Beeranur (2012), Characterization and mechanical properties of alumina ceramic and metal brazed joint
68. Mahajan Pushkar Shridhar (2012), Finite element analysis of flow forming process
69. Harshita Gupta (2012), Finite element analysis of ring rolling process
70. Prakash Ashok Kattire (2012), Laser cladding for die life enhancement
71. Varkal Vivekkumar Shivram (2011), Finite element analysis of electromagnetic forming
72. Wagh Yogesh Raghunath (2011), Laser surface hardening
73. Mahesh Pradip Teli (2011), Characterization of residual stresses in laser assisted mechanical micromachining
74. Sudhir Sarjerao More (2010), Design and development of hydrodynamic nanopolishing set up and process for super polishing of hard materials
75. Ahirrao Sachin Bhimrao (2010), Fiber laser assisted hardening for steels
76. Doiphode Vijay Govardhanrao (2010), Modeling of laser assisted machining
77. Anil Kumar G. (2010), Finite element analysis of rod cutter devices for biomedical application
78. Raut Prashant Brahmadeo (2009), Excimer laser-LIGA: numerical simulation of micro hot embossing process
79. Lekkala Ravi (2009), Modeling and analysis of burrs in micro milling

Labs and Courses Developed

- Established a unique student run **Tinkerers' Lab** for hands-on skill development for undergraduates at IIT Bombay: Conceived the concept, helped with fund raising, identified the key equipment and

facilities, designed the work-space and involved in mentoring the students who run the lab
- Modernized the Metrology Lab with experiments using laser displacement sensors and focus variation microscopy
- CNC laboratory for ME 213
- Setup workshop at IIT Gandhinagar in its founding year in 2009
- Laser Material Processing, ME 677
- Machine Design, ME 423
- Manufacturing Processes I, ME 206
- Manufacturing Processes II, ME 338
- Advanced Manufacturing Process, ME 649

International Academic Collaborations

- Collaboration under **Vajra Fellowship** for Prof. Anil Saigal and student exchange from Tufts University. Our lab hosted two undergraduates from Tufts University, Medford for summer research internship.
- Joint doctoral student advising with Prof. Harish Cherukuri of **University of North Carolina at Charlotte**
- Joint doctoral guidance with **Monash University in Australia** for 4 PhD students with Dr. Wenyi Yan and Dr. Brian Falzon
- **Invited Professor at Arts et Métiers, Campus of Cluny in France**, Joint research and Postdoctoral Fellow guidance with Prof. Jose Outeiro
- Collaboration with Prof. Roshan Vengazhiyil from **Industrial and System Engineering, Georgia Tech**
- Collaboration with **Australian Nuclear Science and Technology Organization (ANSTO)** for Neutron Diffraction imaging and residual stress measurements for additively manufactured products

SERVICE/ADMINISTRATIVE EXPERIENCE

Associate Dean-II (Infrastructure Planning and Support) *2021-25*
- Coordination and oversight of Electrical, Audio-Visual, HVAC, and Classroom Infrastructure at IIT Bombay
- On-campus/Off-campus accommodation allotment

Professor in-charge, National Center for Aerospace Innovation and Research *2019-23*
- Provide leadership to an aerospace manufacturing research consortium funded by **The Boeing Company, Department of Science and Technology, and, Hindustan Aeronautics Limited**

Co-Convener, Institute of Eminence World Class Research Labs in Advanced Materials and Manufacturing *2018-*
- To provide leadership for the creation of World Class Research Labs in Advanced Materials and Manufacturing as a part of the Institute of Eminence status granted by the Government of India to IIT Bombay with a total outlay of **INR 300 million (~$4 million)**
- Facilities, such as 3-D printing for affordable housing, Ultra-precision machining center for optics, Form and surface Metrology, Additive-subtractive manufacturing and 3-D Composites Manufacturing will be established for carrying out cutting edge research

Convener, Department Faculty Search Committee *2020-2021*

- Coordinate the evaluation applications of the faculty candidates and summarize the feedback obtained from internal reviews and make recommendations

Member, Department Policy Committee *2020-2023*

- Formulate the academic, financial, and organizational policies
- Decide on faculty and staff hiring

Member, Department Undergraduate Committee *2020-2023*

- Formulate and evaluate academic policies for undergraduate programs in the Department
- Evaluate and recommend the addition of new courses and changes to the curriculum of undergraduate courses across in the Department

Member, Institute Undergraduate Programs Committee *2018-2021*

- Formulate and evaluate academic policies for undergraduate programs at IIT Bombay
- Evaluate and recommend the addition of new courses and changes to the curriculum of undergraduate courses across are all disciplines at IIT Bombay

Member, Department Postgraduate Committee *2024-*

- Formulate and evaluate academic policies for postgraduate programs in the Department
- Evaluate and recommend the addition of new courses and changes to the curriculum of postgraduate courses across in the Department

Group Coordinator, Manufacturing *2014-2017*

- Handle all the administrative and academic affairs of the Manufacturing group in the Mechanical Engineering Department at IIT Bombay
- Coordinate the faculty candidate seminars and assist the faculty search committee

Member, Faculty Search Committee *2014-2017*

- Evaluate applications of the faculty candidates and summarize the feedback obtained from internal reviews

Member, Department Space Committee *2014-2017*

- Conduct space audit for the Mechanical Engineering Department
- Facilitate allocation of lab space requested by the faculty members

Member, Department Policy Committee *2011-2014*

- Formulate the academic, financial, and organizational policies
- Decide on faculty and staff hiring

Chairman (Sports) *2012-2015*

- Budget allocation and administration of the sports activities at IIT Bombay
- Coordinate hiring of coaches and support staff for sports activities

PUBLICATIONS

Book

- **Singh, R.,** and Srivastava, A., "Engineering Applications of Lasers," Manuscript under preparation to be published by CRC press

Book Chapters

- Mittal, R. K. and **Singh, R.,** "Process Development and Stability Modeling of High-speed Micromachining, New Horizons in Metallurgy, Materials, and Manufacturing, Indian Institute of Metals, Springer, 2021
- Paul S., **Singh R.**, Yan W., "Finite element simulation of laser cladding for tool steel repair", Lasers based Manufacturing, Springer 2015
- Jacob, J., Shanmugavelu, P., Balasubramaniam, R., **Singh, R.,** "Excimer Laser Micromachining and its Applications" Lasers based Manufacturing, Springer 2015
- **Singh, R.** and V. Bajpai, "Coolant and Lubrication in Machining," Handbook of Manufacturing Engineering and Technology, edited by Andrew Yeh-Ching Nee, Springer 2013
- **Singh, R.**, and Melkote, S. N., "Laser Assisted Mechanical Micromachining," *Smart Devices and Machines for Advanced Manufacturing,* co-edited by Dr. Lihui Wang and Dr. Jeff Xi, Springer-Verlag, London, 2008

Keynote and Awarded Papers in Conferences

- Mittal, R. K., Singh, K. K. and **Singh, R.,** "Process Development and Stability Modeling of High-speed Micromachining of Ti6Al4V, "1st GRGLMM International Symposium Global Situation of Light Metal Manufacturing, University of Toyama, 8th Jan 2021**(Keynote paper)**
- Soni, G., **Singh, R.**, Mitra, M., and Falzon, B. G, "Modeling multiple damage mechanisms via multi-fiber multi-layer representative volume element and micro-macro approach," 9th Australasian Congress on Applied Mechanics (ACAM9), University of new South Wales, Sydney, Dec 2017 **(Keynote paper)**
- Paul S., **Singh R.**, Yan, W., "Thermal model for additive restoration of mold steels using crucible steel" 44th SME North American Manufacturing Research Conference (NAMRC), 2016, Virginia Tech, Blacksburg, USA **(NAMRI SME Outstanding Paper award)**
- Hashimoto, F., Melkote, S. N., **Singh, R.**, and Kalil, R. C., "Effect of Finishing Methods on Surface Characteristics and Performance of Precision Components in Rolling/Sliding Contact, *10th CIRP International Workshop on Modeling of Machining Operations*, Reggio Calabria, Italy, August, 2007 **(Keynote paper)**

Journal Papers

1. Kumar, S., Mittal, R. K., and **Singh, R**., "Real-Time Chatter Onset Detection using Normalized Spectral Entropy in High-Speed Micromilling," submitted to Mechanical Systems and Signal Processing
2. Bhowmik, D., Kumar, S., **Singh, R.**, Kapil, S., and Mittal, R. K., "Comparative Machinability and Chatter Stability in High-Speed Micromilling of Wrought and Additively Manufactured (AM) SS316L" submitted to Journal of Manufacturing Processes
3. Shukla, S., **Singh, R.,** Saigal, A., and Mujumdar, S., "Hard Pseudoelastic TiNiCu Shape Memory Alloy Development via a Novel Thermocapillary-driven Additive Manufacturing Route," (2025), Materials & Design, 114625
4. Hodgir, R**., Singh, R**., and Mujumdar, S., "Strengthening of Additively Manufactured SS316L by In-situ Laser Remelting," (2025), Manufacturing Letters 44, 942-947

5. Alya, S., Choudhury, N., Shukla, S., and **Singh, R.,** "Machining characterization of ultra-hard CPM 9V deposits obtained in laser directed energy deposition-based die restoration," (2025), Manufacturing Letters 44, 964-972
6. Shukla, S., **Singh, R.,** Saigal, A., and Mujumdar, S., "Role of premix powder size on ternary alloy development via laser-directed energy deposition," (2025), Manufacturing Letters 44, 1007-1015
7. Gupta, A. K., **Singh, R.**, and Marla, D., "An Experimental Study of Material Removal Mechanisms in Quasi Continuous Wave (QCW) Fiber Laser Micro-drilling of SS 304,"ASME Journal of Micro and Nano Science and Engineering, (2025), 13 (2), 024502
8. Narayana, V., **Singh, R.,** and Marla, D., "Optimization of Nanosecond Pulsed Laser Cleaning of Rust," (2025). Lasers in Manufacturing and Materials Processing, 12 (1), 68-85
9. Hodgir, R**., Singh, R**., Mujumdar, S., "Simultaneous Enhancement of Build Rate and Microstructure in SS316L Additive Manufacturing through In-Situ Laser Remelting," Journal of Manufacturing Processes, (2025), 133, 865-878
10. Sahoo, P., Banerjee, N., and **Singh, R.,** "Investigating the Effects of Free-volume Generation and Thermal Instabilities on Shear Localization in Micro-cutting of Bulk Metallic Glass, Journal of Manufacturing Processes, (2025), 133, 466-478
11. Kant, V., Nejeeb, I., Alya, S., Jain, P., and **Singh, R.** "Supporting Cognitive Intelligence for Smart Manufacturing Systems using HMI design: Challenges and Fundamental Issues." Journal of Engineering Design, (2025), 36 (11), 1961-1981
12. Ahmed, M. S., Hodgir, R**.,** Mujumdar, S., **Singh, R**., "Computational Modeling of Multi-track Multi-layer Laser Directed Energy Deposition Process," Manufacturing Letters, (2024), 41, 983-991.
13. Hodgir, R**., Singh, R**., Mujumdar, S, "Improved Wear and Corrosion Resistance of Additively Manufactured SS316L by Laser Remelting Process," Manufacturing Letters, (2024), 41, 938-946.
14. Shukla, S., Kachhadiya, R., Singh, R., Saigal, A., Mujumdar, S., "Titanium surface functionalization via directed energy deposition of CuNiTi ternary alloy," Manufacturing Letters, (2024), 41, 972-982.
15. Vundru, C., Ghosh, G., and **Singh, R.**, "Hybrid Analytical-numerical Modeling of Surface Geometry Evolution and Deposition Integrity in a Multi-track Laser-directed Energy Deposition Process," ASME Journal of Manufacturing Science and Engineering, (2024), 146, 061008-1
16. Narayana, V., **Singh, R.,** and Marla, D., "A 3D Computational Model of Nanosecond Pulsed Laser Texturing of Metals for Designing Engineered Surfaces," ASME Journal of Manufacturing Science and Engineering, (2024), 146(5): 051006
17. Mittal, R. K., Kulkarni, S. S, and **Singh, R.**, "A Higher Order Stability Model for High-Speed Micromilling of Ti-6Al-4V based on Rotor Dynamics," Journal of Vibration Engineering and Technologies, (2024), Vol. 12, 4789–4807
18. Suryawanshi, P**, Singh, R**., Gupta, A., A Mass Spring Model Applied for Characterizing Mode I Fracture in Orthotropic Materials, Journal of Mechanics of Materials and Structures, Vol. 19 (2024), No. 2, 213–233
19. Ali, A., Vishnu, N., **Singh, R.**, and Marla, D., "A study on the enhancement of chemical and mechanical properties of low carbon steel surface cleaned with a nanosecond pulsed laser," Journal of Laser Micro/Nanoengineering, (2024), 19 (1), 40-45
20. Gupta, A. K., **Singh, R.**, and Marla, D., "Millisecond Pulsed Laser Micro-drilling of Stainless Steel–Optimizing Hole Quality Using Response Surface Methodology," Laser Micro/Nanoengineering, (2023), 18 (3), 187-195
21. Sahoo, P., Kumar, S., **Singh, R.**, Srinivas, G, Venkataramana, B., and Barshilia, H. C., "Effect of Arc-deposited Diamond-like Carbon (DLC) Coating Thickness on Friction and Size Effects in High-Speed Micromilling of Ti6Al4V," Tribology International, (2023), 192, 109223
22. Hodgir, R**., Singh, R**., Mujumdar, S., "Experimental Investigation of Laser Remelting in Directed Energy Deposition (DED) of CPM-9V," Manufacturing Letters, (2023), 35, 701-706

23. Ghosh, G., Agrawal, S., Saigal, A., **Singh, R**., "Effect of process parameters on the porosity in laser-directed energy deposition of $A_{l2}O_3$ reinforced Inconel-based composite coating," Manufacturing Letters, (2023), 35, 683-688
24. Sahoo, P., Banerjee, N, **Singh R**., "Modeling and Analysis of Chip Segmentation in Micro-cutting of Zr-Based Bulk Metallic Glass (BMG)," Manufacturing Letters, (2023), 35, 297-304
25. Alya, S., Ankamreddy, B., and **Singh, R.**, "Investigation of Bonding Strength and Failure Mechanisms for Sustainable Free-Form Remanufacturing via Laser Directed Energy Deposition," CIRP Journal of Manufacturing Science and Technology, (2023), 42, 55-71
26. Birla, S., Alya, S., and **Singh, R.,** "An Integrated Image Processing Approach for 3-D scanning and Micro-Defect Detection," Journal of Micromanufacturing, (2022) doi:10.1177/ 25165984221123205
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Technical Presentations/Reports

- Manufacturing Roadmap in India, Presented in the Consultative Committee of Young Scientist for High Powered Scientific Committee of DST
- **Singh, R.**, Melkote, S. N., and Kalil, R.C., "Evaluation of Frictional Characteristics of Precision Machined Surfaces," *A technical presentation to Advanced Process Technology Group*, The Timken Company, Canton, Ohio, July, 2004
- **Singh, R.**, Melkote, S. N., and Kalil, R.C., "Evaluation of Functional Characteristics of Precision Finished Surfaces," *Technical report submitted to The Timken Company*, July 2004
- Greif, R., **Singh, R.**, and Saigal, A., "Impact Modeling of Recycled Core Composite Polymeric Enclosures," *2004 ASME International Mechanical Engineering Congress and Exposition, Symposium on design and manufacturing of composites*, New Orleans, Louisiana, November 2002

PATENTS/INVENTION DISCLOSURE

- **US Patent No. 10442117 awarded** (U.S. Patent Application No.: 15/489,188) for "Laser based tyre mold vent cleaning process and device," **R. Singh**, S. Alya, R. Mittal, A. Rahim, S. Kharat, P. Parmar and K. Keshav
- **U.S. patent No. 11210486B2 awarded (U.S. Patent Application No.: 16/410, 432; Filing Date: May 13, 2019)** for "Method for Creating Micro Scale Optical Codes on Jewelry and Gemstones and Scanning Micro Scale Optical Codes thereof for Digital Personalization," R. Mittal, P. Mehta, **R. Singh** and D. Kothari
- **Indian Patent No. 289135 awarded** (Application number 442/MUM/2011) for "Method and device for generating laser beam of variable intensity distribution and variable spot size," **R. Singh**, Y. Wagh, S. S. Joshi, S. Ahirrao, N. Gupta
- **Indian Patent No. 336494 awarded** (1929/MUM/2012) for "Conformal Hydrodynamic Polishing Machine and Process," P. Kumar, **R. Singh**, S. S. Joshi, R. Balasubramanium, T. Dewangan, V. K. Suri
- **Indian Patent No. 389360 awarded (1319/MUM/2012)** for "Surgical Rod Cutter based on Inverse Slider Crank Mechanism," A. Guha, **R. Singh**, L. Dhamija, G. Soni
- **Indian Patent No.: 407619 awarded (2547/MUM/2013)** for "Slicing of ultra-thin wafers using WEDM process," G. Dongre, S. S. Joshi, **R. Singh**

HONORS/AWARDS

- **Elected as Fellow of ASME, 2025**
- **Outstanding Associate Editor 2024,** Transactions of ASME, Journal of Micro and Nano Science Engineering
- **G. K. Devarajulu Chair Professor,** 2021- current, Indian Institute of Technology Bombay
- **Excellence in Teaching,** Departmental Awards, 2020, Indian Institute of Technology Bombay
- **Swarna Jayanti Fellowship**, 2016, DST (for 2016-2021) (**Most prestigious and highly selective research fellowship** in India awarded to around 2 researchers in the field of Engineering Sciences every year)
- **NAMRI/SME Outstanding Paper award** for paper titled "Thermal model for additive restoration of mold steels using crucible steel" 44th SME North American Manufacturing Research Conference (NAMRC), 2016, Virginia Tech, Blacksburg, USA
- **Invited Professor** at Arts et. Métiers, Campus of Cluny, France 2017-2018
- **Chair of the student organizing committee,** ASME 2007 International Manufacturing Science and Engineering Conference, Georgia Tech, Atlanta

- Laser-assisted mechanical micromachining research covered by Industry Week Magazine in October 1, 2007 issue
- 1st Prize at Graduate Research Symposium, Tufts University, Medford, MA (2002)
- Nominated as Mechanical Engineering Department Representative to Graduate Student Council at Tufts University (2001-2002)

PROFESSIONAL ACTIVITIES AND EDITORIAL ASSIGNMENTS

- **President Elect,** International Institute of Micromanufacturing (I2M2)
- **Scientific Committee Chair**, WCMNM 2023, Northwestern University, Evanston, USA.
- **Congress Chair,** 4th World Congress on Micro Nano Manufacturing 2021, Indian Institute of Technology Bombay
- **Executive Committee Member**, International Forum on Micromanufacturing
- **Associate Editor**, ASME Journal of Micro and Nano-Science and Engineering
- **Associate Editor**, IISE Transactions, Design and Manufacturing
- **Member, Editorial Board**
  - Nature Scientific Reports
  - JMST Advances
  - International Journal of Precision Technology
  - Intelligent and Sustainable Manufacturing
- Member Board of Studies: D J Sanghvi College of Engineering, K J Somaiya College of Engineering
- Member Academic Advisory Board: Sardar Patel College of Engineering
- National Expert Committee Member for DRDO Dare to Dream
- Member core committee, Advanced Manufacturing Vertical, Vaibahav (Vaishvik Bhartiya Vaigyanik) Summit organized by DRDO and Niti Ayog
- Member, Young Scientists Consultative Committee, Department of Science and Technology, Government of India
- Evaluation for funding research projects from KU Leuven, Belgium and Polish National Science Academy
- Faculty Promotion Review for NTU, Singapore and RPI, Troy
- Expert, Faculty Interview: IIT Madras, IIT Indore, NIT Calicut
- Member, Academic Advisory Board, Birla Institute of Technology Mesra, Ranchi
- Reviewer for:
  - ASME Journal of Manufacturing Science and Engineering
  - Materials and Manufacturing Processes
  - Proceedings of IMECHE B: Journal of Engineering Manufacture
  - Applied Mathematical Modeling
  - Applied Surface Science
  - Precision Engineering
  - International Journal of Machine Tools and Manufacture
  - International Journal of Advanced Manufacturing Technology
- Member, American Society of Mechanical Engineers (ASME)

KEYNOTE AND INVITED TALKS

- Panel Invitee in ASME Engineering Education Seminar, CSIO Chandigarh, April, 2025
- Industry-Academia symposium 2025, IIT Kanpur, March, 2025

- Keynote at 6th International Conference on "Recent Advancements in Mechanical Engineering (ICRAME 2025)", NIT Silchar, March 2025
- Keynote at IACMC, IIT Bombay, January, 2025
- Invited Talk at 13th International Conference on Precision, Meso, Micro and Nano Engineering (COPEN) at NIT Calicut, Dec 2024
- Invited Talk at TAGMA International Tooling Summit, Mumbai, Aug 24
- Space Society of Mechanical Engineers, National Science Day Talk "From Lab-to-Shop: A Journey of Product Development", Space Application Center, Ahmedabad, Feb 24
- Keynote at International Conference on Futuristic Advancements in Materials, Manufacturing and Thermal Sciences (ICFAMMT 2024), IITRAM, Ahmedabad, Jan 24
- Invited Talk in AM-3D Aero-23 Conference by ASME, MSRIT, Bangalore, Dec 2023
- Keynote at International Conference on Recent Advances in Materials & Manufacturing Technologies (IMMT 2023) BITS Pilani Dubai Campus
- Keynote lecture at 10 years celebration of Engineering Development at CEAT Tyres, April 2022
- Keynote at Global Research Group on Light Metal Manufacturing at University of Toyama, Japan, 2021
- Keynote lecture at Australasian Conference in Applied Mechanics, ACAM9, at UNSW Sydney, November, 2017
- Invited lecture on Industry-Academia Interaction at CMTI, Bengaluru, Jan. 2022
- Invited lecture on Metal Additive Manufacturing (MAM)-2021 at VNIT, Nagpur, Dec. 2021
- Invited lecture on Laser based Manufacturing and Precision Engineering, IIT Indore, June 2021
- Invited lecture in New Horizons in Metallurgy, Materials, and Manufacturing, a national workshop organized by Indian Institute of Metals: "Science and Technology of Miniaturization of Subtractive and Additive Manufacturing", 2021
- Mechanical Engineering Department Seminar at IIT Kanpur, 2021
- Invited lecture in Workshop on Additive Manufacturing in NIT Hamirpur, 2021
- Invited talk at University of North Carolina Charlotte, September 2019
- Invited talk at Michigan State University, East Lansing, June 2019
- Invited Speaker at Bangalore India Nano, Bengaluru, December 2016
- Invited talk at VJTI, Mumbai, 2018
- Invited talk at Birla Institute of Technology, Ranchi, 2018 and 2019
- Invited talk at Arts et Metiers, Paris Tech, Campus of Cluny, France, 2018
- Invited talk at Universidad Politécnica de Cartagena, Spain, 2016
- Invited talk at IIT Kanpur, 2016 and 2018

COMMUNITY SERVICE

- Volunteered at IIT Bombay KV
- Vice-President of ASHA for Education (An action group for children's education in India) at Georgia Tech, 2003-2004
- Vice–President, Indian Society at Tufts University, 2001-2002
- Volunteered as tutor for International Community School, Dekalb County, Georgia, Fall 2005
- Volunteer with Habitat for Humanity