

Mohit Singh



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EDUCATION

PhD in Materials Engineering 2020 – Present
Indian Institute of Technology Jodhpur, India
CGPA - 8.79
(Thesis Submitted)

M.Tech in Production Engineering (Gold Medalist) 2018 – 2020
GNDEC Ludhiana, India
CGPA - 9.48

B.Tech in Mechanical Engineering (Gold Medalist) 2014 – 2018
GIMET Amritsar, India
Percentage - 89.84%

PROFILE SUMMARY

Passionate researcher focused on advancing intelligent metal additive manufacturing through real-time monitoring, plasma plume diagnostics, and closed-loop process control. Committed to developing reliable and autonomous manufacturing solutions for next-generation production systems.

RESEARCH INTEREST

Metal Additive Manufacturing
In-situ Monitoring
Closed-Loop Control
Smart Manufacturing Systems

ACADEMIC HIGHLIGHTS ★

PMRF
Fellow

15+
Patents &
Designs Filed

7
Granted IPs

18
Publications

5
Book Chapters

5
Research
Awards

SCOLARSHIPS AND AWARDS 🏆

- Prime Minister's Research Fellowship (PMRF), IIT Jodhpur.
- First Prize – Poster Presentation Award, ICAMC 2025, IIT Bombay.
- First Prize – Oral Presentation Award, NSRS 2025, IIT Kanpur.
- First Prize – Poster Presentation Award, ICAMSD 2025, MNIT Jaipur.
- First Prize – Oral Presentation Award, MatRS 2024, IIT Jodhpur.
- First Prize – M.Tech Project Exhibition, GNDEC, Punjab (2019).
- Appreciation Letter from Hon'ble Chief Minister of Punjab, India.

SELECTED PUBLICATIONS

- Singh et al. Real-time identification of clad morphology and deposition regimes in SS 316 L DED via optical emission spectroscopy. **Materials & Design** (2026).
- Singh et al. Beyond imaging: Optical emission spectroscopy for mechanistic diagnosis of plasma plume and spatter dynamics in laser DED. **Journal of Materials Processing Technology** (2026).
- Singh et al. Mechanistic influence of laser spot diameter on SS 316 L directed energy deposition revealed by in-situ plasma plume diagnostics. **Progress in Additive Manufacturing** (2026).

RESEARCH PROJECTS ASSOCIATED WITH PhD

- Design and fabrication of indigenous powder fed metal additive manufacturing machine (DST-AMT, ₹2.15 Cr).
- Development of optical based in-situ monitoring techniques for porosity detection during laser cladding and additive manufacturing of stainless steel (SERB-CRG, ₹50 Lakhs).
- In-situ monitoring of plasma plume for porosity detection during laser cladding and AM of stainless steel (PMRF, ₹6 Lakhs).

INTELLECTUAL PROPERTY (PATENTS & DESIGNS) DURING PhD

Sr. No.	Title	Application No.	Patent/ Design registration	Year	Status
1.	Powder splitter and method thereof.	202311023249	Patent	2023	Granted
2.	Multifunctional 3D production system.	391218-001	Design registration	2023	Granted
3.	Discrete powder splitter system.	202411088303	Patent	2024	Granted
4.	Discrete powder splitter system.	451912-001	Design registration	2025	Granted
5.	Adjustable discrete powder feeding nozzle for laser additive manufacturing.	438736-001	Design registration	2025	Granted
6.	System and method for generating operational plan for printing nozzle	202411004042	Patent	2024	Granted
7.	System and method for prediction and categorization of porosity during direct energy deposition process using optical emission spectroscopy	202411095837	Patent	2024	Granted
8.	Collimating lens probe guard for laser additive manufacturing.	438737-001	Design registration	2024	Objections Submitted – Waiting for Acceptance

9.	Adjustable discrete powder feeding.	202411015210	Patent	2024	Full Filed
10.	Optical emission spectrometer probe guard.	202411021830	Patent	2024	Full Filed
11.	Plasma signal based closed loop control system and method for additive manufacturing process.	202411088545	Patent	2024	Full Filed
12	System and method for real-time quantitative prediction and categorization of spatter events in DED processes.	202511099265	Patent	2025	Provisional Filed
13	System and Method for real-time prediction of clad morphology and deposition regimes in DED using optical emission spectroscopy.	202511132969	Patent	2025	Provisional Filed
14	A method and system for real-time prediction of alloy composition in directed energy deposition using optical emission spectroscopy.	202511134672	Patent	2025	Provisional Filed

15	Optical emission spectroscopy system for deposition regime identification in laser additive manufacturing and method thereof.	202611056699	Patent	2025	Provisional Filed
16	System and method for real time classification of metal additive manufacturing melting regimes using plasma plume morphology.	202611031704	Patent	2025	Provisional Filed
17	Modular multi-syringe 3D extrusion system.	-	Design registration	2026	Under filing process

PEER-REVIEWED JOURNAL PUBLICATIONS

(Google Scholar Citations: 530+ | h-index: 12 | i10-index: 12)

A. PhD Research Publications (2020–Present)

Sr. No.	Title	SCI- Journals	Year	Status
1.	Real-time identification of clad morphology and deposition regimes in SS 316 L DED via optical emission spectroscopy.	Materials & Design	2026	Published
2.	Beyond imaging: Optical emission spectroscopy for mechanistic diagnosis of plasma plume and spatter dynamics in laser DED.	Journal of Materials Processing Technology	2026	Published
3.	Mechanistic influence of laser spot diameter on SS 316 L directed energy deposition revealed by in-situ plasma plume diagnostics.	Progress in Additive Manufacturing	2026	Published

4.	Investigating Heat Transfer Strategies for Geometrical Accuracy and Solidification Behavior of Additively Manufactured SS316L Thin Clad Structures.	Transactions of the Indian Institute of Metals	2024	Published
5.	Fabrication of superhydrophobic PLA surfaces by tailoring FDM 3D printing and chemical etching process.	Applied Surface Science	2023	Published
6.	Plasma plume emission-driven closed-loop control in directed energy deposition.	Materials & Design	2026	Under Revision
7.	Physics-informed plasma plume diagnostics for deposition-regime identification and porosity-sensitive monitoring in SS 316 L directed energy deposition with machine learning assessment.	-	-	Under Preparation
8.	Mechanistic role of closed-loop melt-pool control in microstructure and property stabilization of SS 316 L thin-wall deposition.	-	-	Under Preparation

B. M.Tech Research Publications (2018–2020)

Sr. No.	Title	SCI- Journals	Year	Status
1.	On shear resistance of almond skin reinforced PLA composite matrix-based scaffold using cancellous screw.	Advances in Materials and Processing Technologies	2022	Published
2.	On 3D printed ZnO reinforced PLA matrix composite: tensile, thermal, morphological and shape memory characteristics.	Thermoplastic Composite Materials	2022	Published

3.	Multistage primary and secondary recycled PLA composite matrix for 3D printing applications.	Proceedings of the National Academy of Sciences, India Section A: Physical Sciences	2022	Published
4.	On shear fracture and morphological features of fused filament fabrication based almond skin powder reinforced PLA structures.	Advances in Materials and Processing Technologies	2022	Published
5.	On mechanical, thermal, morphological and shape memory effect of Sol-gel prepared ZnO nano particle reinforced PLA composites materials.	Proceedings of the National Academy of Sciences, India Section A: Physical Sciences	2022	Published
6.	Multi-material 3D printing of PLA-PA6-TiO ₂ polymeric matrix: flexural, wear and morphological properties.	Journal of Thermoplastic Composite Materials	2022	Published
7.	On flexural, wear and morphological properties of 3D printed almond skin powder reinforced PLA matrix.	Advances in Materials and Processing Technologies	2022	Published
8.	Multi-material 3D printed functional prototypes of PLA/PA6-TiO ₂ composite matrix: rheological, thermal, tensile, morphological and 4D capabilities.	Advances in Materials and Processing Technologies	2022	Published
9.	ZnO nanoparticle grafted PLA thermoplastic composites for 3D printing applications: Tuning of thermal, mechanical, morphological and shape memory effect.	Thermoplastic Composite Materials	2022	Published

10.	On compressive and morphological features of 3D printed almond skin powder reinforced PLA matrix.	Materials Research Express	2020	Published
11.	On ZnO nano particle reinforced PVDF composite materials for 3D printing of biomedical sensors.	Journal of Manufacturing Processes	2020	Published
12.	Thermomechanical and morphological properties of sustainable mortars employing blast furnace slag and fly ash reinforced cement.	IOP Conference Series: Materials Science and Engineering	2020	Published
13.	On mechanical, thermal, and morphological investigations of almond skin powder reinforced polylactic acid feedstock filament.	Thermoplastic Composite Materials	2019	Published

BOOK CHAPTERS: (M.Tech Research Contributions)

Sr No.	Book Chapter	Journal/Publishers	Year	Status
1.	Preventive maintenance of fracture bone assisted by 3D printing.	Additive Manufacturing Solutions for Advanced Veterinary Practice	2025	Published
2.	Hydrogels for additive manufacturing in scaffolding applications: A review.	Innovative processes and materials in additive manufacturing	2023	Published
3.	Twin screw extrusion for recycling of thermoplastics.	Elsevier: Encyclopedia of Materials: Plastics and Polymers	2022	Published

4.	Biocompatible thermoplastics as implant/scaffold.	Elsevier: Encyclopedia of Materials: Plastics and Polymers	2022	Published
5.	Chemical assisted thermoplastic joining for sustainability.	Elsevier: Encyclopedia of Materials: Plastics and Polymers	2022	Published

CONFERENCE/SYMPOSIUM PRESENTATIONS

Sr No.	Title	Conference/Symposium	Year
1.	Real-time monitoring of plasma plume during direct energy deposition of Stainless Steel 316L	International conference on Additive manufacturing and characterization, IIT Bombay	2025
2.	Investigation of plasma plume and spatter dynamics: Advancing process control in direct energy deposition of SS 316 L	National symposium of research Scholars, IIT Kanpur	2025
3.	In-situ monitoring and control of plasma plume in direct energy deposition of SS 316 L	International conference on Advanced materials for sustainable development, MNIT Jaipur	2025
4.	Predicting The Porosity Formation During The Additive Manufacturing Of Stainless Steel 316 L Using Optical Based In-situ Monitoring Method	Material research symposium (MatRs), IIT Jodhpur	2024
5.	Investigating Heat Transfer Strategies for Geometrical Accuracy and Solidification Behaviour of Additively Manufactured SS 316 L Thin Clad Structures	Eighth International conference on solidification science and processing (ICSSP8), Jodhpur	2023

6.	In-situ monitoring of clad during 3D printing of SS 316 L using CMOS camera	Industry 4.0, Indian Institute of Technology, Jodhpur	2023
7.	Development of process map for customized directed energy deposition machine for SS316L based on clad geometry	IIM ATM, Hyderabad	2022
8.	Development of process map for customized directed energy deposition machine for SS 316 L based on clad geometry and mechanical properties	Latest developments in engineering materials and manufacturing processes, IIE, Jaipur	2022
9.	Effect of process parameters on melt pool geometry during laser scanning of SS 316 L	INAE Youth Conclave, Indian Institute of Technology, Jodhpur	2022

PROFESSIONAL MEMBERSHIPS

- Life Member, The Indian Institute of Metals (IIM), Membership No. 59513, Since 2023.
- Student Member, ASTM International, Since 2021.
- Graduate Student Member, Institute of Electrical and Electronics Engineers (IEEE), Rajasthan Subsection, Valid through 2026.

RESEARCH INFRASTRUCTURE & LAB DEVELOPMENT

- Contributed to the establishment of a Directed Energy Deposition (DED) laboratory at IIT Jodhpur, including machine integration, robotic path planning, process optimization, and in-situ monitoring system development.
- Developed and integrated optical emission spectroscopy (OES), pyrometry, CMOS imaging, and data acquisition systems for real-time monitoring and in-house closed-loop control framework development for DED system.
- Assisted in the development of polymer additive manufacturing, CNC machining, and laser engraving facilities at Government Polytechnic College, Jodhpur.

TECHNICAL SKILLS

- **Metal Additive Manufacturing:** Extensive hands-on experience in Directed Energy Deposition (DED), including machine development, process optimization, in-situ

monitoring, defect detection, and closed-loop control. Hands-on experience with FDM and DLP systems for polymer additive manufacturing. Formal training and working knowledge of SLM, EBM, and SLA technologies.

- **In-Situ Monitoring & Diagnostics:** Development and deployment of Off-axis optical emission spectroscopy (OES), two-color pyrometry, CMOS imaging, high-speed imaging, infrared thermography, and laser profilometry for real-time process monitoring.
- **Process Monitoring & Control:** Designed and implemented in-house OES- and pyrometer-based closed-loop control systems using LabVIEW and real-time process feedback (~1 ms acquisition) for adaptive laser power regulation and process stabilization.
- **Robotics & Automation:** Hands-on experience in KUKA robot programming, robotic path planning, DED toolpath generation, machine integration, and process automation for metal additive manufacturing systems.
- **Materials Characterization:** Hands-on experience with optical microscopy and microhardness testing. Data analysis experience with X-ray computed tomography (XCT), scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), Spark-OES.
- **Software, Data Analytics & Simulation:** Intermediate proficiency in SprutCAM X, RoboDK, LabVIEW, and Origin for robotic process planning, additive manufacturing workflow development, and data analysis. Working knowledge of FLOW-3D AM, Python, and Orange Data Mining for additive manufacturing simulations, machine learning, and data-driven process optimization.

OTHER SHORT-TERM TECHNICAL COURSES SUCCESSFULLY COMPLETED

Sr. No.	Course	Institute / University / Organization	Duration
1.	Mastering LPBF Simulations with FLOW-3D AM	Flow Science India	2.6.2026 to 4.6.2026
2.	EBM Level 1 Application	Colibrium Additive – GE Aerospace company	10.3.2025 to 12.3.2025
3.	SLM Training	Intech	19.2.2025 to 26.2.2025
4.	EBM Level 1 Operation and Maintenance	Colibrium Additive – GE Aerospace company	10.2.2025 to 13.2.2025

5.	SprutCam X Software robot module for direct energy deposition machine	SprutCAM	2.12.2024 to 7.12.2024
6.	Physics-based and data-driven modelling in additive manufacturing (International faculty- Dr. Chinnapat Panwisawas)	National Institutes of Technology, Warangal	25.11.2024 to 29.11.2024
7.	Additive manufacturing: Principle, technologies and application	IIT Indore and RRCAT Indore	22.9.2022 to 11.2.2023
8.	Robot programming Level 1	KUKA College	8.11.2021 to 12.11.2021
9.	3D Printing of Metals (Under Continuing Education & Quality Improvement Program)	Indian Institute of Technology Bombay	27.02.2020 to 28.02.2020
10.	Medical prototyping using 3D Printing (Course code: 171036L08) (International faculty- Prof. Ian Gibson)	National Institutes of Technology, Warangal	15.07.2019 to 19.07.2019
11.	Ultimate: 3D Printing Course	Novabeans-Gurgaon, Haryana	04.06.2019 to 15.07.2019
12.	Tribological Analysis of Four-Dimensional Printed Engineering Materials. (QIP Short Term Course)	Guru Nanak Dev Engineering College, Ludhiana	19.11.2018 to 24.11.2018
13.	3D Printer	3D Works CAD Centre (ISO 9001:2015 Certified), Ludhiana	08.10.18 to 21.10.18

14.	CNC Lathe Machine	Central Institute of Plastics Engineering & Technology Amritsar	19.03.2018 to 16.04.2018
15.	Six Sigma Green Belt	Indian Statistical Institute, Bangalore	22.01.18 to 27.01.18
16.	Part A: Uni-Graphics NX-CAM Part B: CNC Milling + Processing + Testing	Central Institute of Plastics Engineering & Technology, Amritsar	14.12.2017 to 13.06.2018
17.	Materials Characteristics & its Testing	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project) Batala	15.06.2017 to 14.08.2017
18.	Basics of Computer	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project) Batala	15.06.2017 to 14.08.2017
19.	Basics of Hydraulic & Pneumatic	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project) Batala	10.12.2016 to 09.01.2017
20.	Heat Treatment	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project) Batala	10.12.2016 to 09.01.2017
21.	Solid Works	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project) Batala	02.07.2016 to 17.08.2016
22.	Basics of Measurements	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project) Batala	02.07.2016 to 15.07.2016

23.	CNC (VMC)	Institute for Machine Tools Technology (UNDP/UNIDO Assisted Punjab Govt. Project), Batala		18.05.2016 to 01.07.2016
24.	Diploma Course in Mechanical CAD	CAD DESK, Amritsar		22.07.2016
25.	Cloud Computing	Global Institute of Management & Emerging Technologies, Amritsar	Indian Institute of Technology, Bhubaneshwar	25.09.2015 to 26.09.2015
26.	Certificate Course in Mechanical Drafting using Auto CAD	CAD DESK, Amritsar		21.07.2015
27.	Workshop on Automobile Engine Design	Govt Polytechnic College, Batala	Workshop organized by Saarang Indian Institute of Technology, Madras	06.04.2015 to 07.04.2015
28.	The complete Labview Essentials – Code & Acquire Data Now	Udemy		17.4.2025
29.	Python for Data Science and Machine Learning Bootcamp	Udemy		25.2.2024
30.	Materialize Mimics : Zero to Mastery	Udemy		30.5.2021
31.	Learn COMSOL Multiphysics simulation: Basics to advanced	Udemy		16.05.2021
32.	Research Methodology	Udemy		16.5.2021
33.	COMSOL Multiphysics all features walk through	Udemy		15.05.2021

34.	Metallurgical aspect in additive manufacturing	NIT, Andhra Pradesh	19.04.2021 to 23.04.2021
35.	International workshop on 3D printing	University of Madras	09.04.2021 to 10.04.2021
36.	Metal 3D printing-technology of near future	Indian Machine Tool Manufacturers Association (IMTMA)	18.02.2021 to 19.02.2021
37.	Workshop on Hand on Research Data Analysis using SPSS	Research Culture Society	08.07.2020 to 12.07.2020
38.	Learn Robot studio	Udemy	17.11.2020
39.	Best practices of writing a research paper Fast & Easy	SS Edutech	19.06.2020 to 21.06.2020
40.	Discovering Resources Using Scopus and Functioning of Mendelay	Hisashi-Excellence Education Pvt. Ltd.	21.06.2020
41.	E-Workshop on Research Methodology and Hypothesis: Biginner Level	Academic Research Practices	28.06.2020
42.	How to prepare your Manuscripts for Publication in Top Journals	Bright TALK	26.06.2020
43.	International Faculty and Researcher Development Program	ACE International PTE Ltd.	21.06.2020
44.	Essential Tips for Publishing in Higher Impact Journals	Bright Talk	26.06.2020

American Society for Testing and Materials (ASTM) Online Courses			
45.	In-situ monitoring and controlling PBF process	ASTM-AM	29.07.2021
46.	Metal powder characterization and specification	ASTM-AM	15.07.2021
47.	Multi-material processing in additive manufacturing	ASTM-AM	17.06.2021

ADDITIONAL INFORMATION

Date of Birth: 01 September 1997
Citizenship: Indian
Marital Status: Unmarried
Languages Known: English (Professional Proficiency), Hindi, Punjabi (Native).

I hereby declare that the above written particulars are the best of my knowledge & belief.

Signature
MOHIT SINGH

Referees: Available upon request