Student Name: Mulla Mahaboob Basha
Institute email id: me19d505@iittp.ac.in
Department: Mechanical Engineering
Institute roll no: me19d505
Website:
Broad area: Chemical and electrochemical assisted finishing processes
Year of joining Ph. D programme: 2019
Ph. D Advisor: Dr. Mamilla Ravi Sankar

Academic Background

I completed graduation in mechanical engineering from Sri Venkateswara University College of Engineering- Tirupati. Then I did master of technology (M. Tech) from NIT Warangal under guidance of Dr. G.V. S Nageswara Rao. As a part of my M Tech project work, I carried out my experiments in Bhabha Atomic Research Centre (BARC) trombay- Mumbai. In the one-year duration at BARC, I learned so many things and then joined the Ph. D programme at IIT Tirupati for continuing the research work.

Research Interest/Broad Area

SLM is a laser powder bed fusion based additive manufacturing processes and is ideally suited for manufacturing metallic components ranging from simple to complex solid geometries using the powder particles as raw material under vacuum or inert atmosphere. The powder is melted and printed precisely as layer upon layer process so called “additive” manufacturing process. In this manufacturing process, the microstructure and surface roughness are characterized by the strong temperature gradient induced by high cooling rates. Generally, the high surface roughness is happened after fabrication of any solid geometry in SLM method hence post processing process. Among finishing technologies, conventional tools as well as abrasive based finishing technologies are not viable for reducing the surface roughness on complex structures having internal surfaces, narrow channels and cavities. Therefore, chemical based finishing technologies are used for finishing of these components.

In my Ph. D, the chemical and electrochemical finishing studies of additive manufactured component for aerospace applications will be carried out.

Advisor Information

Dr. Mamilla Ravi Sankar is currently an Associate Professor in the Department of Mechanical Engineering, IIT Tirupati. Prior to this he worked as Assistant Professor in IIT Guwahati. He did his B. Tech from Sri Venkateswara University, Tirupati, and M. Tech as well as PhD from IIT Kanpur. He has more than 21 years of experience in the area of finishing process. His research group focuses mainly on Micro-Nano Manufacturing, Sustainable Manufacturing, Precision 3D Printing, Online Monitoring, Bio-Manufacturing, Coatings, finishing of additive manufacturing components, Tribology and

Rheology. His lab also involves in development of lab scale Innovations toCommercial Manufacturing Products (Paper to Product Technologies).

He has published over 60 in internationally reputed journals, 100 international conferences, 6 Patents, 2 Edited Books and more than 10 Book chapters. The knowledge transfer ofhis patents is already transferred to India's leading research laboratories such as CMTI, Bangalore and IIT Tirupati (see figure).

Figure. Abrasive flow finishing machine

Presently, his lab possesses with various funding from BARC, DST, DRDO, MeitY, BIRAC, SERB, IMPRINT, IIT Guwahati, IIT Tirupati of about 4 Crore Rupees as Principal investigator and more than 175 Crore Rupees as Co-investigator.

He taught three NPTEL courses namely Introduction to Machining and Machining Fluids, Introduction to Abrasive Machining and Finishing Processes, and Polymer Assisted Abrasive Finishing Processes. He guided 5 PhD, 25 M. Tech, and 30 B. Tech candidates. At present guiding 10 PhD students, 4 MS (Research), and 5 M. Tech students. Currently, he is reviewer of over ten technicaljournals from Nature (S, Elsevier, ACS, Springer, Wiley, Inderscience and Sage (IMechE) Publishers. He is the Editorial member for IMechE Journal of Micro-manufacturing and Guest Editor for International Journal of Precision Technology.

He is recipient of prestigious awards such as Institution of Engineers India (IEI) Young Engineers Award-2015 in Production Engineering, Indian Society for Advancement in Materials and Process Engineering (ISAMPE)-2011 and finalist of Indian National Academy of Engineering (INAE) Young Engineer Award-2014 (Mechanical Engineering). He and his students received 3 best papers awards in national and international conferences (India and abroad). His students got 3 best poster awards in national and international Conferences. Apart from academic awards, he has also received Institute Blues (Outstanding Sports Personality) of IIT Kanpur for his Games and Sports Achievements.

Thesis objectives

1. Preparation of various chemical compositions for chemical and electrochemical assisted polishing process.

2. Optimization of various input parameters (Current, voltage, temperature) for getting minimum surface roughness on different advanced materials fabricated by additive manufacturing.

Courses done during PhD

Abrasive Machining and Finishing Processes

Additive Manufacturing

Advanced Manufacturing Processes

Design for Manufacturing and Assembly

Teaching Assistantships

ME4550 Project I

ME4545 Comprehensive Viva-Voce

ME4560 Project phase II

ME5031 Abrasive machining and finishing

ME3103 Machining processes (on going)

Future Plans

Preparation of electrolyte for electrochemical finishing of additive manufactured bio steel and finding the optimum input parameters

Tribological studies on unfinished and electrochemical finished bio steel components.

List of Patents/Publications

1. Experimental study on Chemical Polishing of Laser Powder Bed Fusion based Inconel 718 Features (accepted for AIMTDR 2021 conference)

Papers in preparation

2. State of art on chemical and electrochemical based finishing processes for additive manufactured components (about to submit in journal)
3. Surface integrity studies on electropolished steel components fabricated by selective laser melting