



# POLYMER ASSISTED ABRASIVE FINISHING PROCESSES

## PROF. M. RAVI SANKAR

Department of Mechanical Engineering  
IIT Tirupati

**INTENDED AUDIENCE :** BE/B.Tech, ME/M.Tech, PHD (Mechanical Engineering, Production Engineering). Faculty who teaches manufacturing

**INDUSTRIES APPLICABLE TO :** Oil India Ltd., ONGC, TATA motors, ISRO, BARC, DRDL, NTPC, CMTI, CMERI, CGCRI, Grind Master, NRL

### COURSE OUTLINE :

Micro and Nano finishing is one of the basic courses for the mechanical undergraduate students. This process comes under the subtractive manufacturing processes where in material is removed in micro to nano range. This course gives the basic understanding of the various polymer assisted abrasive micro to nano finishing processes and its physics. The mentioned syllabus is systematic order to understand gradually, what is the importance of surface finish, how the polymers supports the abrasive particles to finish the workpiece surface to nano level. This course mostly deals with abrasive flow finishing process where polymer rheological abrasive medium/fluids are used achieve nano surface roughness. This course also gives emphasis on polymer rheology and its effect on nano finishing. This course is systemically arranged and taught in smooth as well as clear way so that students understand easily.

### ABOUT INSTRUCTOR :

Prof. Mamilla Ravi Sankar is currently an Assistant Professor in the Department of Mechanical Engineering, IIT Guwahati. He did his B.Tech from Sri Venkateswara University, Tirupati, and M.Tech as well as PhD from IIT Kanpur. His research group is focus on Sustainable Manufacturing, Eco-friendly Cutting fluids, Coatings, Advanced Manufacturing, Tribology and Rheology. MRS Lab also involves in development of lab scale Innovations to Commercial Manufacturing Products. He has published over 30 research articles in internationally reputed journals, 2 Patents, 2 Edited Books and 6 Book chapters. 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. Apart from academic awards, he is also received Institute Blues (Outstanding Sports Personality) of IIT Kanpur for the year 2009.

### COURSE PLAN :

**Week 1 :** Introduction to Polymer Assisted Abrasive Finishing Processes, Importance of Micro to Nano Finishing and Surface roughness representation, Finishing with polymer grinding wheels and polymer medium for vibratory bowl finishing

**Week 2 :** Polymer abrasive medium for vibratory bowl finishing and Pitch Polishing, Polymer Pad and Chemo-mechanical Polishing, Elastic Emission and Elasto Abrasive Finishing

**Week 3 :** Abrasive Flow Machining and Finishing, Polymer Rheological Abrasive Medium/ Fluids for Finishing: Rheology and Tribology, Active abrasive particles and finishing forces during finishing using Polymer assisted Abrasives

**Week 4 :** Advances in Abrasive Flow Finishing: DBGAFF, Spiral Polishing, CFAAFM, R-AFF, Micro AFF, Vibrations assisted AFF, Electro AFF process, Modeling of Polymer rheological abrasive medium for finishing, Finishing of Bio Implants: Knee implant, Hip implants.