ADVANCED MACHINING PROCESSES

PROF. MANAS DAS
Department of Mechanical Engineering
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INTENDED AUDIENCE : Intended for UG and PG students who plan to take up this subject as their future research area. Also, for practitionerin industries who want to implement new development ortechnologies in advanced machining to their factory.

INDUSTRIES APPLICABLE TO : Bharat Heavy Electricals Limited (BHEL), Hindustan Aeronautics Limited (HAL), Defense Research and Development Organization (DRDO), Die manufacturing industries, Automobile Industries, Machine Tool Industries, Precision medical equipment manufacturing industries, High precision optics and semiconductor industries

COURSE OUTLINE :

There is a need for machine tools and processes which can accurately and easily machine the most difficult-to-machine materials and workpieces with intricate and accurate shapes. In order to meet these challenges, a number of newer material removal processes have now been developed to the level of commercial utilization. These newer methods are also called unconventional in the sense that conventional tools are not employed for metal cutting. Instead, energy in its direct form is used to remove the material from the workpiece. This course aims at bringing the students up-to-date with the latest technological developments and research trends in the field of unconventional / nontraditional / modern machining processes.

ABOUT INSTRUCTOR :

Prof. Manas Das is an Assistant Professor in the Department of Mechanical Engineering, Indian Institute of Technology Guwahati, India since 2012. He received his Masters and Ph.D. degree from Mechanical engineering Department, IIT Kanpur. His research areas include Advanced Finishing and Nano-finishing Processes, Magnetorheological Finishing (MRF) Process, Advanced/Non-traditional Machining Processes, Micromachining processes. Dr. Das has published more than 20 papers in reputed journal and conferences. He has also written 2 book chapters in the area of surface finishing. Presently, he is supervising 5 Ph.D. students in the broad area of manufacturing.

COURSE PLAN :

Week 1 : Introduction to advanced machining processes and their classification
Ultrasonic machining and its modelling and analysis

Week 2 : Abrasive jet machining (AJM)
Water jet cutting (WJC) and Abrasive water jet machining (AWJM)
Magnetic abrasive finishing (MAF) and its modelling

Week 3 : Abrasive flow finishing (AFF) and its modelling
Magnetorheological finishing (MRF)

Week 4 : Magnetorheological abrasive flow finishing (MRAFF) and its modelling and analysis

Week 5 : Electric discharge machining (EDM): Principle, applications, process parameters, and modelling
Electric Discharge Grinding (EDG), Electric Discharge Diamond Grinding (EDDG), and Wire Electric Discharge Machining (W-EDM)

Week 6 : Laser beam machining (LBM)
Plasma arc machining (PAM)
Electron Beam Machining (EBM)

Week 7 : Electro chemical machining (ECM): Principle, applications, and process parameters and modelling

Week 8 : Electrochemical Grinding (ECG), Electrostream Drilling (ESD), Shaped Tube Electrolytic Machining (STEM),Chemical machining (ChM)