LASER BASED MANUFACTURING

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PRE-REQUISITES : Should have knowledge of fundamental manufacturing processes.

INTENDED AUDIENCE : B. Tech., M. Tech. and Ph D students of Mechanical / Manufacturing / Production / Industrial Engineering, practicing engineers in small and medium scale industry and tool rooms

INDUSTRY SUPPORT : All Small Scale Industries (SSIs). Companies and research labs of automotive; aerospace; defense; and MEMS sectors. Tool Rooms.

COURSE OUTLINE :

This is a basic course on applications of laser technology in manufacturing. The subject laser technology has a very wide range of applications in the product development, manufacturing, surface engineering, and instrumentation. The course emphasizes the fundamental concepts of the laser technology viz. principle of working, characteristics, types, monitoring and control. There is a comprehensive coverage of physical concepts, process characteristics, mathematical formulations along with examples of various laser based manufacturing processes such as of laser machining (cutting), laser forming, laser welding, laser surface treatment and laser based additive manufacturing. There is a state-of-the-art description of newer and advanced applications of the lasers in industry. This course will be very useful to the students, practicing engineers and researchers. After completion of the course, the students will have a strong foundation on laser technology and will be able to apply the basic principles, process characteristics in the practical scenarios.

ABOUT INSTRUCTOR :

Prof. Shrikrishna N. Joshi has completed his doctoral studies in the area of Intelligent process modeling and optimization of electric discharge machining process from IIT Bombay, Mumbai, India in 2009. Currently, he is working as an Associate Professor in the Department of Mechanical Engineering at Indian Institute of Technology Guwahati, India. He was a visiting faculty at the Asian Institute of Technology (AIT), Bangkok, Thailand in 2015. His research interests include mechatronics and manufacturing automation, CAD/CAM, advanced and precision manufacturing processes with a focus on applications of laser in manufacturing, thin-wall machining and single point diamond turning. Four PhD students have been graduated under his supervision and right now, about 7 students are working on cutting-edge research problems. He has published about 60 research papers and tweleve book chapters in refereed international journals and conferences. He has edited two books on "Laser-based manufacturing" and a book on Advances in Computational Methods in Manufacturing with Springer Nature. He has carried out sponsored and consultancy research work of about INR ten millions. The consultancy work was aimed at "Mechanization of Food Grain Handling Operations at FCI Godowns". Dr. Joshi has also developed a web course on Mechatronics and Manufacturing Automation under the scheme of NPTEL of MHRD, Govt. of India. The course was very well appreciated among the engineering industry, academia and research community. He has conducted this course at IIT Guwahati four times for B.Tech final year, M.Tech. and Ph.D students.

COURSE PLAN :

Week 1: Introduction
Week 2: Laser cutting (machining)
Week 3: Laser welding
Week 4: Laser Bending or Forming
Week 5: Laser surface treatment
Week 6: Additive manufacturing
Week 7: Lasers for automation and sensing
Week 8: Advanced applications