


METAL ADDITIVE MANUFACTURING

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PRE-REQUISITES : The student should have completed two semesters of UG Engineering or Science program.

INTENDED AUDIENCE : Students of all Engineering and Science disciplines.

INDUSTRY SUPPORT : HAL, NAL, SAIL, ISRO

COURSE OUTLINE :

The manufacturing technology has advanced greatly in the recent years with Additive Manufacturing (AM) of metals now being extended to all sectors of industry such as aerospace, medical, and tooling. The fourth industrial revolution with the advent of IoT and digital manufacturing demands for quicker and modular manufacturing solutions which are well catered by metal AM Technologies. This course brings the introduction to the current status of metal AM basics, materials, processes, and major important related aspects to the table. The students, teachers, practitioners would benefit from this course in updating their skills in the modern technology. The course is supplemented with laboratory demonstrations practical experience. After completion of the course, the learners would be able to advance their prowess in AMin order to reduce the cost of production, improve the performance of fabricated parts, and achieve their defined targets in metal products manufacturing.

ABOUT INSTRUCTOR :

Prof. Janakarajan Ramkumar is Professor of Mechanical Engineering Department, and Design Program, at Indian Institute of Technology, Kanpur. He teaches manufacturing science, micro/nano technology, new product development. He has a bachelors in Production Engineering with his doctorate in Defect quantification in drilling of composites from IIT Madras, India with a best thesis award. Over the years his contribution in teaching and research is remarkable. He has worked for BOSCH group and improved the productivity of the company. His research and teaching focus is on nano technology and inclusive design. He has several international and national patents in his credit and has published more than 200 journal papers.

Prof. Amandeep Singh is working as Research Establishment Officer atIndian Institute of Technology, Kanpur, India. He holds PhD degree from Indian Institute of Technology Kanpur, India, and a bachelor degree in Production Engineering. Dr. Singh has seventeen years of industrial and academic experience. His research interests are Sustainable Manufacturing Processes and Systems, Simulation of Manufacturing Systems, Product Design and Manufacturing, Additive Manufacturing and Engineering Metrology. He has fetched grants and has holds projects from various national and international funding agencies such as DST, BIRAC, SIDBI. He has traveled in countries like US, Canada, and Australia to work on international assignments and present his research ideas. His research is also published in many international reputed journals.

COURSE PLAN :

Week 1: Introduction to Additive Manufacturing (AM)
Week 2: Modular Design and Topology
Week 3: Design freedom in AM
Week 4: CAD for AM
Week 5: Metal AM physics and processes, Laser and Extrusion
Week 6: Metal AM processes, Filament, Powder and Sheet Systems
Week 7: Metal AM physics and processes, Directed Energy, Binder and Material Jetting
Week 8: Feedstocks, metallurgy and properties of materials
Week 9: Post processing and testing
Week 10: Reverse Engineering for metal AM
Week 11: Modelling for AM
Week 12: Value analysis, and future of metal AM