



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 AM in 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 Oberoi is a Faculty for online courses and shoulders the position of Senior Research Establishment Officer at the prestigious Indian Institute of Technology (IIT) Kanpur, India. Under the role, he is entrusted with the responsibility to manage Imagineering Laboratory, where the emphasis is principally given to providing novel product development and fostering services in defense, Agritech, and Medtech. Dr. Oberoi has accumulated an experience of over two decades: industrial and academic combined; his research interests include the things he values such as Sustainable Manufacturing Processes and Systems, along with areas such as Additive Manufacturing; Simulation of Manufacturing Systems; Product Design and Manufacturing. He has fetched grants and has holds projects from various national and international funding agencies such as DST, MoT, BIRAC, DRDO, SIDBI, CoL. His MOOCs courses in NPTEL and agMOOC are well-received, gaining favour with the audience and receiving positive feedback. Furthermore, he has visited countries like the USA, Canada, Australia, and Egypt to speak at various international symposiums organised by renowned bodies such as AARDO, CIRP, IEOM.

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