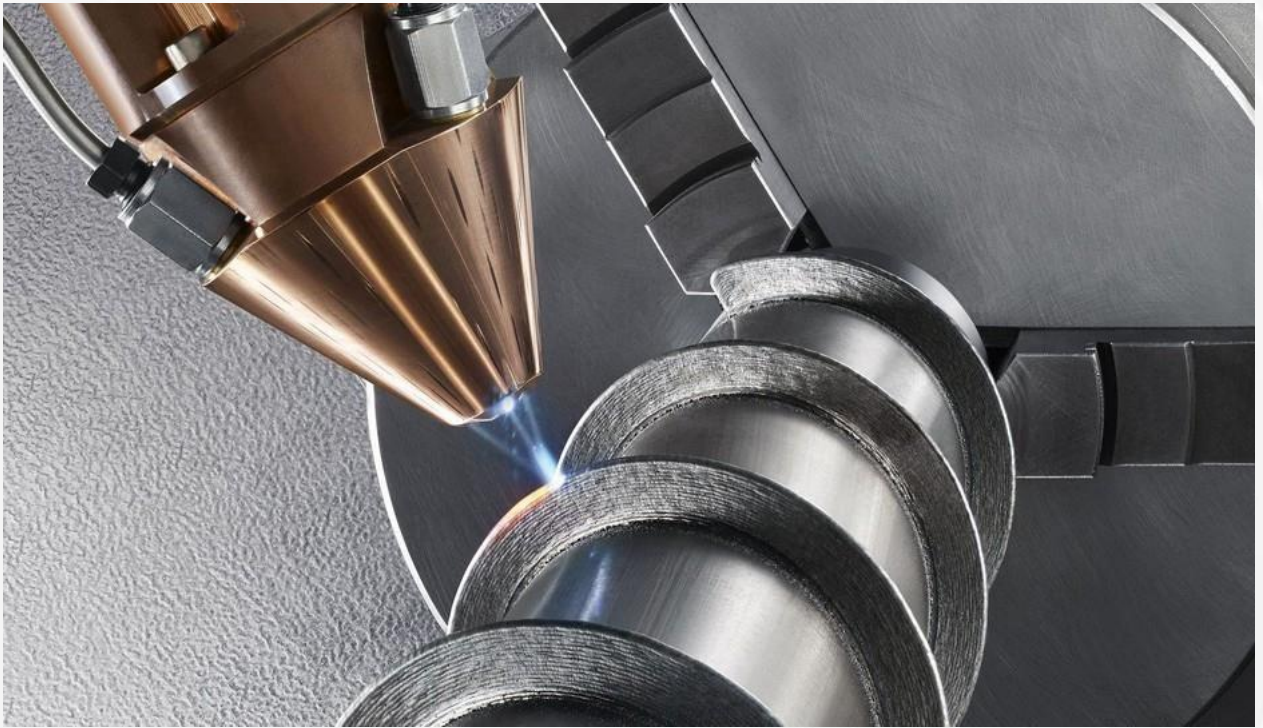


IIT Hyderabad

Centre for Interdisciplinary Programs (CIP)

M.Tech. Program in

ADDITIVE MANUFACTURING



Pioneering the cutting edge of
Digital Manufacturing



भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

ABOUT US

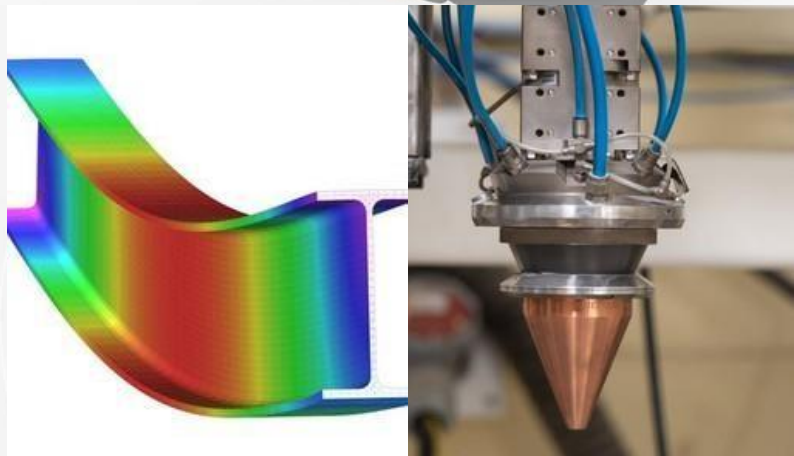
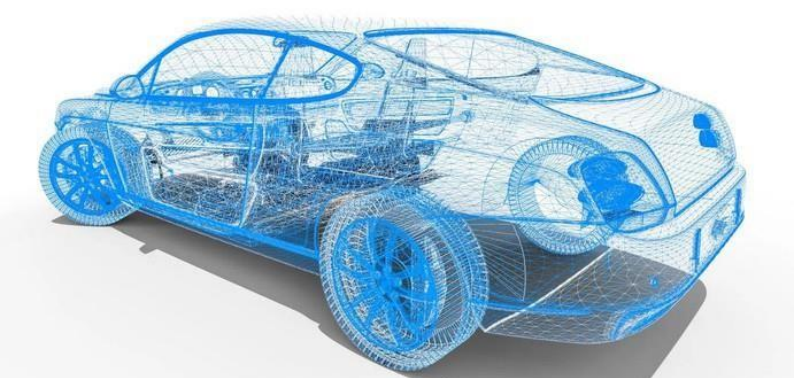
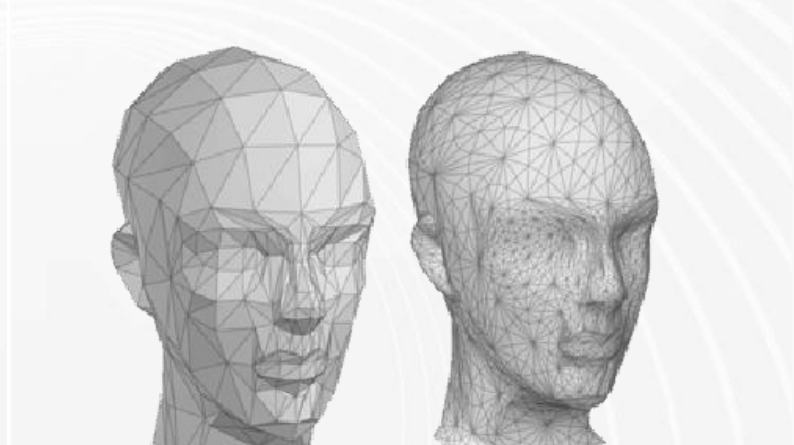
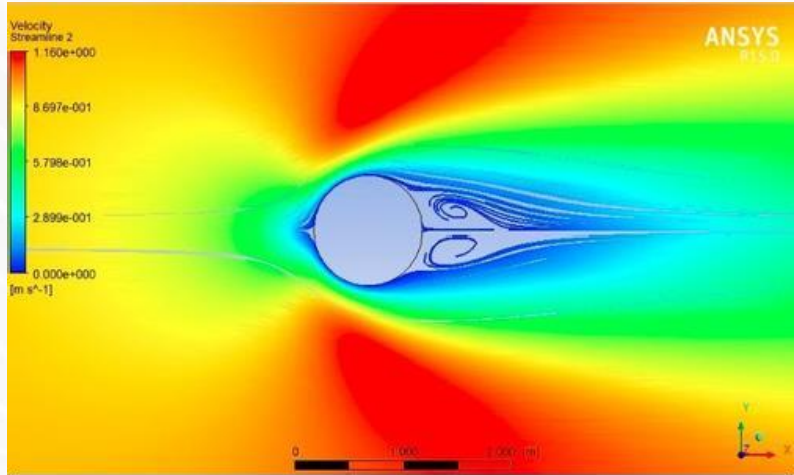
The Program imparts in-depth interdisciplinary knowledge combining various aspects in the field of Additive Manufacturing. Students learn the principles of CAD/CAM, Product Design and Prototyping, Design for Additive Manufacturing, Heat Transfer, Finite Element Analysis, Advanced Material Joining Processes, Material Characterization Techniques and so on. Moreover, students are given ample opportunities to gain hands-on expertise along with exposure to various computational, modelling and simulation techniques. The department offers course work covering broad fields of Mechanical, Materials science, Design, Chemical, Biomedical Engineering from fundamentals to advanced and also emerging areas such as machine learning, nanomaterials, energy science, electron microscopy, thermomechanical processing, thin films and devices and so on, which impart strong foundation on several major aspects that provide state of the art exposure to the students.

ABOUT US

Among the Best in India: IITH has consistently ranked in the **top 10 of the NIRF rankings** for best engineering institutes all over India.

Research Driven Output: The department boasts of its eminent faculty members, highly cited researchers, and the most sought-after in their respective fields.

- **Comprehensive Curriculum**, which gives insights about theory and the application part of the fields such as System Integration for AM, Computational tools, and mathematical modeling and analysis.
- State-of-the-art research facilities like the '**Shrusti Hub**'.
- **Collaborative research** with leaders in various industries and institutes.
- **Academically trained students** with different backgrounds are highly trained in their field and willing to positively impact their workplace.



COURSE CURRICULUM

Typical courses offered in the past include the following:

Fundamental Courses:

1. Fundamentals of Additive Manufacturing
2. Product Design and Prototyping
3. Materials for Additive Manufacturing
4. Biofabrication
5. Metal Additive Manufacturing
6. Metallurgy of Welding and Additive Manufacturing

Mathematical and Computational Courses:

1. Machine Learning and its Applications
2. Finite Element Methods
3. Computational Fluid Dynamics Tools
4. Computation Tools for Geometric Modelling
5. Advanced topics in Mathematical Tools
6. Topology Optimization with Additive Manufacturing
7. Introduction to Computational Methods in Materials Science
8. Augmented Reality and Virtual Reality

*Revisions to the curriculum are undertaken periodically

Elective Courses:

1. Industry 4.0
2. Design for Manufacturing and Assembly
3. Powder Metallurgy
4. Advanced Material Joining Processes
5. Composite Materials
6. Aerospace Propulsion
7. 3d Printing in Medicine
8. Biomaterials
9. Mechanical Behavior of Materials
10. Thermomechanical Processing of Materials
11. Fluid Mechanics and Heat Transfer
12. Biomicrofluidics
13. Tissue Engineering

Lab Courses:

1. Additive Manufacturing Process Lab
2. Biofabrication Technology Lab



RESEARCH FACILITIES

IIT Hyderabad is equipped with state of the art research facilities. The institute encourages its scholars to pursue cutting-edge research under the guidance of eminent faculty members. The scholars undertake theoretical, computational, and experimental research in the fundamental and applied areas. Some prominent AM research facilities at IITH include:

- ◆ **Wire-Arc Additive Manufacturing setup for large sized components.**
- ◆ **Twin-wire based WAAM setup for functionally gradient components.**
- ◆ **Laser + Powder based Direct Energy Deposition system.**
- ◆ **GE Mlab 200R Powder Bed Fusion.**
- ◆ **Mark Two Carbon fiber Composite 3d printer.**
- ◆ **HP Jet Fusion 580 Color Binder Jetting 3D Printer.**
- ◆ **ProJet6000 SLA.**
- ◆ **Stratasys Fortus 450 MC (FDM)**
- ◆ **EnvisionTec 3D Bioplotter.**



ONGOING AND COMPLETED PROJECTS

- ◆ Large Area Additive Manufacturing (LAAM): Design and Development of Powder based Directed Energy Deposition System for Direct Fabrication of Rocket Components, **DRDO**
- ◆ Machine Learning Approach for Decision Making in Metal Additive Manufacturing Components, **Boeing (Bangalore)**
- ◆ 3D Printing: Design & Development of 3D Printer Accompanied by Feasibility Studies
- ◆ Additive Manufacturing of Large Size Metal Components with Wire & Powder Hybrid Direct Energy Deposition (WP-DED) Process
- ◆ Thermal Management Approaches for Distortion Control in Metal Additive Manufacturing Component, **Boeing (Bangalore)**
- ◆ Development of an Integrated Metal Additive and Formative Manufacturing System to Enhance Product Complexity and Properties, **AMT-DST**
- ◆ Manufacture of Functionally Gradient Objects through Weld-Deposition, DST under Fast Track scheme for Young Scientists
- ◆ Laser cladding of functionally graded ceramic coatings for high temperature and wear applications: Assessment of mechanical properties and their correlation with molten pool thermal history and its improvement through laser shock peening, **DRDO**
- ◆ Post-Processing of Direct Energy Deposition Components: Need Identification and Process Selection, **CRG-DST**
- ◆ Evaluation of Laser weld joint of E16NCD13 for Aero Engine Gear Application, **GTRE - DRDO**
- ◆ Additive manufacturing of nickel-based alloys, **PRATT AND WHITNEY**
- ◆ Heat transfer using lattice materials made from AM
- ◆ Additive manufacturing of metal matrix composite using L-DED and its machining

FACULTY



Prof. Janaki Ram G. D

- .Welding and Materials Joining
- .Additive Manufacturing
- .Metallurgical failure analysis
- .Materials Processing



Prof. N. Venkata Reddy

- .Deformation Processes
- .Predictive Models for digital Fabrication
- .Integrated Product and process Design Systems
- .Additive Manufacturing



Prof. Surya kumar S.

- .Metal Additive Manufacturing
- .3D Printing
- .CAD/CAM
- .Additive Manufacturing
- .Materials Processing



Prof. Bharat Bhooshan Panigrahi

- .Composites (MMC, CMC, PMC)
- .Additive Manufacturing.
- .Nanocrystalline Materials.
- .High Entropy Alloys.
- . Powder Metallurgy



Prof. Amirtham Rajagopal

- .Finite Element and Mesh free methods
- .Additive Manufacturing
- .Multiscale Modelling
- .Nanoscience & Technology
- .Applied Mathematics



Prof. Suhash Ranjan Dey

- .Sensors
- .Additive Manufacturing
- .Electrodeposition
- .Biomaterials
- .Multi-Component Alloys
- .Titanium Alloys



Dr. Prasad Onkar

- .Product Design
- .Computer Aided Conceptual Design
- .3D Sketching
- .Additive Manufacturing
- .Design Innovation
- .HCI/ Interaction Design
- .Virtual Reality and Augmented Reality



Dr. Falguni Pati

- .Additive Manufacturing
- .Biomaterials
- .Tissue Engineering
- .3D Bioprinting
- .In Vitro Tissue/Organ Models
- .Biomedical Materials
- .Biomedical Devices



Dr. Rajesh Korla

- .Deformation behavior of materials
- .Additive Manufacturing
- .Materials Processing

FACULTY



Dr. Syed Nizamuddin Khaderi

- .Solid mechanics
- .Impact mechanics
- .Fluid-structure interaction
- .Lattice materials
- .Metal foams
- .Solid Fluids



Dr. Viswanath RRS R Chinthapenta

- .Computational Solid Mechanics
- .First Principle Calculations
- .Multiscale Modelling
- .Nanoscience & Technology



Dr. Lopamudra Giri

- .Additive Manufacturing
- .Bioimaging
- .Confocal microscopy
- .Live cell imaging
- .Neuroscience
- .Biomedical Materials
- .Biomedical Devices



Dr. Muvvala Gopinath

- .Additive Manufacturing
- .Laser Material Processing
- .Under Water laser material processing
- .Solid state welding (Friction stir welding)
- .Materials Processing



Dr. Anurup Datta

- .Nanoscience & Technology
- .Additive Manufacturing
- .Optics/Photonics/Spectroscopy
- .Process Monitoring of Manufacturing Processes
- .Laser-based Micro and Nano-Manufacturing



Dr. Anirban Naskar

- . Numerical modelling of residual stress in hybrid manufacturing.
- .Additive Manufacturing.
- .Abrasive finishing of free form surfaces for biomedical and aerospace application



Dr. Subhradeep Chatterjee

Process-Microstructure-Property relations in metallic systems

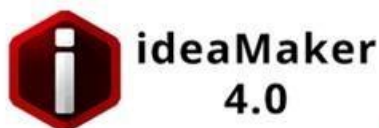
COLLABORATIONS



Keio University



SOFTWARES TRAINED



Eligibility and Admission Procedure

MHRD Fellowship: Candidates with valid GATE score in {AE, ME, MT, PI, BM, BT, CH, XE, XL} and a BTech/BE in the relevant field. Admission is based on GATE Score of Candidates. For IIT Undergraduates with a CGPA of 8.0 or above, GATE is not essential.

Self-Sponsored candidates: Candidates having BTech/BE in relevant fields of Engineering and Technology with minimum CGPA of 7.0 or equivalent. This is a nonsubsidized program and no financial support is provided to the students. For self-sponsored candidates, GATE score is not mandatory. Admission is based on Written Test/Interview.

Candidates sponsored by Govt. Labs/Public Sector Units: Candidates working in Government or Public sector institutes (including armed forces) with more than 2-year experience and having a basic BTech/BE degree in relevant field. GATE score is not mandatory. Admission is based on Written Test/Interview.

Contact Information:

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Dr. Anurup Datta: anurup.datta@mae.iith.ac.in