

COURSE PROSPECTUS

Name of the Group : CAD/CAM
Name of the Course : Additive Manufacturing/3D Printing
Course Code : MT300
Duration : 400 Hrs

Preamble:

Additive Manufacturing refers to a process by which digital 3D design data is used to build up a component in layers by depositing material. The term "3D printing" is increasingly used as a synonym for Additive Manufacturing. However, the latter is more accurate in that it describes a professional production technique which is clearly distinguished from conventional methods of material removal. .

The technology has especially been applied in conjunction with Rapid Prototyping - the construction of illustrative and functional prototypes. Additive Manufacturing is now being used increasingly in Series Production. It gives Original Equipment Manufacturers (OEMs) in the most varied sectors of industry the opportunity to create a distinctive profile for themselves based on new customer benefits, cost-saving potential and the ability to meet sustainability goals.

Objective of the Course:

The course is aimed at giving exposure to and enhancing the knowledge and skills of fresh graduate engineers and engineers involved in the operation use of 3D Scanners and 3D printing / additive manufacturing with the aid of CAD packages and for those who want to provide training to others in this area. It gives exposure and on hand experience in the field of CAD packages, 3D Scanner and 3D Printing.

Outcome of the Course:

Persons trained in the digital fabrication (3D Printing, 3D Scanning and CNC) program will have the following new skills which are directly relevant to industry.

- 3D Modeling,
- Slicing & Orientation
- Post Processing of 3D Printed models
- 3D Printer machine maintenance
- Design for 3D Printing,
- 3D Scan processing
- Estimation and scheduling

Course Structure:

<i>Module</i>	<i>Duration (Hrs)</i>
Introduction to 3 D Printing	25
102 AM Technologies	100
3D Modelling for 3 D Printing	100
Application of 3 D Printing	100
105 Integrated Product Design and Post Processing	70
Interpersonal and Communication Skills/Reporting	5

Other Contents

- Course Fees:** ₹40,000 plus GST (Fee can be paid in two installments viz: first installment ₹25,000 plus GST and second installment of ₹15,000 plus GST. No Course fee is charged for ST/ST students.
- Eligibility:** Diploma or B. E, B. Tech., in Mechanical, production Tool & Die, Automobile and Industrial engineering or equivalent
- Number of Seats :** 20
- Selection of candidates:** The candidates passed in the qualifying examination will be based on their marks obtained, subject to eligibility and availability of seats.

e. **Counseling/Admission: 25/09/2017**

f. **Admission Procedure :**

Students who have been selected for test/interview/counseling/admission are required to report to the Institute on the prescribed day by 9:30 hrs along with the following

1. Attested Copies of Proof of Age, Qualifications, etc
2. Original Certificate of the above
3. Two copies of photograph and one stamp size photograph for identity card.
4. SC/ST Certificate (if applicable)
5. Income Certificate (if applicable)

The students on reaching the Institute are required to meet the Front Office Councilor (FOC). The FOC then directs the student to the Course Coordinator. The student gets the enrollment form verified by the Course Coordinator and then meets the FOC who shall direct the student to the Accounts for payment of fees. A student is thus admitted.

- Discontinuing the course:** No fees under any circumstances shall be refunded in the event of a student discontinuing the course. A student can however, be eligible for module certificates (applicable only for courses which provide for modular

admission) which he has successfully completed provided he has paid the entire course fees.

h. **Course Timings** : 9:30 to 5:00 PM

i. **Placement**: Support shall be provided

j. **Hostel facilities**:

Hostel accommodation is available for boys and girls on daily or monthly chargeable basis. However, students are required to pay the hostel fees for the duration of the course for which they are seeking admission at the time of joining the course.

k. **Canteen facilities** :

The Centre has a canteen functioning at the main campus and food at reasonable rates is available for breakfast, lunch, and dinner

l. **Lab Facilities**:

CAD/CAM lab consists of 3D Scanner, 3D Printer, CNC Machines Tools (Lathe and Milling), Latest versions of Creo (formerly Pro/engineer), CATIA V5, Mastercam X8, AutoCAD, Autodesk Inventor Professional, 3D Scanner, 3D Printer, PCs with higher RAM and Graphics cards.

m. **Faculty**

The centre has a team of enthusiastic and competent engineers with postgraduate qualifications who have undergone specialized training in various International Universities and Industries.

n. **Course Contents** :

Introduction to 3D Printing (25 Hrs)

Designing, Slicing Direct Slicing of the CAD Model, Color Models Multiple Materials Use of STL for Machining Reverse Engineering and 3D Scanning

Preparing STLs for 3D Printing- Preparation of CAD Models: The STL File, file formats, creating STL files from CAD System, Calculation of each slice profile, Technology specific elements

Issues with STL files, STL file manipulation, manipulation on AM machine. Beyond STL file. Additional Software to Assist AM

AM Process Simulations Using Finite Element Analysis, The Additive Manufacturing File Format Data formats. Design for Additive Manufacturing, tools and methods.

Additive Manufacturing Technologies and 3D Printing (100 Hrs)

Fused Deposition Modelling - Basic Principles, Material Loading, Liquification, Extrusion, Solidification, Positional Control, Bonding, Support Generation, Plotting and Path Control, Fused Deposition Modelling from Stratasys.

FDM Machine Types, Materials, Limitations of FDM. Selective Laser Sintering Polyjet, Materials for Additive Manufacturing & 3D Printing

Development of AM Technologies, Computers, Computer-Aided Design Technology - Other Associated Technologies, Lasers, Printing Technologies, Programmable Logic Controllers, Materials, Computer Numerically Controlled Machining

The Use of Layers , Classification of AM Processes Liquid Polymer Systems , Discrete Particle Systems , Molten Material Systems , Solid Sheet Systems , New AM Classification Schemes, Metal Systems, Hybrid Systems, Milestones in AM Development, AM Around the World, Rapid Prototyping Develops into Direct Digital Manufacturing.

3 D Modelling for 3 D Printing (100 Hrs)

Designing, Slicing Direct Slicing of the CAD Model, Color Models Multiple Materials Use of STL for Machining Reverse Engineering and 3D Scanning.

Preparing STLs for 3D Printing- Preparation of CAD Models: The STL File, file formats, creating STL files from CAD System, Calculation of each slice profile, Technology specific elements.

Issues with STL files, STL file manipulation, manipulation on AM machine. Beyond STL file. Additional Software to Assist AM.

AM Process Simulations Using Finite Element Analysis, The Additive Manufacturing File Format Data formats. Design for Additive Manufacturing, tools and methods..

Applications of 3 D Printing (100 Hrs)

Medical - Historical Developments - Value of Physical Models, Functional Testing, Rapid Tooling. The Use of AM to Support Medical Applications, Surgical and Diagnostic Aids

Prosthetics Development, Manufacturing, Tissue Engineering and Organ Printing, Software Support for Medical Applications.

Limitations, further developments. Aerospace, Automotive, Construction & Architecture, Product Prototyping, Art, Jewellery.

Integrated Product Design and Post Processing (70 Hrs)

Principles of Product Development, Basic Electronics Structural Electronics, Vapour Smoothing, Sand Papering Vinyl Pasting. Entrepreneurial opportunities in 3 D Printing.

Interpersonal and Communication Skills/Reporting (5 Hrs)

Communication Skills Technical Writing