A Short Term Course
on

ADDITIVE MANUFACTURING

February 11 – February 15, 2019

(Application form should contain the following Information printed on A4 size paper)

Name:

Position:

Department:

Institution/Organization:

Address:

E-mail Address: Mobile No.:

Educational Background (starting from B.E./B.Tech):

Degree	Field of Specialization	Institution	% marks/ CGPA/CPI	Year	Rank in the class
B.E./B.Tech.					
M.E./M.Tech.					
Ph.D.					

Areas of Research Interest: _____

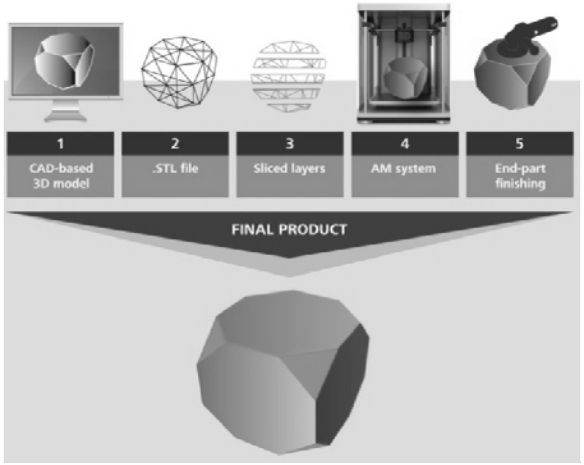
Have you attended any course on "Additive Manufacturing" at IITK or elsewhere: Yes / No

(If yes, please give details……)

Note: Candidates from the teaching institutions should send the refundable caution money deposit only after getting the confirmation of their selection.

Recommendation **Signature of applicant**

Signature of Head of the Department / Head of the organization (with seal).



Additive Manufacturing Process Flow (Source: DUPress.com)

*IMPORTANT DATES

For College Teachers

- Receipt of application through email: Jan. 21, 2019
- Selected candidates list: Jan. 22, 2019
- Receipt of payment: Jan. 23, 2019

For Participants from Industries, R&D Labs, and PhD Scholars

- Receipt of application through email: Jan. 21, 2019
- Selected candidates list: Jan. 22, 2019
- Receipt of payment: Jan. 23, 2019

ADDRESS FOR CORRESPONDENCE

Dr. Arvind Kumar/ Dr. Niraj Sinha
Department of Mechanical Engineering
Indian Institute of Technology Kanpur
Kanpur- 208016
E-mail: arvindkr@iitk.ac.in / nsinha@iitk.ac.in
Phone: 0512-259 7484(O); 259 7196(O)

A Short Term Course
On

Additive Manufacturing

For Engineering College Teachers, Practicing Engineers and Scientists

February 11 – February 15, 2019

Sponsored by
All India Council of Technical Education,
New Delhi

Coordinators: Dr. Arvind Kumar, Dr. Niraj Sinha

Department of Mechanical Engineering
Indian Institute of Technology, Kanpur

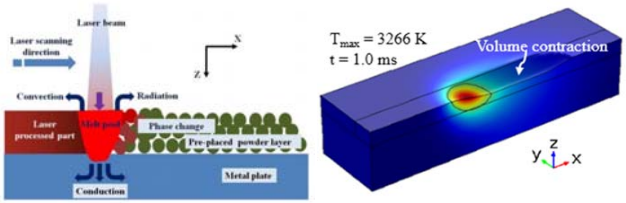
All India Council of Technical Education,
New Delhi

INTRODUCTION

An intensive course on **Additive Manufacturing** will be offered during February 11-15, 2019, under the Continuing Education Programme of I.I.T. Kanpur. It is sponsored by Quality Improvement Programme, All India Council of Technical Education, New Delhi. The course is designed to cater the needs of teachers, scientists from R & D houses and Labs, and practicing engineers from industries. This programme will be specifically useful for persons who are concerned with training / teaching, research, and industrial applications of additive manufacturing, manufacturing of complex parts, CAD for additive manufacturing, bio-additive manufacturing, modelling, to name a few.

OBJECTIVE

Additive Manufacturing (AM) is a process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies, such as traditional machining. The basic principle of AM is that a model, initially generated using a three-dimensional Computer Aided Design (3D CAD) system, can be fabricated directly. AM technologies have significantly evolved over the last decade. Because of their potential to extensively transform the nature of manufacturing processes, e.g., by enabling "Freedom of Design" several industries have been attracted by these technologies. Using AM, manufacturing of highly complex parts can be an economically viable alternative to conventional manufacturing technologies.



Powder bed based AM process; Temperature map in single-layer powder bed melting; Crank shaft made using FDM process (images from left to right)

AM processes can be categorized by the type of material used, the deposition technique or by the way the material is fused or solidified. Over the years, many AM processes have emerged with each of them having their own advantages and limitations.

The primary objective of the present course is to acquaint the participants with the concept of AM, various AM technologies, materials science aspect for AM, modelling of AM processes, and their applications in various fields. Towards modelling in AM, relevant case studies have been included to expose the participants to the mathematical models for AM to describe the transport phenomena such as heat/mass transfer and fluid flow. The course will also cover AM process plan including building strategies and post-processing.

COURSE CONTENT

- **Introduction to Additive Manufacturing**
- **CAD for Additive Manufacturing**
- **Material Science Aspects in Additive Manufacturing**
  Different materials used in AM, Use of multiple materials, multifunctional and graded materials in AM, Role of cooling rate.
- **Various Additive Manufacturing Processes**
  Powder-based AM processes (SLM, SLS, LMD), Printing processes (droplet-based 3D printing), Fused deposition modelling (FDM), Laminated object manufacturing, Stereolithography, Micro- and nano-additive manufacturing.
- **Modelling in Additive Manufacturing**
  Transport phenomena models: thermal and fluid flow, molten pool, residual stress, Various case studies - modelling of powder-based AM process, droplet-based printing process.
- **Applications of Additive Manufacturing**
  Aerospace, Automotive, Electronics industries and Biomedical applications.
- **Demo of FDM and SLM Machine**
  Additive Manufacturing Lab visit

FACULTY

Speakers shall be drawn from various disciplines of different IITs and other institutions of higher learning, and related industries and R&D organizations of different parts of the country.

COURSE FEE

FOR COLLEGE TEACHERS ONLY

There is no course fee for the sponsored teachers from engineering colleges **(only those approved by AICTE, New Delhi)**. They will be paid to and fro 3rd AC class train fare via shortest Route (**strictly on production of ticket**), and free boarding and lodging in the visitors hostel extension of IIT Kanpur. The applications of the teachers from the accredited colleges should reach the course coordinator latest by 21st Jan, 2019 giving the information as mentioned in the Proforma. The engineering College teachers are required submit their application duly recommended by the Head of the Institution/Department through email. The candidate should have minimum qualification as B.E. / B.Tech. / B.Sc. (Engineering). However, candidates with M.E. / M.Tech. / M.Sc. (Engineering) will be given preference. The candidates with Ph.D. degree with manufacturing specialization are most welcome, and will be given the highest priority.

For the selected candidates: The selected candidates will have to send a refundable caution deposit of Rs. 1,000/- to ensure their seat in this course. This amount will be refundable only to those teachers who attend the course (**Please do not send the money until you get selection confirmation**).

FOR PARTICIPANTS FROM INDUSTIERS AND R & D LABS

Private and public sector industries, R & D Labs, teaching Institutions and other organizations are welcome to depute their executives, managers, teachers and engineers to participate in the course. The sponsoring organizations are required to pay a registration fee of Rs. 18,000/ per participant. The participants will have to make their own arrangements to meet their travel and boarding & lodging expenses. Boarding and lodging can be arranged in IITK guest house based upon **prior request**. Applications on a separate sheet giving the information shown in the proforma should reach the Course Coordinator latest by 21st Jan, 2019.

FOR PHD SCHOLARS

For Ph.D. Scholars, the registration fee is Rs. 4,500/. They have to bear their travel and boarding & lodging expenses. Boarding and lodging can be arranged in IITK guest house based upon **prior request**. Applications on a separate sheet giving the information shown in the proforma should reach the Course Coordinator latest by 21st Jan, 2019.

PAYMENT DETAILS

The registration fee or refundable caution money deposit should be sent by bank transfer. After completing the bank transfer email the details of the payment along with your name.

Account name: M F S Course
Account number: 34783101142
Bank: State Bank of India, IIT Kanpur Branch
IFS Code: SBIN0001161

The list of the selected candidates and other useful information will be provided on the website
http://home.iitk.ac.in/~arvindkr/