

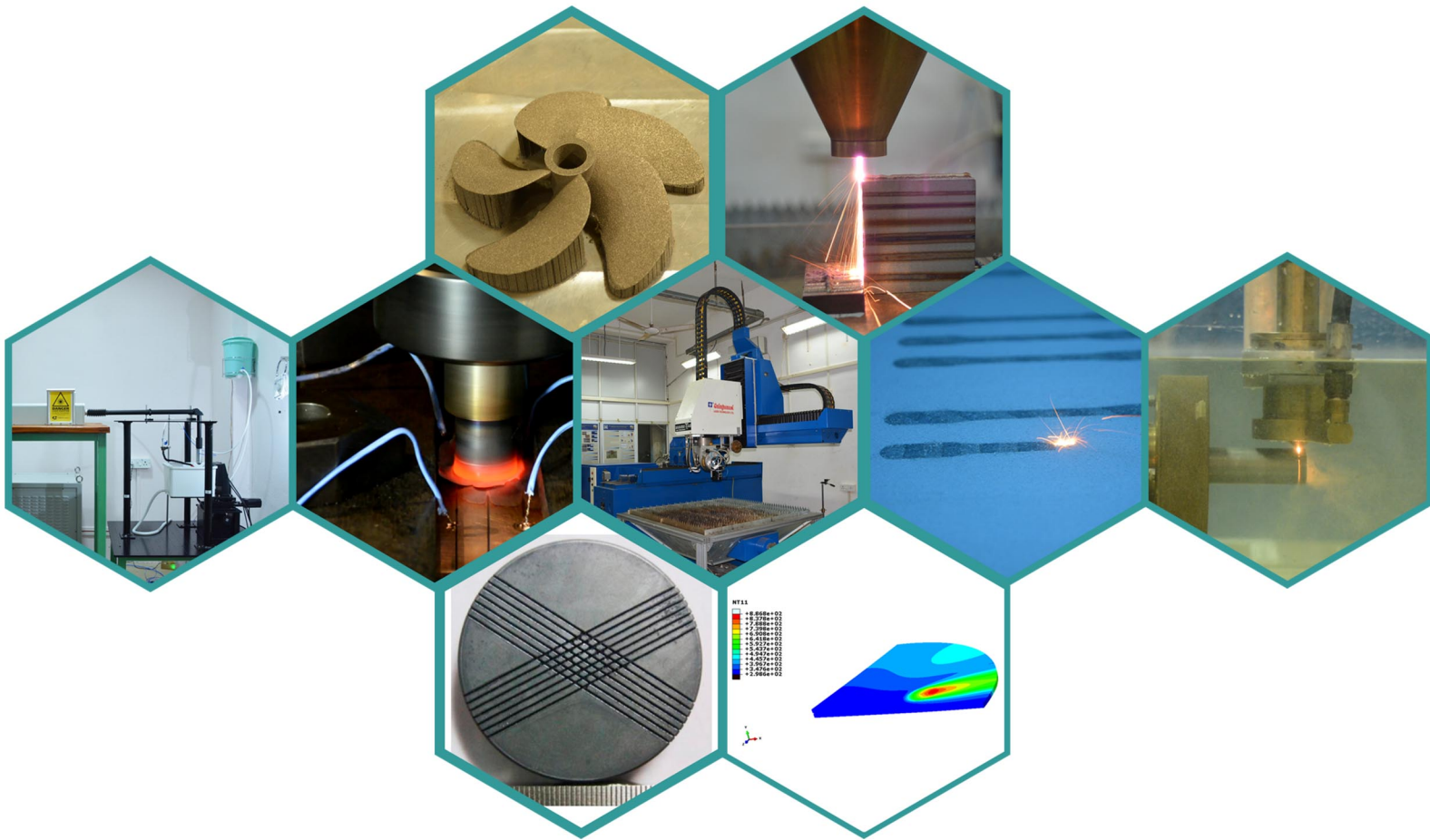
AICTE-QIP  
Sponsored Short-term Course  
on



# Advances in Laser Material Processing & Additive Manufacturing

(December 17-21, 2018)

A Continuing Education Program of Indian Institute of Technology Kharagpur



Organized by  
Department of Mechanical Engineering  
Indian Institute of Technology Kharagpur  
Kharagpur-721302, India

## Brief Course Outline & Objectives

Lasers are finding ever-increasing applications in a wide variety of material processing applications, such as cutting, drilling, welding, metal forming, surface hardening, alloying, cladding, shock peening, micro- and nano fabrication, and a very exciting modality –additive manufacturing. Different manufacturing industries such as automobile, aerospace, ship-building, railways, ordinance, nuclear and bio-implant are regularly using lasers in their production line to machine several exotic materials in many interesting ways. This course aims to provide a better understanding of different types of lasers commonly used in manufacturing industries , their special characteristics, their interaction with different types of materials, effects of laser wavelength (IR to UV), laser power densities ( $\text{kW/cm}^2$  -  $\text{TW/cm}^2$ ) and laser interaction time (ms-fs), and basic mechanisms of various material processing modalities and their parametric dependence.

Additive manufacturing and 3D printing is poised to revolutionize the entire product cycle and lasers are playing a very vital role in it. Laser based additive manufacturing process can produce metallic functional parts directly from their CAD models. Various methods of laser based additive manufacturing and technological challenges will be discussed. In addition laser applications in metrology and laser safety aspects will be also briefly discussed. Lectures will be supplemented with laboratory demonstrations of laser cutting, drilling, welding, metal forming, surface hardening, cladding, and additive manufacturing.

## Course Content

- ☐ Laser fundamental & the Special properties of laser beam
- ☐ Types of industrial lasers including Q-switched, mode -locked & femtosecond lasers
- ☐ Laser beam transport and delivery systems
- ☐ Laser absorption in metal, semiconductor and dielectric materials,
- ☐ Laser material interaction- Effects of laser wavelength, intensity and pulse duration
- ☐ Different laser material processing modalities- Cutting, Drilling, Welding, Surface hardening, Alloying, Cladding, Laser shock peening, Metal forming, Micro- nano fabrications, and laser additive manufacturing,
- ☐ Laser metrological applications and
- ☐ Laser safety

## Laboratory Demonstrations

- |  |   |
|--|---|
| <input type="checkbox"/> Laser Cutting     | <input type="checkbox"/> Laser Cladding         |
| <input type="checkbox"/> Laser Drilling    | <input type="checkbox"/> Metal Forming          |
| <input type="checkbox"/> Laser Welding     | <input type="checkbox"/> Shock Peening          |
| <input type="checkbox"/> Surface Hardening | <input type="checkbox"/> Additive Manufacturing |

## Eligibility for Participation

- ☐ Faculty members from the AICTE-QIP approved institutions
- ☐ Faculty members from non AICTE-QIP approved institutions
- ☐ Engineers from manufacturing Industries
- ☐ Scholars pursuing Ph.D
- ☐ **Min. qualification in all cases - ME / M Tech.**

## Selection

- ☐ Number of seats: 30
- ☐ Selection on “First come first served” basis with 1<sup>st</sup> priority to applicants from the AICTE-QIP approved institutions.
- ☐ Unfilled seats will be open to applicants from non AICTE-QIP approved institutions, industries and Ph.D. Scholars.

## Course Fee

- ☐ Participant from AICTE-QIP approved institutions: Nil
- ☐ Participant from non AICTE-QIP approved institutions: Rs.10000/-\*
- ☐ Participants pursuing Ph.D.: Rs.7000/-\*
- ☐ Participant from Industries:Rs.15000/-\*

*\*includes all taxes, course material, working lunch and snacks during the course*

## Financial Assistance from IIT Kharagpur

Participants from AICTE-QIP approved institutions will be reimbursed to and fro railway fare via shortest route (proof of journey / ticket needed) limited to maximum AC 3-tier from their institutes and free lodging and boarding in the Visveswaraya Guest House (VGH) during course period.

For all other participants (**non** AICTE-QIP institutes & Industry and Ph.D. Scholars) **no TA/DA** will be paid by IIT Kharagpur. Depending upon the availability sharing accommodation in the Institute Guest house **on personal payment** basis may be arranged.

## How to apply

- ☐ All candidates should apply online by clicking “**APPLY for CE Events**” under EVENTS section in the IIT Kharagpur web-portal [www.iitkgp.ac.in](http://www.iitkgp.ac.in) or directly at “<https://erp.iitkgp.ac.in/CEP/courses.htm>”
- ☐ Click on **How to Apply** at the top the page.
- ☐ Follow the instructions given there for signing up and editing your profile.
- ☐ Scroll down to the course “Short Term Training Program on Advances in Laser Material Processing & Additive Manufacturing”.
- ☐ Click on the “**Apply Now**” Button and follow point no. 6 mentioned in the instruction page available at the **How to Apply** link.
- ☐ Shortlisted non AICTE-QIP institutes and Industry participants should pay their course fee online following the above steps and clicking on **How to Pay** at the top the page

## Connectivity

Kharagpur is an important railway junction and is well connected to all parts of the country by rail service (SER). Numerous local & express trains are available from Howrah. The Institute is approximately 5 kms from the Kharagpur railway station. Rickshaws (Rs. 100-150), auto-rickshaws (Rs. 100) and taxis (Rs.150) are available from the railway station.

## Course Coordinators

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<b>Prof. Partha Saha</b> Professor, Mechanical Engineering Department, IIT Kharagpur.	Ph. No.: 03222 281926 (O), 281927 (R) Mob. 9434051944 E-mail: psaha@mech.iitkgp.ac.in

## Lab Demo Coordinators

<b>Dr. Muvvala Gopinath</b> Senior Scientific Officer, Mechanical Engineering Department, IIT Kharagpur	Ph. No.: 03222 281574 (O) Mob. 8142628426 E-mail: muvvala.gopinath039@gmail.com
<b>Mr. Sagar Sarkar</b> Ph.D Student, Mechanical Engineering Department, IIT Kharagpur	Ph. No.: 03222 269857 (O) Mob. 8420335305 E-mail: sagar.sarkar123@gmail.com

## Important Dates

Closing of online registration	: 15 <sup>th</sup> November, 2018
Announcement of shortlisted candidates	: 20 <sup>th</sup> November, 2018
Last date for online fee payment (if applicable)	: 30 <sup>th</sup> November, 2018
Commencement of course	: 17 <sup>th</sup> December, 2018
End of course	: 21 <sup>st</sup> December, 2018

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