INFORMATION OF TECHNOLOGY
KANPUR
A short term Course on
Third SERC School on MICROMACHINING
July 20 to July 25, 2009
Registration Form should contain the following
information and should be printed (not hand written)
Name:
Position:
Department:
Institution/Organization:
Address:
E-mail Address*: Mobile No.: Telephone No.:
Fax No.:
Educational Background (starting from B.Tech./B.E.):
Degree Field of Institution %marks specialization or CPI Year Rank in the class
B.E.
M.E.
Ph.D.
Areas of Research Interest:
Have you attended any course on "Micromachining"
at IITK, CMTI or IITB: Yes / No. (If yes,
1. Give details ..............................................................
2. Why do you want to attend again..................
..........................................................)
Payment details
Demand draft no.__________ dated__________
Amount in Rs.__________ drawn at__________
Sponsored by
Name ____________________________
Designation _________________________
Organization ________________________
Recommendation: .................................................................
• Signature of applicant
Signature of Head of the Department /
Head of the organisation.
Note: Correspondence will be done through e-mail,
but application's hard copy is also required.

Optical view of Silicon blank mirror finished using
CMMRF. The figure shows mirror reflection of IITK,
BARC, DST

IMPORTANT DATES
For College Teachers
• Receipt of applications: June 18, 2009
• Information to the selected candidates*:
  June 25, 2009
• Receipt of the draft: July 06, 2009
• Short term course Program: July 20 to July 25, 2009
  *See on the home page also
For Participants from Industries and R & D Labs.
• Receipt of applications: June 28, 2009
• Information to the selected candidates*:
  July 05, 2009
• Receipt of the draft: July 13, 2009
• Short term course Program: July 20 to July 25, 2009
  *See on the home page also

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Sponsored by
Department of Science & Technology Govt. of India, New Delhi

Coordinator : Dr. V.K.Jain

Third SERC School on
MICROMACHINING
For Engineering College Teachers,
Practising Engineers and Scientists.
July 20 to July 25, 2009

Dept. Of Mechanical Engineering
Indian Institute of Technology Kanpur
Kanpur 208016
Govt. of India,
New Delhi
INTRODUCTION

An intensive course on MICROMACHINING will be offered from July 20 to July 25, 2009, under the Continuing Education Programme of I.I.T. Kanpur. It is being sponsored by Department of Science & Technology, Govt. of India. The course is designed to cater the needs of 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 µ-machining, - to nano-finishing and µ-fabrication.

OBJECTIVE

With the advent of numerical control (NC), computer numerical control (CNC) and direct numerical control (DNC), the accuracy, uniformity and repeatability of the machined parts have improved and manufacturing has gained the flexibility. Micro and Nano fabrication are the latest basic technologies to produce miniaturized parts and components. With time, the miniaturization of the machines and devices is leading to the demand of parts with dimensions of the order of a few micrometers (1µm=10-6m) to a few hundred micrometers. For example, a small bearing in a watch supports a spindle of µ-gear. The size of the micro spindle is smaller than the size of the bearing hole. With its exploitation, it is quite safe to say that there is a need to have the machining processes, which are capable of dealing with atomic and molecular dimensions. Hence, such processes come under the category of µ-machining.

The demand of industries for µ-machining and nanofinishing of various types of materials (metallic, ceramics and plastics) is increasing day by day. Minute parts have applications in various industries like electronics, medicine, communication, avionics and others. Some of the examples of the products that require µ-machining are micro holes in fibers, micro nozzles for high temperature jets, micro molds, etc. Conventional methods (turning, drilling, etc.) with modified versions have been employed for µ-machining of various types of materials. Conditions for chip production during conventional material removal processes (at µ level) are affected by molecular scale phenomena. The depth of cut is in the range of nanometers.

In case of advanced machining processes, material is removed at micro level either by mechanical means (USM, APM, MAF), thermal erosion (EBM, LBM), anodic dissolution (ECM), chemical reaction or combination of two or more than two processes called hybrid machining. µ-machining can be placed in the group of precision machining and ultra precision machining, µ-machining can be divided into two categories: i) Bulk µ-machining where comparatively large amount of material is removed and shape and size are created, and ii) surface µ-machining where the objective is just to improve surface finish in the sub-micron / sub-nano range. The surface roughness values obtained by these processes have been reported as low as the size of an atom or even a fraction of the size of an atom. Now the natural question arises, how to measure such surface roughness or which equipment should be used to measure such low values of surface roughness? Atomic force microscope is the latest equipment used to measure such a low value of surface roughness.

The basic objective of the present course is to acquaint the participants with the principles, basic m/c tools, and developments in the micro- and nano-machining systems, and research trends in the area of micro- and nano-machining processes. Thus, this short term course will deal with all the three areas: µ- and nano-machining, µ- to nano-finishing, and measurement techniques including sensors and actuators used for these machine tools. The proposed SERC School is aimed to make the participants aware of the advanced technologies globally prevailing in the area of µ-fabrication in general and µ-machining in particular. The course will deal with the fundamentals and diversified industrial applications of the advanced machining processes. This course would also cover demonstration of the existing know-how and facilities in the lab. The discussion of the processes will also encompass how to solve machining problems of advanced engineering materials. The SERC sponsored short term School is being organized to facilitate such interactions and to provide an overview of the latest trends in emerging technologies related to µ-machining.

COURSE CONTENTS

Introduction
• Micro / Nano-machining
  (a) Mechanics of Micro-machining
  (b) Abrasive Micro-machining
  (c) Diamond Micro-grinding / turning
  (d) Ultrasonic Micro-machining
  (e) Electro-discharge Micromachining
  (f) Laser Micro-machining
  (g) Electrochemical and Chemical Micro-machining
  (h) Ion Beam Machining
  (i) Electron Beam Machining
  (j) Elastic Emission Machining

• Micro to Nano-finishing
  (a) Abrasive Flow Finishing
  (b) Magnetic Abrasive Finishing
  (c) Magnetorheological Abrasive Flow Finishing
  (d) Magnetic Float Polishing

• Miscellaneous Processes
  High-Resolution Lithography and others

• Microfabrication

• Measuring techniques for µ-/nano-features

In addition to the lectures, the program shall also have following activities:
• IITK Labs visit
• Academic Video films
• Industry visit

FACTORY

Faculty shall be drawn from various disciplines of IIT Kanpur, related industries and R&D organizations from different parts of the country. A couple of experts are likely to come from abroad also.

COURSE FEE

For College Teachers only

There is no course fee for sponsored teachers from engineering colleges (only those approved by AICTE, New Delhi). There will be paid to and fro II AC class train fare via shortest route (strictly on the production of ticket), and free boarding and lodging in the guest house/hostels of IIT Kanpur. The applications of the teachers from the AICTE accredited colleges should reach the course coordinator latest by June 18, 2009, giving the information as shown in the proforma. The engineering College teachers are required to get their applications duly recommended by the Head of Institution / Department. The candidates should have B.E./B.Tech. in Mechanical / Production / Production and industrial Engineering. However, the candidates with M.E. / M.Tech in Production / Production and Industrial Engineering will be given preference. The candidates with Ph.D. degree in these specializations are equally welcome.

*For Selected Candidates: The selected candidates will be requested to send a refundable caution deposit of Rs.500/- to ensure their commitment for participation in the course. This amount will be refundable only to those teachers who attend the course (Please do not send the money until you get selection letter / email / fax).

For participants from Industries / R&D Labs

Private and public sector industries and other organizations are welcome to depute their executives, managers and engineers to participate in the course. The sponsoring organizations are required to pay a registration fee of Rs. 5000/- per participant. The participants will have to make their own arrangements to meet travel and other expenses. Boarding and lodging can be arranged on the payment basis in IITK guest house or IITK hostels based upon prior request, and availability.

Application on a separate sheet giving the information shown in the proforma should reach the Course Coordinator latest by June 28, 2009.

Mode of Payment

The registration fee or caution deposit should be sent by bank draft payable at the “State Bank of India, IIT Kanpur” Branch and drawn in favour of “Micromachining”.

The list of the selected candidates will also be displayed on the home page of the coordinator, as given below.

Home page: http://home.iitk.ac.in/~vkjain/