Finite Element Method for Manufacturing Processes

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Overview

The finite element method (FEM) has become an essential tool for engineers, whether in academics, industry or research, for designing, simulating and optimizing manufacturing processes for engineering components. The Finite Element Method (FEM) is a numerical and computer-based technique of solving a variety of practical engineering problems that arise in different fields. It is recognized by developers and users as one of the most powerful numerical analysis tools ever devised to analyze complex problems of engineering. Experimental approaches to study manufacturing processes are important but they can be replaced by FEM analyses in many cases with the advantages of saving the time and money required to undertake experimental procedures in the laboratory. Manufacturing processes such as rolling, extrusion, machining are complex processes involving a variety of physical phenomena such as plastic deformation, frictional contact, thermo-mechanical coupling, burr formation mechanisms, etc. FEM-based tools can be used to simulate these processes and understand the role that each of these mechanisms plays. However the experimental validation of FEM analysis in manufacturing processes is also very important. Many practitioners of FEM in manufacturing industry do not often understand the method as applied to engineering problems, especially in generating input data and interpreting the results. Keeping this in view, this course will enable the participants to understand the theoretical aspects of the finite element method as applied to modelling manufacturing processes and develop the skill sets for using finite element technique for simulating a select set of processes. The primary objectives of the course are to:

(i) Expose participants to the fundamentals of finite element method,

(ii) Acquaint participants with finite element formulations and theories,

(iii) Develop the ability of the participants to perform finite element analyses and evaluate the results of a select set of manufacturing processes, and

(iv) Provide exposure to practical problems and their solutions, through simulations using the finite element software.

Modules	**Finite Element Method for Manufacturing Processes: December, 19-23, 2020.** **Number of participants for the course will be limited to Thirty.**
You Should Attend If…	▪ you are a mechanical or civil engineer or research scientist interested in the field of Finite Element Method. ▪ you are an executive, engineer or researcher from manufacturing, service and Government organization including R&D laboratories. ▪ you are a student or faculty from academic institution interested in learning application of Finite Element Method in the field of Manufacturing.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry: ₹10000** **Research Organizations: ₹5000** **Faculty/Staff from Academic Institutions: ₹3000** **Students: ₹2000** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, lunch, tea and snacks. The participants must take care of their travel. Accommodation can be arranged for participants on first-come-first-serve basis for nominal payment.

The Faculty

Prof. Harischandra P. Cherukuri is Professor and Chair, Department of Mechanical Engineering and Engineering Science, The University of North Carolina at Charlotte, Charlotte, NC, USA. Prof. Cherukuri obtained his PhD from The University of Illinois at Urbana-Champaign, USA in 1994. He has published many articles in the peer-reviewed international journals and conference proceedings. He is recipient of several fellowships and awards. His research interests include but not limited to: computational mechanics, residual stresses and distortion due to heat treatment, modeling of metal forming and materials processing problems, mechanical response of pressure-sensitive materials, fracture mechanics, numerical solution of hyperbolic problems, laser heating of biological and non-biological materials, modeling of soil-tool interactions, mechanical response of fiber optic cables, and thermal issues in metrology.

Dr. Gurinder Singh Brar received his PhD degree from The University of North Carolina at Charlotte, NC, USA. He currently is an Associate Professor in the Department of Mechanical Engineering at National Institute of Technology, Uttarakhand. He is recipient of the UGC Research Award in Mechanical Engineering (2016-2018). He has supervised Five Ph.D. and Sixty-One M.Tech. students in the field of Manufacturing and Industrial Engineering. He has published more than 110 papers in National and International level. He has delivered more than 19 Invited talks on various topics of his research at Engineering Colleges, Universities, Research Centers and in Conferences. His current research activities include: (i) Solid state processing and joining of similar/dissimilar materials (Friction stir welding, Friction crush welding etc.); (ii) Application of Finite Element Method in Manufacturing Processes; (iii) Development and Manufacturing of advanced materials (Metal matrix composites, Ceramic Matrix Composites); (iv) Material Processing (Friction, Microwave processing etc.); and (v) Recycling and repurposing of plastic waste through Additive Manufacturing technologies.

Course Co-ordinator

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