



A Global Initiative of Academic Networks (GIAN) course on Advanced Knowledge of Fatigue and Fracture Mechanics in Engineering Materials and Structure

October 08-13, 2018

Overview

The industrial growth with global competition of high-class technology and enhanced awareness of safety demands more stringent quality control of engineering component and structure especially when fabricated by welding and other mechanical means. The right selection of material as well as control of fabrication and maintenance with the help of advanced knowledge of fracture mechanics, primarily dealing with criticality of crack initiation, propagation and fracture, can provide desired safety against premature failure and catastrophe. The safety and integrity analysis of any structural material needs knowledge of its fracture mechanics under static and dynamic loading. Here it is also necessary to understand the influence of service environment on fracture mechanics of the material. A critical analysis of various contributory aspects of failure mechanism determines the integrity and life of a component.

The use of fracture mechanics requires knowledge of testing, interpretation of data and analytical concept of application. The fracture mechanics testing follows some definite norms and procedures as prescribed in various standards, but largely follows the ASTM specifications. However, the philosophy of analysis and interpretation of fracture mechanics data and their application in safety and integrity analysis up to certain extent varies in different codes and practices recommended at different places. Based on fast changing scenario of demand of safety and integrity the standards and practices of using this knowledge in design, inspection, monitoring and maintenance are time to time modified by recommendations of various commissions.

In view of the above it is considered imperative for the modern practicing engineers and researchers working primarily in the field of product development and fabrication to have specialized knowledge of fracture mechanics to serve appropriately in the modern highly competitive engineering. The knowledge is equally important for the service engineers working

primarily in the area of inspection and monitoring to ensure the safety and integrity of the service by avoiding catastrophe.

Course Objectives

In consideration of the increasing awareness of safety especially of high performance component and structure the short-term course has been designed to impart advanced analytical knowledge of inspection, fatigue and fracture mechanics to enable the practicing engineer to improve the performance quality of structural components. It will also provide the knowledge of various international standards relevant to the application especially in reference to automobile and construction industries.

Modules	<p>Well-known experts and practitioners of international repute from India and Germany will deliver the lectures followed by interactive discussions and relevant practical exposure based on the following modules.</p> <p>Basics of fatigue and fracture mechanics in reference to : Theory and concept of fatigue fracture and fracture mechanics, Estimation and analysis of various fracture mechanics characteristics.</p> <p>Fracture mechanics test procedure: ASTM specifications for fatigue fracture toughness and fatigue crack growth rate tests in metals, ceramics and polymer.</p> <p>Application of fracture mechanics: in Design, material selection, fabrication, inspection and monitoring, service and maintenance.</p>
You Should Attend If...	<p>You are Executive, Engineer, Researcher or Teacher of any industry, research laboratory or Academic Institute having Bachelor's Degree in Metallurgical & Materials Engineering / Mechanical Engineering / Industrial, Production & Manufacturing Engineering / Civil Engineering or any other related disciplines</p>
Fees	<p>The participation fees for taking the course is</p> <ul style="list-style-type: none"> • Participants from abroad: US \$ 500 • Participants from Industries: Rs. 20,000/- [Rs. 15,000/- (in a group of min. 3)] per person • Participants from Research Organizations: Rs. 15,000/- [Rs. 10,000/- (in a group of min. 3)] per person • Participants from Academic Institutions: Rs. 10,000/- per person • Student Participants: Rs. 3,000/- per person <p>The above fee includes all instructional materials, assignments, laboratory equipment usage charges. The fee does not include accommodation and food. On request boarding and lodging can be arranged in the campus guesthouse on payment basis of first come first serve process depending on its availability.</p>

The Faculty



Professor Peter Häfele has studied mechanical engineering with a specialization on strength of materials at the Universities of Esslingen and Stuttgart, Germany. He earned his master degree in the field of Structures and Dynamics at The George Washington University in Washington, D.C. Professor Häfele received his doctorate (Ph.D.) with highest distinction from the RWTH Aachen, Germany.

He has dealt with fracture mechanics issues from 1990-1992 in the USA. Until 1996 he worked at the Vereinigte Aluminum-Werke (VAW) and at the Max Planck Institute for Iron Research in Düsseldorf as a research engineer. In 1997 he began working for the International Trainee Program of Daimler AG. After a temporary employment in Argentina, he was in the car development of Daimler in the field of structural durability of passenger cars.

Since 2001 he has been Professor of Strength of Materials at the Faculty of Automotive Engineering of the Esslingen University of Applied Sciences and Head of the Laboratory for Materials and Joining Technology. He is Deputy Head of the Steinbeis Transfer Center "Component Strength and Safety, Materials and Joining Technology" where around 700 mainly industrial projects are carried out each year in the field of component safety and durability.

Professor Häfele is the co-author of a book on Strength of Materials published at Springer Verlag.

He has earned several recognitions like the German Tribology Award and the Badge of Honour from The German Association for Materials Research and Testing (DVM).



MHRD

Government of India
Ministry of Human Resource Development



Course Coordinator

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Prof. Dr. Prakriti Kumar Ghosh, Vice-president of Siddharth Group of Institutions, Puttur, Andhra Pradesh, was Senior Professor in Department of Metallurgical & Materials Engineering of Indian Institute of Technology (IIT) Roorkee and also held the positions of Govt. of India IPR Chair Professor in IIT Roorkee till April 2017. He has served in many important administrative positions as Head of the Department, Dean (Finance & planning), Deputy Director and the highest office as Director Officiating of IIT Roorkee. He is visiting Chairman of National Board of Accreditation and served in many national committees. He took lead role in drafting important IP policies of IIT Roorkee and introduced them in practice to strengthen the delivery of research outcome to industry.

Prof. Ghosh is recipient of the Prestigious Alexander von Humboldt Fellowship (Germany) and several national awards that includes Binany Gold Medal and SAIL Gold Medal of Indian Institute of Metals and ISCMS-Tata Steel Award. He is Member, Reviewers Board (Key Reader), Metallurgical & Materials Trans. (A), ASM, USA. He has extensively travelled to many countries of Asia, Europe and America under several delegations of Govt. of India and as visiting scientist and visiting professor for scientific and engineering research and education.

He has served as consultant in large number of developmental projects of public and private sector organizations, some of them worth mentioning as SAIL, DAE, Indian railways, BHEL, Irrigation Department of UP Government, M/s Cloos India welding technology (P) Ltd., Escort Constructions Equipment and EICHER Tractors to transfer advanced knowledge to industry. He has long experience of supporting more than 40 numbers of innovative projects from educational institutes and the grass root level unorganised sector of society for promotion of technopreneur.

He has research interest in fatigue and fracture mechanics, joining of materials, polymer base nano composite and metal matrix composite as well as innovation management. He has published more than 350 research papers out of his supervision of a large number of Ph.D. theses and M.Tech. dissertations executed under several national and international sponsored research projects. He was chairman of Technical Commission for Arc Welding of IIW concurrent with the International Institute of Welding and member editorial board "Indian Welding Journal", Calcutta. He is a member, Reviewers Board (Key Reader), Metallurgical & Materials Trans. (A), ASM, USA (From 2007). He has 5 patents filling in his credit with 1 Technology Transfer in process. Prof. Ghosh has authored a book titled "Pulsed current gas metal arc welding: characteristics, control and applications", Publ. Springer Nature, April 2017.