



Steinbeis

Centre for Technology
Transfer India



Steinbeis

GmbH & Co. KG für
Technologietransfer, Germany

Technology Competence Program (TCP-DES) on *Advanced Design Concepts in Structural Engineering*

Modern and Powerful Tools for Safety Assessment and Failure Prevention

13-15 December 2010, Conference Spa (Paharpur Business Centre)

Nehru Place, New Delhi



Faculty

Prof. Dr.-Ing. Lothar Issler-

*Director Steinbeis Transfer Centre, Safety and Integrity of
Structures, Material and Joining Technology (BWF)*

University of Applied Sciences Esslingen (Germany)

Dr. Vinay Tewari & Dr. P.K. Ghosh – MMED, IIT- Roorkee

Steinbeis Centre for Technology Transfer India

12-2-725/32 Flat#5 P&T Colony Rethibowli, Mehdiapatnam, Hyderabad, AP 500028 India Ph : +91-40-23510255, 9346012052
info@steinbeis.in, 2eTech@Steinbeis.in www.steinbeis.in, www.steinbeisindia.com, www.stw.de

Introduction

Structural engineering deals with analysis and design of structures that support or resist loads. Structural engineers are most commonly involved in the design of buildings and large non-building structures, design of machinery, vehicles or any item where structural integrity affects the item's function or safety. Structural engineers often specialize in particular fields, such as bridge engineering, building engineering, pipeline engineering, industrial structures, or special mechanical structures such as vehicles or aircraft.

Structural engineers must ensure their designs satisfy given design criteria, predicated on safety (e.g. structures must not collapse without due warning) or serviceability and performance (e.g. building sway must not cause discomfort to the occupants). Buildings are made to endure massive loads as well as changing climate and natural disasters. Similarly Principles of structural engineering are applied to variety of mechanical (moveable) structures. The design of static structures assumes they always have the same geometry (in fact, so-called static structures can move significantly, and structural engineering design must take this into account where necessary), but the design of moveable or moving structures must account for fatigue, variation in the method in which load is resisted and significant deflections of structures.

Participation

The target participants for this program are Design and Construction Engineers from the following sectors –

1. Building & Infrastructure Companies
2. General Engineering Companies – Power Plants, Process Plants etc/
3. Railways, Automobile & Automotive Components, Aviation
4. Faculty & Students in Engineering Colleges in Civil, Mechanical, Automotive & related disciplines.

Objectives & Deliverables

The maintenance of safety and integrity of technical structures is the utmost important and most challenging task in all branches of engineering. The well known fact that the technological development is from the very beginning accompanied by failures of structures is an obvious proof that this goal was and is still only partly successful and of disappointing success.

This is insofar astonishing because several powerful advanced safety concepts are meanwhile available which are based on the selection of proper materials, optimized design and manufacturing procedures and consequent and effective quality control during manufacturing as well as structural health monitoring during operation. This leads to definitive safe and economic structures in mechanical, civil, automotive, railway, aircraft engineering as well as in the process, piping systems and pressure vessels industry, conventional and nuclear energy supply including alternative energies.

The objective of the course is to introduce engineers who are involved in industry, governmental bodies and academic institutions into modern design, manufacturing, testing and quality control applying the latest and advanced safety and design methods. These concepts are based on nominal stresses, structural stresses, local stresses and strains as well as fracture mechanics approaches. This includes in the context of a lower bound concept the consideration of material and manufacturing imperfections and the consideration of extremely complex loading conditions including long term influences like fatigue, creep and corrosion.

The practical application of the concepts is demonstrated on case studies including welded structural civil engineering components and automotive structures.

The tools are not only based on theoretical approaches but they are heavily depending experimental validation which is one of the main activities of BWF working successfully in know-how transfer and applied research.

At the end of Technology Competence Program on Engineering Structures, the Engineers should be able to make enhanced creative and efficient use of funds, structural elements and materials to achieve the goals of style, safety, serviceability and performance of their designed structures.

Course Content

◆ Fundamentals of Modern Design Approaches (13-14 December 2010)

1. Advanced Design Concepts
2. Design for Quasistatic Loading
3. Design for Cyclic Loading
4. Design Concepts for Welded Structures
5. Introduction into Structural Safety
6. Practical Design Studies - *Lifetime Assessment for a Car Structure, Application of Design Concepts for a Shaft in Mechanical Engineering*
7. Summary and Discussions

◆ Failure Investigation of Engineering Structures (14-15 December 2010)

1. Introduction
2. General Reasons for Failures
3. Methods of Failure Analysis
4. Concepts for Failure Prevention
5. Case Studies - *Failure Investigation and Design Optimization for a Welded Structure in Civil Engineering*
6. Summary and Discussions

◆ Failures Related to Corrosion & Weldments (15 December 2010)

Faculty



Dr. Issler is an expert in the field of safety analysis of materials and components which the specialisation on theoretical and experimental stress analysis, fatigue, lifetime analysis of structures, fracture mechanics, design concepts and failure analysis. He has 40 years of vast experience in teaching, research and industrial consultancy. He works closely together with reputed companies like Daimler AG, Smart, Bosch GmbH, Porsche AG, Behr GmbH & Co. KG, ThyssenKrupp AG, Schindler, Züblin AG, Festo AG & Co. KG, Liebherr GmbH, RUD GmbH & Co. KG, Siemens, Stihl AG & Co. KG, Kärcher GmbH, Audi AG, Eberspächer GmbH & Co. KG, Honsel AG, Benteler AG.

Dr. Tewari & Dr. Ghosh, both from Metallurgy & Material Engineering Department, Indian Institute of Technology, Roorkee, are national experts in on Failure analysis of Stress Corrosion Cracking of Steels and Failure analysis of Weldments respectively. They advise many companies like ONGC, BPCL, Min. Of Railways, Escorts, etc. on these and related technologies.



Steinbeis

Technology, Transfer, Applications

Steinbeis builds bridges between the world of science, academia, and business. Always focused on the actual benefits of transfer, our success lies in the value-added for our client.



Steinbeis Centre for Technology Transfer, India (SCTI) is a Technology Transfer Network Centre of Steinbeis Foundation, Germany, with its office at Hyderabad, India. It is a part of Global network connecting more than 800 Steinbeis Centres, not just in Europe, but also in other countries like China, Russia and Singapore. Each Centre specializes in its own stream of technology and has excellent resources in terms of laboratories and expert faculty. Hence the industry interested to outsource its technology development work with an institution does it at a fraction of cost involved – that if it were to borne the entire cost of its own. This is further backed by enormous knowledge resources, which can be assessed by each Centre by networking with its peer institutions within the Steinbeis network globally. The SCTI provides its expertise in terms of contract and project management so as to provide the services in the most professional manner.

The services of SCTI are available not just by the traditional way of technology development and transfer, SCTI Centres shall also provide services in the field of outsourcing, consulting and executive and vocational (technical) training. **The turnover of Steinbeis in 2009 was 124 Million Euros (approx. Rs. 800 Crores).**

Steinbeis Centre for Technology Transfer, INDIA

#12-2-725/32, Flat No. 5, P&T Colony, Rethibowli, Mehdipatnam,
Hyderabad-28 Phone: +91-40-32212456, 23510255, 9346012052

2etech@steinbeis.in, tech-mktg@steinbeis.in, www.steinbeis.in
www.steinbeisindia.com

HQ: Steinbeis GmbH & Co. KG für Technologietransfer

Haus der Wirtschaft, Willi-Bleicher-Strasse 19, D-70174 Stuttgart, Ph:
+49 711 1839-5 Fax: +49 711 1839 – 700

A Steinbeis Foundation Company www.stw.de