

WORKSHOP

The 3rd International Conference on
Structural Health Monitoring of Intelligent Infrastructure

SHMII-3 2007

www.isiscanada.com/shmii-3

Vancouver, Canada

November 13-16, 2007

Fairmont Waterfront Hotel



The 3rd International Conference on Structural Health Monitoring of Intelligent Infrastructure, SHMII-3 2007, will provide a forum for international scientists, engineers, enterprisers and young researchers to discuss recent advances in smart sensors, wireless sensor networks, signal acquisition and processing, real-time data transferring and management, and explore the potential for international cooperation. Participants will be able to share innovative ideas on the state-of-the-art, state-of-the-practice and future trends of smart sensors, advanced sensor networks and integrated systems for structural health monitoring of intelligent infrastructure.

SHMII-3 2007 is the official conference of the International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII), and is organized by the ISIS Canada Research Network.

Implementing Structural Monitoring in Bridge Management and Maintenance Practices Tuesday, November 13, 2007

Implementing Structural Monitoring in Bridge Management and Maintenance Practices

Structural Monitoring is emerging as an important tool for bridge engineers, owners and operators. While speciality conferences such as SHMII-3 expose attendees to the leading edge in research and development, this workshop is intended to provide an overview of how elements of structural health monitoring are being used today. Presenters have been selected from the user community and industry to discuss experiences and provide examples of how monitoring techniques are currently being integrated into Bridge Management and Maintenance Practices.

The presentations will draw from real world applications including the use of monitoring information in the management and operation of the Confederation Bridge in Canada. Industry engineers will discuss issues related to the successful implementation of SHM systems including vibration-based assessment and fibre optic systems.

The course is open to those individuals seeking to learn more about the application and benefits of SHM as it is being used today, or to those seeking to implement systems in field projects in the future.

AGENDA:

- 1:00** Welcome and Workshop Introduction
- 1:05** Overview of Structural Monitoring Objectives, Technology and Implementation - J. Newhook
- 1:35** Implemented SHM Practices to Support Bridge Management Decisions - D. Inaudi
- 2:20** Monitoring Technology in the Management and Operation of the Confederation Bridge - D. McGinn
- 3:00** Coffee Break
- 3:15** Modal Based Techniques in Bridge Diagnostics and Decision Making - H. Wenzel
- 4:15** SHM Installations: Lessons Learned - R. Haldane-Wilson
- 4:45** Open Discussion
- 5:00** Session wrap-up

Cost for this workshop is \$200 (CDN), or \$50 (CDN) for students.

Please Register Online at

www.isiscanada.com/shmii-3/online_registration.htm

SHMII-3 2007 WORKSHOP

Implementing Structural Monitoring in Bridge Management and Maintenance Practices

Presenters

John P. Newhook, Ph.D., P.Eng.

Dr. Newhook is an Associate Professor in the Department of Civil and Resource Engineering at Dalhousie University. He is a member of the Intelligent Sensing for Innovative Structures (ISIS Canada) Network of Centres of Excellence Program currently leading several projects related to the development and advancement of SHM technology. Dr. Newhook is a founding executive committee member of the International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII) and is currently editor of the international publication - The Monitor.

Since beginning field monitoring projects in 1995, he has been involved in the monitoring and interpretation of data from marine structures, buildings, soil-steel structures and bridges including the Confederation Bridge.

Helmut Wenzel, Ph.D.

Dr. Helmut Wenzel is the founder and Managing Director of Vienna Consulting Engineers (VCE), an independent high tech oriented consulting firm with its head office in Austria. Through the leadership of Dr. Wenzel VCE has pioneered the use of ambient vibration techniques in structural health monitoring of bridges and many other engineering structures. The brand BRIMOS has been developed under his leadership. He has published the book "Ambient Vibration Monitoring" in 2005 and is currently finalizing "Structural Health Monitoring of Bridges" to be published early in 2008 at Wiley.

Daniele Inaudi, Ph.D.

Dr. Daniele Inaudi received a degree in physics at the Swiss Federal Institute of Technology in Zurich (ETHZ). In 1997 he obtained his Ph.D. in civil engineering at the Laboratory of Stress Analysis (IMAC) of the Swiss Federal Institute of Technology in Lausanne for his work on the development of a fiber optic deformation sensing system for civil engineering structural monitoring.

Daniele Inaudi is co-founder and CTO of SMARTEC SA and CTO of RocTest. He is an active member of OSA, SPIE, IABSE, fib, chairman of the Sensor conference at the annual "SPIE International Symposium on Smart Structures and Materials" and member of the organizing committee of the annual "International Conference on Optical Fiber Sensors". Daniele Inaudi is author of more than 80 papers, three book chapters and editor of a book on Optical Nondestructive Testing.

Rick Haldane-Wilson, P.Eng., CIM

Rick Haldane-Wilson is a Senior Project Manager with Wardrop Engineering. He is a senior structural engineer and has gained significant experience in bridge and structural engineering through his involvement and leadership on numerous projects over the past 13 years with Wardrop. He has specialized capabilities in the design and implementation of Structural Health Monitoring systems from his work on several key bridge structures in Manitoba.

Rick is a winner of the 2003 APEGM Early Achievement Award recognizing his outstanding service to the profession in the early stages of his career. He is committed to continued advancement of technology to improve the service life of our aging and new infrastructure.

Don McGinn, P.Eng.

Mr. McGinn is the Director of Engineering and Maintenance for the Confederation Bridge. He has a degree in Civil Engineering from the Technical University of Nova Scotia and a Masters Degree in Structural Engineering from the University of Calgary.

Don McGinn has been associated with the Confederation Bridge since 1992 and in 2001 he was appointed by Strait Crossing as the Long Term Maintenance Engineer (LTME) responsible for initiating and implementing all technical aspects of long term maintenance associated with the Confederation Bridge.

Abstracts

Overview of Structural Monitoring Objectives, Technology and Implementation - J. Newhook

This presentation will provide a general overview of structural health monitoring as it pertains to civil engineering applications. In addition to a general introduction to the technology, considerations in the design and implementation of SHM systems will be discussed. Some of the common objectives and outcomes of structural health monitoring projects will be reviewed including the growing trend to use SHM technology to help understand the behaviour and performance of structures.

Implemented SHM Practices to Support Bridge Management Decisions - D. Inaudi

Structural health monitoring is a process aiming to provide accurate and timely information on structural conditions and performance. It consists of a continuous or periodical recording of representative parameters selected on the basis of a condition and risk analysis. The information obtained from monitoring is generally used to plan and optimize maintenance activities, increase the safety, verify hypothesis, reduce uncertainty and to widen the knowledge concerning a monitored structure. In spite of its importance, the culture of structural monitoring is not yet widespread among engineers and owners. It is often considered as an accessory activity, which doesn't require detailed planning or an adequate budget. The facts are rather the opposite and the presented application examples will show how SHM can contribute to a safe and economic management of structures.

SHM Installations: Lessons Learned - R. Haldane-Wilson

This presentation will review the installations undertaken by Wardrop Engineering Inc. at the Taylor Bridge, Provencher Bridge, and the TransCanada Highway Bridge. The presentation will cover what the specific goals of the monitoring were, the challenges with the installations, what worked, what didn't, and the lessons learned from these installations.

Monitoring Technology in the Management and Operation of the Confederation Bridge - D. McGinn

The 12.9 km long Confederation Bridge is the world's longest prestressed concrete box girder bridge built over ice covered waters. With 45 main spans of 250 m each and a 100-year design life, the design criteria of the Confederation Bridge are not covered by any code or standard in the world. A comprehensive monitoring and research program is being carried out to monitor and study the behaviour and performance of the bridge under ice forces, short- and long-term deformations, thermal stresses, traffic load and load combinations, dynamic response due to wind and earthquake, and corrosion, and to obtain critical information that engineers now lack in these areas. More than 1000 sensors including strain gauges, thermocouples, accelerometers, dynamic tiltmeters, displacement transducers, weather systems, ice load panels, sonar systems, and video systems are used to support the program.

The monitoring systems also provide important information for effective operational management and maintenance of the bridge. Sensors are used to monitor the progression of creep and shrinkage used in long term deformation calculations. Other sensors provide immediate feedback concerning load conditions (live load combinations); in particular ice loading on the structure. A specialized program allows for determination of the potential for pier scour.

This presentation presents details of the monitoring project and research program and how it is being used by the private operator of the Bridge to effectively manage maintenance of the Facility.