

## NSERC SYNERGY AWARD FOR INNOVATIONS



Dr. Aftab Mufti and Mr. Garth Fallis

Mr. Donald Whitmore, Chairman of ISIS Canada and President of Vector Construction Group, is pleased to announce that ISIS Canada at the University of Manitoba and Vector Construction Group in Winnipeg, Manitoba, have received the Synergy Award for Innovations. Established by the Natural Sciences and Engineering Research Council of Canada (NSERC), the Synergy Award recognizes outstanding research and development partnerships between universities and industry. This award recognizes the ten-year partnership between the University of Manitoba and Vector Construction Group. Led by Dr. Aftab Mufti, ISIS Canada Research Network President and Civil Engineering Professor at the University of Manitoba, and Vector Construction Group Vice-President, Mr. Garth Fallis, the collaboration has combined innovative ideas with leading-edge materials and systems to advance the state-of-the-art in construction, restoration and monitoring of concrete and timber structures. This partnership is also leading the world in 'civionics' - the use of advanced sensor devices and systems for real-time monitoring of bridges and other structures.

## IMPACT OF ISIS CANADA

- Advancing fibre optic sensor technologies
- Creating Structural Health Monitoring [SHM] Systems and Applications
- Developing unique SHM instrumentation for commercial use
- Quantifying the durability of Fibre Reinforced Polymers [FRPs] under extreme environmental conditions
- Using FRPs for rehabilitation of civil engineering structures
- Preserving heritage structures through innovation and new technology
- Enabling design engineers to utilize new materials and concepts through design manuals and code updates
- Illustrating the economic benefits of ISIS technologies through Life Cycle Engineering and Costing Methodologies

**FOR THE BENEFIT OF CANADIANS AND BEYOND**



## ISIS Canada 11<sup>th</sup> Annual Conference May 3<sup>rd</sup> - 5<sup>th</sup>, 2006 Public Forum Day May 3<sup>rd</sup>, 2006

Calgary Marriott Hotel  
110-9th Avenue SE  
Calgary, Alberta T2G 5A6  
Reservations 1.800.896.6878

### STUDENT COMPETITIONS

Visit the ISIS website for details on all student competitions and the four scholarships offered.

Scholarships

Posters

Presentations

*\*NEW\* - IMAGINATIVE USES  
(see below for more details)*

[www.isiscanada.com/competitions/studentc.htm](http://www.isiscanada.com/competitions/studentc.htm)

The Research Management Committee of ISIS Canada is pleased to announce a new student competition on Imaginative Uses of ISIS Technologies.

Applicants are invited to make a submission describing an innovative idea involving ISIS technologies that has not yet been utilized. This can include a product, process, application, design or repair concept, or anything related to the ISIS mandate to advance the field of civil infrastructure to a world leadership position.

For further information visit the ISIS website at [www.isiscanada.com/competitions/imaginative.htm](http://www.isiscanada.com/competitions/imaginative.htm)

Plan to participate in this exciting presentation of smart, alternative **solutions for construction and rehabilitation of civil infrastructure**. You will learn about the latest advances in research and application of **fibre reinforced polymers** and **structural health monitoring** including:

- Application of new technology for the benefit of industry and government, particularly in Alberta
- Employment of the ISIS Canada Winnipeg principles by using arching action to design concrete bridge decks
- Provision of Product Certification for the manufacture of FRP (fibre-reinforced polymer) material for use in civil infrastructure
- Focus of the ISIS 2006 to 2009 research program on the needs of the user sector, including the application of SHM (structural health monitoring) as a management tool using new sensor systems and instrumentation

Register on-line at [www.isiscanada.com/conference/conference06.htm](http://www.isiscanada.com/conference/conference06.htm)

## THE EMERGING CHALLENGE FOR CIVIL ENGINEERING IN A GLOBAL CONTEXT

### Keynote Speaker: Mr. Jac van Beek

Director, Planning and Performance Management  
Strategy, Development and Relations  
National Research Council Canada



Mr. van Beek is responsible for planning and performance management at the NRC, including preparation and submission of annual reports on performance to Canadian Central Agencies and development of a decision-support capability based upon performance metrics. As a planner, he recently directed the development of a science community foresight process as a starting point for the emergent strategy of the National Research Council of Canada.

He is an active member of both the federal government planning and evaluation communities, eminently qualified to contribute a Canadian perspective on science futures, science management and regional innovation based upon his current responsibilities and his twenty years of experience in leading or enabling the management of industry and science-based public organizations.

Mr. van Beek holds an MBA based upon studies at Carleton and York Universities with subsequent work at Duke University's Advanced Management Program and is an adjunct professor of strategy at the University of Ottawa.



# INTERNATIONAL PARTICIPATION

## Proceedings from International Workshop on Innovative Bridge Deck Technologies Now Available

The International Workshop on Innovative Bridge Deck Technologies, held in Winnipeg on April 14-15, 2005, was highly successful. Presentations were made by 18 invited speakers from five countries in order to establish the state-of-the-art for the design of bridge decks. A peer-reviewed book of the proceedings has now been published. The objective of the workshop was to develop a consensus on future design of bridge decks to provide leadership to the civil engineering design community. A consensus was developed at the workshop to establish "The ISIS Canada Winnipeg Principles" that is destined to create a paradigm shift in the design of bridge decks.

To place an order for a copy of the proceedings, please email Charleen Choboter at [choboter@ms.umanitoba.ca](mailto:choboter@ms.umanitoba.ca)

## 5th International Conference on Advanced Composite Materials in Bridges and Structures

The 5th International Conference on Advanced Composite Materials in Bridges and Structures, ACMBS-V, will be held at the Fairmont Hotel, Winnipeg, Manitoba, Canada, from July 16-18, 2006. The Conference is organized under the auspices of the ACMBS Technical Committee of the Canadian Society for Civil Engineering (CSCE) and is sponsored by the ISIS Canada Network of Centres of Excellence. The success of the four previous ACMBS conferences has established this event as a premier forum for exchange of knowledge and experience with the use of advanced composites in bridges and other structures.

The objectives of the ACMBS-V Conference are to provide a forum for the presentation and discussion of recent developments in the use of advanced composite materials (ACM) and fibre reinforced polymers (FRP) in bridges and other structures, and to provide an opportunity for national and international delegates from industry, government, research and academic institutions to interact and share their knowledge, to learn about new and innovative technologies in the field, and to discuss future directions.

For more information, please visit the website at : <http://www.isiscanada.com/acmbs/acmbs.htm>

## First Announcement and Call for Papers for FRPRCS-8

The 8th International Symposium on Fibre Reinforced Polymer Reinforcement for Concrete Structures is a bi-annual symposium focusing on the research, development and application of FRP reinforcement (externally applied or internal) for concrete and other structures such as unreinforced masonry, including historic buildings). The Symposium will continue the success of symposia held in Canada, Belgium, Japan, USA and UK, attracting engineers and researchers from around the world. The symposium will be held July 16-18, 2007 at the University of Patras in Greece.

A call for papers has been sent out with a deadline for abstracts of May 20, 2006. For more information, please visit the website at:

<http://www.frprcs8.upatras.gr/>

## International Symposium for the ACSE to be Held in Quebec City

The second edition of the International Symposium Advances in Concrete through Science and Engineering, will be held in Quebec City, September 11-13, 2006. The event is organized in conjunction with the 60th RILEM Week 2006, which will be held for the first time in North America.

Designed to provide a forum to highlight and discuss the most recent developments and innovations in the science and engineering of concrete, this conference will be divided into three main areas (with simultaneous sessions):

- 1) Numerical models: From microstructure to transport properties and durability
- 2) From fresh to hardened concrete
- 3) Recent developments in the monitoring, repair and maintenance of concrete structures

## CICE 3rd International Conference

The 3rd International Conference on FRP Composites in Civil Engineering will be held December 13-15, 2006 in Miami, Florida. This is the official conference of the International Institute for FRPs in Construction.

This conference is for structural and construction engineers. The objective of the conference is to learn from the experts in the field on how to design and construct FRP repair systems to increase load capacity and to repair structural damages.

For more information on this conference, please visit the following website:

<http://www.iifc-hq.org/cice2006/>



## Guidelines for Product Certification of FRP Material



Dr. Brahim Benmokrane

ISIS Canada has taken on a new challenge to establish guidelines for test procedures and product certification of fibre-reinforced polymer materials. FRP bars are being used increasingly as reinforcement for concrete structures, and their use is expected to grow with the publication of the newly revised Section 16 of the Canadian Highway Bridge Design Code (CHBDC) allowing FRPs to be used as primary reinforcement. As a result, the need for having standardized test procedures and certification becomes progressively more important to the owners of civil infrastructure. In fact, it is believed that the lack of product certification for FRPs as new construction materials constitutes a serious barrier to the use of this material in the design of civil structures where conventional design practices continue to prevail.

ISIS Canada is in a unique position to establish quality control standards for both the manufacturers of FRPs and the owners of infrastructure because of its independence and technical capability. Accordingly, the ISIS Canada Research Network has agreed to spearhead the initiative to formulate this much-needed guide to 'Product Certification for FRP Materials.' The President of ISIS Canada, Dr. Aftab Mufti, is pleased that this newly formed Committee is being chaired by Dr. Brahim Benmokrane, ISIS Project Leader, and Professor in the Department of Civil Engineering at the Université de Sherbrooke. Dr. Benmokrane has been tasked with organizing this new committee, with the mandate: "To establish guidelines for test procedures and certification of FRP products." At first, the committee will focus on FRP reinforcing bars for concrete structures, producing standards for FRP bars that are comparable to the CSA guidelines for steel reinforcing bars.

The membership of this Committee includes representatives from FRP manufacturers, governmental agencies, academia, and consulting engineering firms. The Committee held its first meeting on January 24th, 2006 in Gatineau, Quebec. It is expected that the guidelines will be completed in time for presentation at the upcoming ISIS Canada Annual Conference in May 2006.

### Educational Modules Overview

An important component of the ISIS Canada mandate is to effectively transfer its leading edge technology to the user sector, including engineering students and the design community. As such, a series of Educational Modules on fibre reinforced polymers (FRPs) and structural health monitoring (SHM) technologies has been developed by ISIS Canada for use in undergraduate engineering and technical college curricula. These modules are available free of charge for the use of students, educators and practicing engineers. To date, 150 copies have been downloaded for use in 33 countries.

Ten modules are currently planned, and the first five of these are available for download:

1. Mechanics Examples Incorporating FRP Materials
2. An Introduction to FRP Composites for Construction
3. An Introduction to FRP Reinforcement for Concrete
4. An Introduction to FRP Strengthening of Concrete Structures
5. An Introduction to Structural Health Monitoring
6. Application & Handling of FRPs
7. Life Cycle Engineering & Costing
8. An Introduction to Prestressing with FRPs
9. Durability of FRPs for Construction
10. Compendium of FRP and SHM Case Studies

For more information on these modules, or to receive more information on the planned joint meeting with engineering professors and technical college instructors to be held this spring, please visit our website at [www.isiscanada.com/education/education.htm](http://www.isiscanada.com/education/education.htm)

### Life Cycle Engineering and Costing Model

On November 28, 2005, a presentation of a recently developed Life Cycle Costing and Engineering model was made by Dr. Gordon Sparks to representatives of the user sector in Manitoba, including Manitoba Transportation, the City of Winnipeg Engineering Department, the Manitoba Floodway Authority and Wardrop Engineering.

The presentation was a forerunner to planned workshops on using LCE&C to establish the benefits of using FRPs in civil engineering structures. The cross-country workshops, planned for later this year, will follow a half-day presentation by leading ISIS researchers on the latest design manuals so that practicing engineers are also well versed in the latest case studies regarding ISIS technologies.

The objective is to illustrate the benefits of LCE&C and how the methodology works and to enable practicing engineers to use the latest advancements in LCE&C as part of their future design routine. In the process, the user sector will come to appreciate the value of the ISIS methodology regarding how to handle the complexity and uncertainty involved in taking the multitude of reinforcement and surface options into consideration in the design of a concrete bridge deck.

**For more information on the Life Cycle Engineering and Costing methodology, please contact: Dr. Gordon Sparks, University of Saskatchewan  
email: [gordon.sparks@vemax.com](mailto:gordon.sparks@vemax.com)**

## SSCE Invites ISIS to Saudi Arabia

Dr. Aftab Mufti and Dr. Shamim Sheikh of ISIS Canada visited Saudi Arabia at the invitation of the Saudi Society for Civil Engineering (SSCE) and made presentations sharing the exciting engineering advances that ISIS has developed and how to apply them to local projects. The presentations were well received, and considerable interest in ISIS technologies has been expressed.

A collaborative agreement is being developed between King Fahd University of Petroleum and Minerals (KFUPM) and the University of Manitoba Faculty of Engineering. This is a mutually beneficial opportunity to further the acceptance of ISIS technologies related to the development of intelligent infrastructure. KFUPM is particularly interested in utilizing ISIS equipment for monitoring of pipelines.

This invitation comes directly on the heels of an emerging relationship between Fox-Tek Inc., a manufacturer of patented fibre optic sensing and monitoring equipment that utilizes ISIS technologies, and Saudi Aramco, a world leader in crude oil production.



Dr. M. Baluch, Dr. A. Mufti, Dr. K. Alsultan, Dr. S. Sheikh, Dr. O. Amoudi, Dr. H. Abdulwahhab

## RMC of Canada Bestows Honour on Longtime ISIS Collaborator From Switzerland

The Royal Military College of Canada has bestowed an honorary doctorate on Prof. Urs Meier, Deputy Director of EMPA, Switzerland. In his citation Prof. John Scott Cowan, the Principal of the Royal Military College of Canada, described Urs Meier, a professor of many years' standing at the Swiss Federal Institute of Technology in Zurich, as "a tireless friend of Canadian civil engineering" and as "the spiritual force behind Canada's success in the field of carbon-fibre reinforced structures". The award ceremony, during which Prof. Meier was presented with his honorary doctorate, took place on November 4, 2005 in Kingston, Ontario. Following the morning ceremony, a symposium in honour of Prof. Meier was held at the Royal Military College with the topic of "The Future of Structures - 2030 and Beyond". Twelve senior professors from across Canada were invited to make presentations.



Dr. Sami Rizkalla, Dr. Leslie Jaeger, Dr. Gamil Tadros, Dr. Marie-Anne Erki, Prof. Urs Meier, Dr. Baidar Bakht, Dr. Aftab Mufti



Professor Urs Meier receiving honorary degree



## INTERNATIONAL TECHNOLOGY TRANSFER

### June 2005

Hosted delegation from the University of Mexico (UNAM) to discuss partnership agreement.

### July 2005

Presented papers on ISIS technologies related to FRPs and FOSs in innovative structures at the 3rd International Conference on Composites in Construction held in Lyon, France.

### August 2005

Hosted visit by Dr. Su Taylor of Queen's University, Belfast, Ireland.

### September 2005

Hosted CIDA-sponsored visit by 20 Chinese delegates.

### September 2005

Lectured at The University of Edinburgh, Edinburgh, Scotland.

### November 2005

Presented papers on ISIS technologies at SHMII-2-2005 Second International Society for Structural Health Monitoring of Intelligent Infrastructure, held in Shenzhen, China.

### November 2005

Presented papers on ISIS technologies at the 7th International Symposium on Fiber Reinforced Polymer Reinforcement for Reinforced Concrete Structures (FRPRCS-7) in Kansas City, Missouri.

### December 2005

Lectured at workshop in Hong Kong sponsored by Hughes Brothers.

# APPOINTMENTS & HONOURS

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University of Manitoba

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### Dr. Peter Buckland, P. Eng.

**ISIS Canada is pleased to announce that Dr. Peter Buckland,** principal of Buckland and Taylor Ltd. in North Vancouver, British Columbia, **has joined its Board of Directors.** With 36 years of engineering experience, Dr. Buckland is a leading international consultant.



### Mr. Joe Solomon, P. Eng.

**The Technology Transfer and Commercialization Committee welcomes Mr. Joe Solomon,** president of Specialty Construction Products Ltd. in Winnipeg, Manitoba. Mr. Solomon has several years experience in the field application of fibre reinforced polymer materials.



### Dr. Shamim Sheikh, P. Eng.

**The Technology Transfer and Commercialization Committee welcomes Dr. Shamim Sheikh,** a professor in the Department of Civil Engineering at the University of Toronto. Dr. Sheikh has been associated with ISIS for several years as a project leader and principal investigator who focuses on the application of FRPs on large, complex structures.



### Dr. Brahim Benmokrane

**Dr. Brahim Benmokrane, ISIS Project Leader, and Professor of the Department of Civil Engineering at the Université de Sherbrooke, has received a grant of \$1,176,000** to support the continuation of his **NSERC Chair** in Innovative Fibre Reinforced Polymer (FRP) Composite Materials for Infrastructure. This announcement was made by the Honourable David L. Emerson, Minister of Industry and Minister responsible for the Natural Sciences and Engineering Research Council of Canada on November 18, 2005.



### Mr. Dennis Sargent, P. Eng.

**ISIS Canada would like to congratulate Mr. Dennis Sargent,** president of Sargent and Associates Ltd., and a member of the ISIS Technology Transfer and Commercialization Committee on receiving the Deputy Minister of Transportation Award for Project Supervision for the Hansard Bridge in Prince George, British Columbia.

