

# Program

## SHOTCRETE FOR UNDERGROUND SUPPORT X

**September 12 – 16, 2006**

**Hilton Whistler Resort & Spa**  
4050 Whistler Way - Whistler, BC, Canada V0N 1B4  
Tel: 1-604-966-5013 -- Fax: 1-604-966-5092

### ***Co-Sponsors***

***American Shotcrete Association  
University of British Columbia  
International Tunnelling Association***

### ***Conference Chair***

**Dr. D. R. (Rusty) Morgan**  
**AMEC Earth & Environmental, Canada**

### ***Conference Co-Chair***

**Dr. Harvey Parker**  
**Harvey Parker & Associates Inc., USA**

# ECI

**Engineering Conferences International**  
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**Brooklyn, NY 11201**  
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**Tuesday, September 12, 2006**

4:30 pm – 6:30 pm	Registration Sign-up for Optional Tours
6:00 pm – 6:45 pm	Welcome Reception
6:45 pm – 8:30 pm	Welcome Dinner
8:30 pm – 9:15 pm	Social Hour

***Important Notes***

Breakfasts are in the hotel restaurant “CBG” (via voucher)

Lunches and dinners – Mt. Currie South

Technical sessions – Mt. Currie North

Please wear your name badge at all conference functions – it admits you to meals and identifies you as a conference participant.

Audio taping, videotaping and photography of presentations are prohibited.

Please do not smoke at any conference functions.

Turn your cell phones to *vibrate* or *off* during technical sessions.

Optional Recreational Activities are available for Thursday afternoon:

Nairn Falls Nature Walk/Hike

Green Lake Guided Canoeing or Kayaking Tour

Please sign up with ECI prior to Monday, September 11<sup>th</sup> at 12 noon.

**Wednesday September 13, 2006**

- 7:30 am – 9:00 am Breakfast (in Hotel Restaurant “CBG” via voucher)
- 9:00 am – 9:15 am Opening Comments: ECI – Herbert Klapperich, Technical Liaison
- 9:15 am – 9:30 am Conference Chair opening address, D. R. Morgan, AMEC Americas Ltd., Vancouver, BC, Canada
- 9:30 am – 12:00 pm **Session I: Standards and Specifications**  
Session Chair: Harvey Parker, Seattle, Washington, USA
- 9:30 am – 10:00 am **Keynote Paper: *Activities of the ITA Working Group on Shotcrete Use***  
Tarcisio Celestino, University of Sao Paulo, Brazil and  
Atsumu Ishida, Denki Kagaku Kogyo Co. Ltd., Niigata, Japan
- 10:00 am – 10:30 am *Standards, Test Methods and Guides for Shotcrete Ground Support*  
Peter Tatnall, Performance Concrete Technology, Marietta, Georgia, USA
- 10:30 am – 11:00 am Coffee Break
- 11:00 am – 11:30 am *ACI Guide for Underground Shotcrete Specification*  
Harvey Parker, Harvey Parker and Associates, Seattle, Washington and  
Chris Breeds, Sub-Terra Inc., Seattle, Washington, USA
- 11:30 am – 12:00 pm *Recommendations for Shotcreting (draft) Part Tunnels by NATM by The Japan Society of Civil Engineers*  
Taketo Uomoto, The University of Tokyo, Tokyo, Japan and  
Chikanori Hashimoto, The University of Tokushima, Tokushima, Japan.
- 12:00 pm – 1:00 pm Lunch
- 1:00 pm – 5:30 pm **Session II: Shotcrete Research and Testing**  
Session Chair: Stefan Bernard, TSE Pty, Ltd., Sydney, NSW, Australia
- 1:00 pm – 1:30 pm **Keynote Paper: *Bringing Science to an Art: A Decade of Shotcrete Research at the University of British Columbia***  
Nemkumar Banthia and Sidney Mindess  
University of British Columbia, Vancouver, BC, Canada
- 1:30 pm – 2:00 pm *A Decade of Shotcrete Research at Laval University*  
Marc Jolin and Benoit Bissonnette, Laval University, Quebec City, Quebec, Canada

**Wednesday September 13, 2006 (continued)**

- 1:30 pm - Abstract only      *An Application for Bayesian Statistics for Monitoring the Thickness of Shotcrete Linings*  
Haken Stille, Royal Institute of Technology Stockholm,  
Mats Holmberg, Tunnel Engineering AB, Nykoping and  
Tomas Franzen, Swedish Rock Engineering Research, Stockholm,  
Sweden
- 2:00 pm – 2:30 pm      *Design of Bolt-Anchored Reinforced Shotcrete Linings Subjected to Impact Loadings*  
Jonas Holmgren and A. Ansell, Royal Institute of Technology,  
Stockholm, Sweden
- 2:30 pm – 3:00 pm      *Applicability of Shotcrete for NATM Using Blast Furnace Slag Cement*  
Satsumu Yoshida and F. Taguchi, Civil Engineering Research Institute  
of Hokkaido, Hiragishi and S. Yamanaka and H. Sato, Hokkaido  
Development Bureau, Ministry of Land Infrastructure and Transport,  
Hokkaido, Japan
- 3:00 pm – 3:30 pm      Coffee Break
- 3:30 pm – 4:00 pm      *Behaviour of Concrete Panels Reinforced with Welded Wire Fabric and Fibres Under Impact Loading*  
Hanfeng Xu and Sidney Mindess, University of British Columbia,  
Vancouver, BC, Canada
- 4:00 pm – 4:30 pm      *Shotcrete with High Strength at Early Age*  
A. Ishida, Denki, Kagaku Kogyo Co. Ltd., Niigata, Japan
- 4:30 pm - 5:00 pm      Open Discussion on Shotcrete Research and Testing
- 6:30 pm – 7:00 pm      Social Hour
- 7:00 pm – 9:00 pm      Dinner/Informal Discussions

**Thursday September 14, 2006**

- 7:30 am – 9:00 am Breakfast (in Hotel Restaurant “CBG” via voucher)
- 9:00 am – 12:00 pm **Session III: Fibre Reinforced Shotcrete**  
Session Chair: Pete Tatnall, Marietta, Georgia, USA
- 9:00 am – 9:30 am **Keynote paper: *High Dosages of Set Accelerators in Fibre Reinforced Shotcrete***  
Stefan Bernard, TSE Pty. Ltd., Sydney, NSW, Australia, O. Jerlin and K. Lonnesjo, Royal Institute of Technology, Stockholm, Sweden
- 9:30 am – 10:00 am *Deformation of Round Determinate Panels Containing Fibres*  
Hanfeng Xu, Quian Gu and Sidney Mindess, University of British Columbia, Vancouver, BC, Canada
- 10:00 am – 10:30 am *Strength and Deformability Anisotropy of Fibre Reinforced Shotcrete*  
Tarcisio Celestino, G.R. de Castro, P.Vessaró, A.A. Borto Lucci and O.J. Santos, University of Sao Paulo, Sao Paulo, Brazil
- 10:30 am – 11:00 am Coffee Break
- 11:00 am – 11:30 am *Fibre Reinforced Shotcrete: The Effect of Spraying Process*  
Vivek Bindiganavile, University of Alberta, Edmonton and Nemkumar Banthia, University of British Columbia, Vancouver, BC, Canada
- 11:30 am – 12:00 pm *The Influence of Curing on the Mechanical Performance of Fibre Reinforced Shotcrete*  
Stefan Bernard, TSE Pty. Ltd., Sydney, NSW, Australia
- 12:00 pm – 1:00 pm Lunch
- 1:00 pm – 6:00 pm Free Time (Recreational Activities and/or *ad hoc* discussions)
- 6:00 pm – 7:30 pm Dinner/Informal Discussion
- 7:30 pm – 9:30 pm **Session III (continued) Fibre Reinforced Shotcrete**  
Session Chair: David Wood, Sudbury, Ontario, Canada
- 7:30 pm - 8:00 pm *Behaviour and Performance of Macro-Synthetic Fibres in Dry-Mix Shotcrete*  
Jean-Francois Dufour, KPM Industries Montreal, Quebec, Jean-Francois Trottier and Dean Forgeron, Dalhousie University, Halifax, Nova Scotia, Canada,

**Thursday September 14, 2006 (continued)**

- 8:00 pm – Abstract only      *Application of High Performance Fibre Reinforced Shotcrete for Tunnel Primary Support*  
Marijan Skazlic and Z. Skazlic, University of Zagreb, and  
Kaciceva, Zagreb and J. Majer Transportation Department, Institute of  
Civil Engineering, Zagreb, Croatia
- 8:00 pm – 8:30 pm              *Steel Versus Synthetic Fibre Reinforcement in Shotcrete*  
Royce Ratcliffe, Bekaert Onesteel Fibres Australasia, Perth, Western  
Australia
- 8:30 pm – 9:00 pm              Open Discussion Session on Fibre Reinforced Shotcrete
- 9:00 pm – 10:00 pm            Social Hour



**Friday September 15, 2006**

- 7:30 am – 9:00 am Breakfast (in Hotel Restaurant “CBG” via voucher)
- 9:00 am – 12:00 pm **Session IV: Shotcrete in Tunnels**  
Session Chair: George Yoggy, GCS, LLC, Allentown, Pennsylvania, USA
- 9:00 am – Abstract only *Shotcrete Under Squeezing Rock Conditions During the Construction of the Multifunctional Station Faido*  
Daniel Sporri, Consorto TAT Faido, and  
Gustav Bracher, Sika Schweiz AG, Widen, Gotthard Base Tunnel, Switzerland
- 9:00 am – 9:30 am **Keynote paper: *Beacon Hill Station Shotcrete Application***  
J. Laubbichler, Design Engineer, Dr. G. Sauer Corp.,  
Stephen Redmond, Obayashi Corp., and  
Zephaniah Varley, Parsons Brinkerhoff, Seattle, Washington, USA
- 9:30 am – 10:00 am *Shotcrete Support for the Seymour Shaft and Shaftbase TBM Launch Chamber, Seymour Capilano Twin Tunnels Project, Vancouver, BC,*  
Dean Brox, Hatch Mott MacDonald, Christian Genschel, and Josef  
Messner, Bilfinger Berger Canada,  
Andy Saltis, Pacific Liaicon and Associates and  
Tom Morrison, Greater Vancouver Water District, Vancouver, BC,  
Canada
- 10:00 am – 10:30 am Coffee Break
- 10:30 am – 11:00 am *Seismic Retrofit of Undersea Massey Tunnel with Reinforced Shotcrete,*  
Dudley Morgan, AMEC Americas Limited,  
Keith Kazakoff, British Columbia Ministry of Transportation and Hisham  
Ibrahim, Buckland and Taylor, Vancouver, BC, Canada
- 11:00 am – 11:30 am *Thermal Barriers and Fibre Concrete - Roles in Passive Fire Protection of Tunnels*  
Thomas Melbye and Ross Dimmock, UGC International, Division of  
BASF Admixtures Inc./Master Builders, Switzerland
- 11:30 am – 12:00 pm Open Discussion Session on Shotcrete in Tunnels
- 12:00 noon – 1:00 pm Lunch

**Friday September 15, 2006** (continued)

- 1:00 pm – 3:30 pm      **Session V: Shotcrete in Mining**  
Session Chair: Ross Dimmock UGC, International Division of BASF Admixtures Inc./Master Builders, Switzerland
- 1:00 pm – 1:30 pm      **Keynote Paper: *Wet-Mix Shotcrete as a Material Process and Ground Control Component of a 21<sup>st</sup> Century Mining Operation***  
Brad Knight, BASF Admixtures Inc., North Bay Ontario, Canada and Mike Rispin, BASF Admixtures Inc. Cleveland, Ohio, USA, and Ian Clegg, Clegg Consulting, Sudbury, Ontario, Canada
- 1:30 pm – 2:00 pm      *SCC for Underground Sprayed Concrete Application*  
Michel Lessard Euclid Canada, St-Hubert , Quebec, Dan Millette, Euclid Chemical Company, Cleveland, Ohio, Francois Vezina, Agnico Eagle Mine, Laronde, Caddillac, Quebec, Alain Tremblay, Beton Fournier, Val d'Or, Quebec and Jean-Claude Leduc, St. Lawrence Cement, Longueuil, Quebec, Canada
- 2:00 pm – 2:30 pm      *Design, Testing and Implementation of In-Cycle Shotcrete in the Northern 3500 Orebody, Mt. Isa, Australia*  
David O'Toole and S. Pope, Xstrata Copper, Mt. Isa, Queensland, Australia
- 2:30 pm – Abstract only      *In Cycle Shotcrete for Drifting at Doz Mine PT Freeport, Indonesia*  
Glen Rotty and S. M. Parningotan, PT Freeport, Indonesia
- 2:30 pm – 3:00 pm      Open Discussion on Shotcrete in Mining
- 3:00 pm – 3:30 pm      Coffee Break
- 3:30 pm – 6:00 pm      **Session VI: Miscellaneous Shotcrete**  
Session Chair: Tarcisio Celestino, University of Sao Paulo, Brazil
- 3:30 pm – 4:00 pm      **Keynote Paper: *Pumping Concrete: a Fundamental and Practical Approach***  
Marc Jolin and F. Gagnon, Laval University, Quebec, F. Chapdelaine, Direction Generale des Technologies de l'information et des communications, Quebec, and Denis Beaupré, Unibeton Readymix, Abu Dhabi, United Arab Emirates
- 4:00 pm – 4:30 pm      *Lessons Learned from a Successful Shotcrete Repair*  
Paul D. Carter, CH<sub>2</sub>M Hill, Edmonton Alberta and Jim Wong, Alberta Transportation, Edmonton, Alberta, Canada
- 4:30 pm – 5:00 pm      *The Advantages of Using Preblended Dry Materials for Wet-Mix Shotcrete*  
Mike Ballou, Sika USA Tunnelling and Mining, Taylorsville, Utah, USA, and Mark Lukkarilla, Spec Mix Inc., Mendota Heights, Minnesota, USA

**Friday September 15, 2006** (continued)

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| 5:00 pm – 5:30 pm  | <i>Computer Controlled Application of Shotcrete; A Status Report</i><br>Knut Garshol, Degussa UGC Latin America, Miami, Florida and<br>C. Ziegler Switzerland AG, Winterthur, Switzerland |
| 5:30 pm – 6:00 pm  | Closing address: Conference Co-chair Harvey Parker, Seattle,<br>Washington, USA   |
| 7:00 pm – 7:45 pm  | Pre dinner reception  |
| 7:45 pm – 10:00 pm | Conference Banquet and Cultural Event   |

**Saturday, September 16, 2006**

9:00 am

Farewell breakfast (in Hotel Restaurant "CBG" via voucher)  
and departure