

## Conference Programme

### Tuesday 1<sup>st</sup> September 2009

10:00 Registration

#### FRP Reinforced Concrete

- 10:40 **Keynote:**  
**FRPS In Construction: A North American Perspective**  
Garth Fallis, Vector Construction Group
- 11:00 **Detection and Imaging of Concrete Glass Fiber Reinforcing Bars Using High Frequency Ground Penetrating Radar**  
C. Campbell, H.E.J. De, L.A. Bisby, A. Giannopoulos and T.J. Stratford, University of Edinburgh
- 11:20 **FRP Reinforced Laterally Restrained Concrete Slabs**  
G. Tharmarajah, D.J. Robinson, S.E. Taylor, D.J. Cleland, Queen's University of Belfast
- 11:40 **Calculation of Crack Widths in Concrete Members Reinforced with Fiber Reinforced Polymers (FRP)**  
J. Hegger and M. Kurth, Institute of Structural Concrete, RWTH Aachen University & J. Niewels, Klemens Pelle
- 12:00 **Deflection Prediction of FRP Reinforced Concrete Beams**  
K. Pilakoutas, I. Hajirasouliha, M. Guadagnini & R. Al-Sunna, University of Sheffield
- 12:20 **Failure Modes of Prestressed CFRP Rods in a Wedge Anchored Set-Up**  
Anders Bennitz, Luleå University of Technology, Jacob. W. Schmidt, Björn Täljsten, Technical University Denmark
- 12:40 Lunch

#### Existing FRP Structures

- 13:40 **Keynote:**  
**Recent Developments in the use of FRPs in the UK Railway Civil Engineering**  
Brian Bell, Network Rail
- 14:00 **St Austell Footbridge: The First Fibre Reinforced Polymer Structure on the UK Rail Network**  
J.D. Shave, S.R. Denton, Parsons Brinckerhoff and I. Frostick, Network Rail
- 14:20 **Calder Viaduct FRP Re-Decking**  
Lee Canning, Nick Speight, Rob Stephens, Yvonne Dobson, Mouchel
- 14:40 **Monitoring of Tievenameena FlexiArch Bridge**  
S. Taylor, D. Robinson, S Grattan, J Bourke and A Long, Queen's University Belfast and A. Gupta and J Kirkpatrick, Macrete Ltd
- 15:10 Break
- 15:40 **Dynamic Assessment of a FRP Suspension Footbridge**  
R.A. Votsis, M.K. Chryssanthopoulos, University of Surrey and T.J. Stratford, University of Edinburgh
- 16:00 **Design Criteria for Aramid Fibres**  
Ioannis Giannopoulos & Chris Burgoyne, University of Cambridge

#### Fire and Elevated Temperature

- 16:20 **Predictive Methods for the Fire Resistance of Single Skin and Sandwich Composite Materials**  
P.A. Cutter, S.S.J. Moy, R.A. Sheno, University of Southampton
- 16:40 **Fibre Reinforced Cementitious Matrix Systems for Fire-Safe Flexural Strengthening of Concrete: Pilot Testing at Ambient Temperature**  
E.C. Roy, M. Ward, L. Bisby, T.J. Stratford, University of Edinburgh of Edinburgh
- 17:00 Close

## Wednesday 2<sup>nd</sup> September 2009

09:00 Registration

09:20 **Keynote:**  
**The Goal for the FRP Industry to be in Quadrant 1: Ongoing Research to Assist in This Quest**  
T. Ibell, A. Darby, University of Bath, S.R. Denton, Parsons Brinckerhoff

### FRP Strengthening : Concrete Structures

09:40 **FRP Strengthening of RC Wall With Openings**  
Gabriel Sas, Luleå University of Technology, Christian S. Hansen and Björn Täljsten, Technical University of Denmark.

10:00 **Optimum Shear Strengthening of Reinforced Concrete Beams with Presetressed Carbon Fibre Reinforced Polymer (CFRP) Straps**  
H.D. Yapa, J.M. Lees University of Cambridge

10:20 **Sensitivity of NSM Reinforcement Forces to Bond-Slip Effects**  
J.M. Lees, University of Cambridge

10:40 **Calculation of Deflection of FRP-Strengthened RC Slabs Using a Tri-Linear Moment-Curvature Relationship**  
Scott Smith, The University of Hong Kong and Seo Jin Kim, University of Technology Sydney

11:00 **Bond Mechanisms of Various Shapes of NSM CFRP Bars**  
Kalpana Perera, Prof. Tim Ibell, Dr. Antony Darby, University of Bath

11:20 Break

### FRP Strengthening : Bond, Anchorage and Qualification

11:50 **Crack Sliding Theory for Tension Free Face FRP-Plated Beams – Experimental Part**  
Fedja Arifovic & Björn Täljsten, Technical University of Denmark

12:10 **A Solution for Interfacial Stresses in Plated Beams Including Shear Deformation Effect**  
V. Narayanamurthy, J.F. Chen & J. Cairns, University of Edinburgh

12:30 **Tests on FRP-Concrete Bond Behaviour in the presence of Steel**  
M.T. Khorramabadi, C.J. Burgoyne University of Cambridge

12:50 **Stress Concentration of Plate-Type Anchor System for Prestressing CFRP Sheets: Finite Element Analysis**  
Yail J. Kim, North Dakota State University, Mark F. Green, Queen's University, Canada

13:10 **Using CompClass in Practice – The Inspection and Acceptance of Polymer Composite Strengthening Systems**  
Richard Hill, Ove Arup & Partners Ltd, Allan Hutchinson, James Broughton, Oxford Brookes University, John Drewett, Concrete Repairs Limited

13:30 Lunch

### Case Studies and Business Cases (Sponsored by Modern Built Environment)

14:30 **Keynote:**  
**Clearing the Hurdles to Growth and New Applications**  
David Kendall, Optima Projects

14:50 **Case Study of a Composite Beam for a Monorail/PRT System**  
Peter Lovering, Composite Solutions UK Ltd

15:10 **The Case for FRP Balconies**  
Mark Hobbs, Gurit

15:30 **Economic Viability of FRP Road Bridges**  
Ben Sadka, Highways Agency and Jon Shave, Parsons Brinckerhoff

15:50 Break

## Durability and Environmental Conditions

- 16:20 **Use of Thermoset/Organomica Nanocomposites to Enhance the Long-Term Durability of Structural FRP Composite Materials**  
M. Robert, P. Cousin, B. Benmokrane, University of Sherbrooke, Canada
- 16:40 **Finite Element and Fracture Mechanics Analysis of CFRP Systems Applied to Concrete Under Varying Environmental Loads**  
Patrice Godonou, Uppsala University
- 17:00 **Comparative Analysis of Infrared and Thermal Cured Glass Fibre Reinforced Polymer Composite Laminates**  
P. Kiran Kumar, B.N.M Institute of Technology, India & N.V. Raghavendra, B.K. Sridhar, The National Institute of Engineering (NIE), India
- 17:20 Close

## Thursday 3<sup>rd</sup> September 2009

- 09:00 Registration

## FRP Stay in Place Formwork and Sandwich Panels

- 09:20 **Keynote:**  
**FRP Stay-in-Place Tubular Forms for a New Generation of Precast Concrete Piles and Poles**  
Amir Fam, Queen's University, Canada
- 09:40 **FRP Stay-in-Place Participating Formwork - Design Considerations and Preliminary Testing**  
X.Gai, A.P. Darby, T.J. Ibell, M. Evernden, University of Bath
- 10:00 **Analysis and Design Guidelines of Precast/Prestressed Composite Load-Bearing Sandwich Wall Panels**  
Tarek K. Hassan, Ain Shams University, Cairo, Egypt & Sami Rizkalla, NC State University, Raleigh, NC, USA
- 10:20 Break

## FRP Strengthening : Steel, Masonry and Timber Structures

- 10:50 **The Use of Advanced Carbon Composites for the Repair of Fatigue Cracks in Steel Structures**  
I.M. May, C. Lang, R. Khan, Heriot Watt University, Edinburgh and M. Roy, QinetiQ, Dunfermline.
- 11:10 **Crack Propagation in ESE(T) Specimens Strengthened with CFRP Sheets**  
Christian Hansen, Björn Täljsten, Peter H. Jensen and Jens Dyrelund, Technical University of Denmark
- 11:30 **Experimental Testing of FRP Plate Reinforced Glulam**  
Gary. M. Raftery, Annette Harte, National University of Ireland, Galway
- 11:50 **Repair of a Model Masonry Arch Bridge Using FRP**  
Y. Tao, J.F. Chen, T.J. Stratford, University of Edinburgh
- 12:10 Lunch

## FRP Strengthening: Confinement

- 13:10 **Behaviour of FRP-Confined High Strength Concrete**  
Q.G. Xiao, J.G. Teng and T. Yu, The Hong Kong Polytechnic University
- 13:30 **Effectively Confined Area for FRP Confined RC Columns Under Eccentric Loading**  
R.M. Coonan, A.P. Darby, T.J. Ibell, University of Bath
- 13:50 **A Novel Model for Ultimate Strength of Solid and Hollow-Core FRP-Confined Concrete Members**  
Rossella Modarelli, CETMA, Italy

## FRP to FRP Connections

- 14:10 **An Experimental Investigation of Bolt Pull-Through Failure in Pultruded GRP Plate**  
G.J. Turvey, Lancaster University, UK
- 14:30 **Single Bolt Tension Joints in Pultruded Fiber Reinforced Polymer Leg Angle Connections**  
M. Evernden & R.J. Pelly, University of Bath, UK

14:50	Break
15:20	<b>Determination of Pin-bearing Strength for the Design of Bolted Connections with Standard Pultruded Profiles</b> J. Toby Mottram, University of Warwick, UK
15:40	<b>Behaviour of bolted connections in GFRP subjected to tension loads</b> Matthias Oppe, Jan Knippers, Knippers Helbig KHing, Stuttgart, Germany
16:00	<b>Influence of Bolt Diameter on the Bearing Failure Load of GFRP Bolted Laminates</b> Francesco Ascione, Franco Maceri, University of Rome & Luciano Feo, University of Salerno
16:20	<b>An Overview of the IMAJINE Project</b> R. Lee & M. Wall, ESR Technology, S. Kelly & L. Garden, Doosan Babcock Energy Ltd, M. Gower, NPL & M. Dixon & N.Ravirala, Deepsea Engineering & Management Ltd
16:40	Discussion and Close

## Poster Presentations

### **Fracture Mechanics of Plate Debonding: Experimental Validation**

Mithila Achintha, Oxford University & C.J. Burgoyne, University of Cambridge

### **Seismic Behaviour of EBR FRP-Retrofitted Frames**

Reyes Garcia, Iman Hajirasouliha, Kypros Pilakoutas, Maurizio Guadagnini, University of Sheffield

### **Enhancement of RC Column and Joint Resistance by Using CFRP Strengthening**

Panos Papastergiou, Kypros Pilakoutas, University of Sheffield & Mihaela Anca Ciupala University of East London

### **Flexural Reinforcement of Glue-Laminated Timber Beams using Prestressed FRP Plates**

James Brady & Annette M. Harte, National University of Ireland, Galway

### **What Happens with Bonded-FRP Strengthening Beams Get Warm?**

Dr T.J. Stratford, Dr. L.A. Bisby, C. Gillespie & M. Moran, University of Edinburgh

### **Effects of Aspect Ratio on the Observed Hoop Strain Variation in FRP Confined Concrete Cylinders**

M. Webster, D. Sinclair, Dr L.A. Bisby, Dr T.J. Stratford & Dr W.A. Take, University of Edinburgh