



**First Announcement – “SSFRP2014”**

*The Institution  
of Structural  
Engineers*

**ONE-DAY SEMINAR  
ON STRUCTURAL STRENGTHENING USING  
FIBRE-REINFORCED  
POLYMER MATERIALS:  
STATE OF THE ART APPLICATIONS**



**Wednesday, 9<sup>th</sup> April 2014**

**Crystal Ballroom, Level B3, Holiday Inn Golden Mile Hong Kong**

50 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong

Organisers : HKIE/IStructE Joint Structural Division, Hong Kong  
IES/IStructE Joint Committee, Singapore  
The Hong Kong Institute of Steel Construction

Sponsor :



**FYFE (Hong Kong) Limited**

Unit 7, 20/F, Block B, New Trade Plaza

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The Hong Kong Institute of Steel Construction
- Sponsors : FYFE (Hong Kong) Limited
- Date : 9<sup>th</sup> April 2014
- Time : 8.30am registration for 9:00am to 5.00pm
- Venue : Crystal Ballroom, Level B3, Holiday Inn Golden Mile Hong Kong  
50 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong
- Fees : HK\$950 (IStructE, HKIE, IES, HKISC Members) and group registration  
HK\$1250 (Non-Members)
- CPD Certificate : 6 hours

Fees are inclusive of course notes, lunch and light refreshments

### **Introduction**

Structures require regular maintenance and repairs to remain in a serviceable condition. If the conditions of service change and when deteriorations occur after prolonged exposure to the environment, structural repairs and often strengthening are inevitable. There are many traditional methods available, but the one using modern Fibre-reinforced polymer (FRP) technology has gained wide acceptance and popularity leading to many applications.

This seminar brings together some of the renowned experts in the field to share with our engineers the latest knowledge in using such FRP technology. The following topics will be covered:-

- FRP materials and engineering properties
- Structural design, detailing and installations
- Applications to reinforced concrete and steel structures
- Case studies
- Design codes
- Regulatory Perspectives from the Singapore experience

## Who should attend?

All the professionals in key areas of building and construction, i.e. planners, architects, engineers, surveyors, building professionals, specialists and regulators.

## Official Language

The English language will be used in the presentations. The seminar notes will be provided and a 6-hour CPD certificate will be issued to each participant at the end of the seminar.



*The* **Institution**  
*of* **Structural**  
**Engineers**



Programme : 9<sup>th</sup> April 2014 (Wednesday)

Time	Topic
8.30am - 9.00am	Registration
9:00am - 9.10am	Welcome speech by representatives of IStructE Singapore and Hong Kong
9.10am - 9.15am	<b>Opening Address</b>
9.15am - 10.00am	<p><b>1<sup>st</sup> Lecture: Strengthening Concrete Structures using Advanced Composites: a European perspective</b>  <b>Lecturer: Dr Antony Darby (Bath University, UK)</b>  <b>Abstract</b>                      The UK has recently published the 3<sup>rd</sup> edition of the Concrete Society's TR55, the UK guidance document on strengthening concrete structures using advanced composites. This 3<sup>rd</sup> edition was prompted by the need to harmonise the document with European design standards for concrete structures. More recently still, the European community has taken up the task of writing design standards for FRP strengthening and reinforcing which can be used throughout Europe. This lecture will present the approaches developed in both the UK and Europe to tackle the design of FRP strengthening, highlighting the particular problems associated with satisfying a disparate collection of countries with differing backgrounds, methodology, building stock and history and how they can be addressed without leading to compromise.</p>
10.00am - 10.45am	<p><b>2<sup>nd</sup> Lecture: FRP Composites in Construction: Opportunities and Challenges</b>  <b>Lecturer: Prof Teng Jin-Guang (Hong Kong Polytechnic University)</b>  <b>Abstract</b>                      Fibre-reinforced polymer (FRP) composites have found increasingly wide applications in construction around the world. The most popular area for the application of FRP composites has been the strengthening and retrofit of deficient structures, although the new construction area has also attracted increasing attention. This lecture will provide a survey of recent developments in both the strengthening and new construction areas. Particular attention will be paid to the opportunities offered by FRP composite for the Hong Kong construction industry and the obstacles that need to be overcome for FRP composites to be much more widely used in Hong Kong.</p>
10.45am - 11.05am	<b>Morning Coffee/Tea Break</b>
11.05am - 11.50am	<p><b>3<sup>rd</sup> Lecture: FRP Strengthening of Steel Structures</b>  <b>Lecturer: Prof Zhao Xiao-Ling (Monash University, Australia)</b>  <b>Abstract</b>                      The conventional method of repairing or strengthening aging metallic structures often involves bulky and heavy plates that are generally prone to corrosion and overall fatigue. Fibre-reinforced polymer (FRP), a composite material made of a polymer matrix reinforced with fibres, offers a great alternative for strengthening metallic structures, especially steel structures such as bridges, buildings, offshore platforms, pipelines, and crane structures. This lecture presents an overview of FRP strengthening of steel structures. Main topics include: Behaviour of bond between FRP and steel; Flexural strengthening of steel and steel-concrete composite beams with FRP laminates; Strengthening of compression members; Strengthening of web crippling of beams subjected to end bearing forces and Enhancement of fatigue performance.</p>

Programme (Cont'd)

Time	Topic
12.00noon - 2.00pm	<b>Lunch</b>
2.00pm - 2.45pm	<p><b>4<sup>th</sup> Lecture: Use of FRP in Building and Bridge Projects in Singapore: From a Regulatory Perspective</b>  <b>Lecturer: Er. Chew Keat Chuan (Group Director, BCA)</b>  <b>Abstract</b>            This lecture briefly describes the historical evolution of the use of FRP in Singapore and how the building regulations evolved to allow acceptance of its use. Case history of past and recent projects in Singapore using FRP will be presented to highlight its use in structural applications such as enhancement of structural capacity for old buildings and bridges, restoration of structures for fire-damaged buildings and for security protection. The current regulatory regime governing the use of FRP in Singapore will also be presented.</p>
2.45pm - 3.15pm	<b>Afternoon Tea / Coffee Break</b>
3.15pm - 4.00pm	<p><b>5<sup>th</sup> Lecture: Fantastic Fabric Formed Concrete Structures: Opportunities and Challenges for FRP Reinforcement</b>  <b>Lecturer: Dr Antony Darby (Bath University, UK)</b>  <b>Abstract</b>            Fabric formed concrete provides architects and engineers with a new construction language, freeing them from the straightjacket of conventional rectilinear forms. Gone is the rigid traditional timber or steel formwork making way for the flexibility of tensile fabrics to contain the concrete while it sets. This opens up the possibility of amazing architectural forms as well as providing a practical means of optimising structural performance. However, the introduction of unconventional concrete forms leads to the challenge of efficiently reinforcing these structures. This is an area where advanced textiles and fibre reinforced polymers have an advantage over traditional reinforcement solutions. The possibilities and challenges of this new construction method will be explored in the presentation.</p>
4.00pm - 4.45pm	<p><b>6<sup>th</sup> Lecture: Tracking the Progress of FRP Applications in Civil Engineering Over the Years</b>  <b>Lecturer: Er. Jeslin Quek (FYFE Asia, Singapore)</b>  <b>Abstract</b>            FRP was first introduced as a new strengthening method against seismic in the USA in the 1980s. Inherently a very versatile product, it has spawned into many other applications over time. Most notably, its use in static load enhancement of buildings, blast mitigation and force main strengthening, to name but a few. This lecture will bring the audience through the various types of applications in which FRP are being used today. In each of these, showcase projects will be discussed and best practices highlighted. Some past and ongoing research and development for the use of FRP in different current and new applications will also be presented.</p>
4.45pm - 5.00pm	Closing Remark
5.00pm	End of Seminar

## Brief Profile of Dr Antony Darby



Antony Darby is Head of Civil Engineering and a Reader in Structural Engineering at the University of Bath, one of the leading Universities in the UK. Prior to his present post Bath, he worked in industry with Petrochemical contractor, M.W. Kellogg and at Matra-Marconi Space, designing satellite structures. He studied for his PhD at the University of Cambridge and spent two and a half years as a Leverhulme Research Fellow at the University of Oxford, where he was involved in pioneering work on real time sub-structure testing. He is currently Chair of the Network Group for Composites in Construction Research and Development Committee and a member of the IStructE Research Panel. He has researched into the use of advanced composites in concrete construction for over 13 years, and has over 120 refereed publications to his name. In 2004 he was commissioned to lead the revision of the Concrete Society's TR55, the UK guidance document of strengthening concrete structures using advanced composites. A further revision (the 3<sup>rd</sup> edition) of this document, also led by Dr Darby, was published at the end of 2012. Following this, he was appointed as the UK principal expert on Task Group 1 of the Eurocode 2 committee CEN/TC250, responsible for drafting the European Standard for both strengthening and reinforcing concrete structures using FRP materials. In recent years his research has focussed on the development of optimised structural concrete forms using flexible fabric formwork. This exciting new area of research, resulting in concrete forms with complex geometries, provides a real opportunity to make appropriate use of the properties of FRPs.

## Brief Profile of Prof Teng Jin-Guang



Prof. Jin-Guang Teng is a Chair Professor of Structural Engineering and the Director of the Research Institute for Sustainable Urban Development (RISUD), The Hong Kong Polytechnic University (PolyU). His research interests include the structural use of fibre-reinforced polymer (FRP) composites in construction and thin-walled structures. He is the author/co-author of some 170 SCI journal papers, the lead author of the book "*FRP-strengthened RC Structures*" published by Wiley in 2002, and a co-editor of the book "Strengthening and Rehabilitation of Civil Infrastructures Using FRP Composites" published by Woodhead Publishing Limited in 2008 (with Professor L.C. Hollaway). Professor Teng is the Editor-in-Chief of the SCI international journal "Advances in Structural Engineering" and a member of the editorial boards of 7 other SCI international journals, including "Engineering Structures" and "ASCE Journal of Composites for Construction". He has given over 60 keynote and invited presentations at international and national conferences. He has also received a number of prestigious national and international awards for his research contributions including the Distinguished Young Scholar Award from the Natural Science Foundation of China, the State-of-the-Art of Civil Engineering Award from the American Society of Civil Engineers, and the IIFC Medal from the International Institute for FRP in Construction (IIFC).

## Brief Profile of Prof Zhao Xiao-Ling



Prof Zhao obtained his BE and ME from Shanghai JiaoTong University, China, both his PhD and Doctor of Engineering from The University of Sydney, while his MBA (Executive) was jointly awarded by The University of Sydney and University of New South Wales. Prof. Zhao has received prestigious fellowships from The Royal Academy of Engineering UK, Swiss National Science Foundation, Humboldt Foundation, Japan Society for Promotion of Science and Chinese “1000-talent” program. He chairs the International Institute for FRP in Construction (IIFC) working group on FRP Strengthened Metallic Structures. Prof. Zhao was the Head of Department of Civil Engineering at Monash University, Australia from 2008 to 2011. Here is the link for Prof Zhao’s new book on FRP-Strengthened Metallic Structures: <http://www.crcpress.com/product/isbn/9780415468213>

## Brief Profile of Er. Chew Keat Chuan



Er. Chew Keat Chuan graduated with a First Class Honours degree in Civil Engineering from National University of Singapore in 1983. He obtained his Master of Science in Civil Engineering in 1986. He is a professional engineer as well as an Accredited Checker. Keat Chuan began his career as a resident engineer in the former Public Works Department supervising the Keppel Viaduct project. Subsequently, he was transferred to the Structural Design and Investigation Branch to do design government buildings. In 1992, he was posted to the Building Control Department where he worked his way up to be the Group Director of Building Engineering Group of the Building and Construction Authority in 2009. As a Group Director, he is responsible for administering the Building Control Act and its Regulations on structural safety. His main function is to ensure that building works in Singapore are designed and constructed safely and in compliance with the structural safety requirements of the building legislation.

## Brief Profile of Er. Jeslin Quek



Er. Jeslin Quek is the Senior Vice President of FYFE Asia Pte Ltd, a wholly owned subsidiary of Aegion Corporation, USA, a NASDAQ Stock Exchange listed company. She obtained her Bachelor of Civil Engineering from the University of Leeds, UK and her Masters of Science from National University of Singapore. She is a Professional Engineer (PE) registered with the Singapore PE Board as well as ASEAN Chartered Professional Engineer. She has over 20 years of industry experience in providing practical and quick solutions to structural problems. Her expertise is in structural repair and strengthening as well as blast retrofitting using Fibre Reinforced Polymer (FRP) which is supported by extensive R&D efforts and track records. Being one of the pioneers in Singapore in the use of FRP on buildings and infrastructure, Er Quek is instrumental in introducing and promoting FRP to revolutionise the structural rehabilitation industry in the region. To date, she has overseen hundreds of projects successfully strengthened using FRP. She is currently the Asst Hon Treasurer of IES-IStructE Singapore. She has been invited to speak in numerous international conferences and seminars and has published several technical papers, articles and provided training and workshops to professionals.

**Seminar** : **One-Day Seminar On Structural Strengthening Using Fibre-Reinforced Polymer Materials : State of the Art Applications**

**Date** : 9<sup>th</sup> April 2014 (Wednesday)

**Venue** : Crystal Ballroom, Level B3, Holiday Inn Golden Mile, 50 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong

**Time** : 8:30 am (registration) for 9:00 am to 5:00 pm

## REGISTRATION FORM

*(To be replied on or before 20<sup>th</sup> March 2014)*

Please follow the 2 steps registration procedure:

1. Fax the completed registration form to Mr. Sam Chan (Fax: 852-2334 6389) for preliminary registration.
2. Post the completed registration form together with a crossed cheque payable to **Hong Kong Institute of Steel Construction Limited** to Mr. Sam Chan, HKISC c/o Room ZS972, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hunghom, Kowloon, Hong Kong, China on or before 20<sup>th</sup> March 2014.

**To: Mr. Sam Chan**

**Fax: 852- 2334 6389**

### A. Personal Details:

Title	Name in full (Block Letter)	Name of Company	Tel. (or Fax)	E-mail address	Institution/ Membership No.
1.					
2.					
3.					
4.					
5.					

Postal Address (for official receipt):

### B. Registration Details:

Item	Registration Fee	Total no. of registration	Sub-total
1. Regular registration (Member*price)	HK\$ 950 each x	_____ person(s)	= HK\$ _____
2. Regular registration (Non-member*price)	HK\$ 1,250 each x	_____ person(s)	= HK\$ _____
3. Group registration (at least <u>5</u> people)	HK\$ 950 each x	_____ person(s)	= HK\$ _____
<b>Total Amount</b>			<b>HK\$</b>

*Note: The registration fee includes a copy of proceedings, CPD certificate, 2 tea refreshment and lunch.*

I enclosed a crossed cheque (cheque no. \_\_\_\_\_) with the sum of HK\$ \_\_\_\_\_ for the registration fee of the captioned Seminar.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_