

Regency Steel Asia Symposium on Latest Design and Construction Technologies for Steel and Composite Steel-Concrete Structures



Thursday, 9 July 2015

8:30 am to 5:45 pm

**Tan Chin Tuan Lecture Theatre
@ North Academic Complex
Nanyang Technological University**



Accreditation

This symposium is accredited under Professional Engineers Board Singapore's CPD Programme (PDU points) and The Institution of Engineers, Singapore's CPD Programme (STU points).

Accreditation: **PDU/STU Points Pending**

Organised by:

**School of Civil and Environmental Engineering
Nanyang Technological University**

Sponsored by:

Regency Steel Asia Endowment Fund @ NTU

About this Symposium

The Regency Steel Asia (RSA) symposium series was launched back in May 2008 to recognize the generous donation from Regency Steel Asia Pte Ltd to the School of Civil and Environmental Engineering, NTU and to mark the establishment of the RSA Endowment Fund @ NTU to support steel research and to promote the use of steel and composite construction for greater productivity, sustainability and safety in our building and construction industry. In line with this overall objective, this fourth RSA symposium will focus on applications of **Latest Design and Construction Technologies for Steel and Composite Steel-Concrete Structures** and will showcase how latest architectural and engineering innovations in design and materials can be fully exploited to create simple yet iconic long-span column-free spaces in actual building projects. Also, the Structural Eurocodes are now fully implemented and the symposium will discuss how the latest Eurocodes can be better exploited to design efficient tall and slender high-rise building structures to withstand wind and earthquake actions. On construction technologies, recent development such as use of pipe struts instead of laced struts for the new East Coast Line station construction is attracting some attention from the industry. Also, other recent developments such as new product shape for steel sheet piles, high strength Grade S690 TMCP steel plates and Grade 600 reinforcing steel bars and how all these developments can help to improve productivity will be presented during the Symposium.

Symposium Programme

- 0830 hrs [Registration](#)
- 0900 hrs [Welcome Address](#)
by **Chair**, School of Civil and Environmental Engineering, NTU
- 0915 hrs [Opening Address](#)
by **Mr. Gui Boon Sui**, Chairman, Regency Steel Asia Pte Ltd
- 0930 hrs [Keynote Presentation: 268 Orchard Road: Unity in Architecture & Structure](#)
- Architect **Raymond Woo** (Raymond Woo & Associates Architects, Singapore)
- 1030 hrs [Morning Refreshment Break](#)
- 1100 hrs [Presentation 1: Design of Slender Dome Structures](#)
- Engr. **Yacine Bouzida** (Passage Projects Singapore)
- 1145 hrs [Presentation 2: Design of Slender Tall Buildings for Wind and Earthquake](#)
- **Dr. Juneid Qureshi** (Meinhardt Singapore)
- 1230 hrs [Lunch Break](#)
- 1330 hrs [Presentation 3: Recent Innovations for Steel and Composite Steel-Concrete Structures in Australia](#)
- Engr. **Prof. Brian Uy** (University of New South Wales Sydney, Australia)
- 1410 hrs [Presentation 4: Effective Use of Q690 to Q960 Steel Materials in Building Structures](#)
- Engr. **Prof. Kwok-Fai Chung** (Hong Kong Polytechnic University, Hong Kong SAR China)
- 1450 hrs [Presentation 5: Pipe Struts vs. Laced Struts](#)
- Engr. **Prof. Sing-Ping Chiew** (Nanyang Technological University, Singapore)
- 1530 hrs [Afternoon Refreshment Break](#)
- 1600 hrs [Presentation 6: Technical Solutions by Hat-Type Steel Sheet Piles for enhancing Safety and productivity in construction](#)
- Engr. **Matsui Nobuyuki** (Nippon Steel & Sumitomo Metal Corporation, Japan)
- 1635 hrs [Presentation 7: Development and Application of Tensile Strength 780N/mm² Steel Plates for Building Structures](#)
- Engr. **Yukio Murakami** (JFE Steel Corporation, Japan)
- 1710 hrs [Presentation 8: High Strength Steel Reinforcement – A New Beginning in Smart Construction](#)
- Engr. **Natarajan Saravanan** (NatSteel Holdings Pte Ltd, Singapore)
- 1745 hrs [Adjournment for the Day](#)

Symposium Speakers



268 Orchard Road: Unity in Architecture & Structure

by Architect **Raymond Woo**

Inspired by the glass pyramids of “the Louvre” in Paris, the building’s main features are the three tilted glass curtain wall boxes cascading down towards Orchard Road. Envisioned as the jewel of Orchard Road the building is the first in Singapore to utilize a system of double glazing units, structural extruded stainless steel SS 315LN mullions with tension cable net system. This system eliminated cumbersome columns within the building interiors, ensuring limited obstruction visually and physically and creating a versatile retail tenancy layout. The transparency of glass and the slenderness of the mullions at 80x150mm and cables optimized the visual engagement of shoppers with Orchard Road both from inside and outside.

Raymond WOO is a pioneer generation architect who has been in practice for over 40 years. He was involved in winning entries such as the Jurong Town Hall and Bank of Singapore Headquarter, both built in the late 1960s. He founded Raymond Woo & Associates Architects in 1975 when he won the prestigious Singapore Science Centre Competition single-handedly.

He is known for his distinctive architecture style which stresses on dignified presence and elegance shown in projects such as The Ngee Ann City (1993), Prudential Tower (1998), Equity Plaza (1992) and 78 Shenton Way (1988). Another notable Singapore landmark that he designed is the Changi Airport Boeing 747 Hangar built in 1983. His latest project, the 268 Orchard Road sets a new benchmark in Singapore as the first, in using precision engineered tension cable-net system for double-glazed curtain wall.

Now at 76 years old, he still believes in sharing his wealth of knowledge and experience by serving in juries for local competitions such as the Pinnacle@Duxton, Marina Barrage, One-North, Theatres by the Bay and National Arts Gallery. He is also actively involved in advisory committees of the URA, LTA and the BOA and is a fellow of the Singapore Institute of Architects.



Design of Slender Dome Structures

by Engr. **Yacine Bouzida**

More projects are embracing long span domes with complex geometries creating elegant light-weight structures but increasing the challenges faced by engineers. Two of the most important aspects of the design of such structures are the geometry or buildability, and the understanding of structural instabilities. This keynote will present several high profile projects across Europe and Asia such as Gardens by the Bay domes.

Yacine BOUZIDA is a French Architect and Structural Engineer. He is graduated from Ecole des Ponts et Chaussées in Paris. Yacine worked in France and the UK on several high profile projects like stadiums, airports and museums specialising in light-weight and complex geometry structures. In the UK he joined Atelier One where he was in charge of the structural design of the two conservatories at Gardens by the Bay. After working on Gardens by the Bay as a site engineer, he started Passage Projects a consultancy firm based in Singapore to promote creative structural engineering and multi-disciplinary approach in the construction industry.



Design of Slender Tall Buildings for Earthquake

by **Dr. Juneid Qureshi**

Tall and slender buildings subject to wind and seismic loads present complex engineering challenges since the structural demands are more pronounced than other building typologies. This presentation focuses on some of the critical considerations for structural design of tall and slender buildings subject to wind and seismic loads with emphasis on drift control, occupant comfort, robustness, staged construction analysis, optimization and the limitations of prescriptive code provisions for seismic design. Case studies of some recent tall and slender buildings engineered by Meinhardt are also presented highlighting unique, and sometimes conflicting, challenges presented by wind and seismic loads and showcase innovative engineering solutions to address them.

Juneid QURESHI obtained his Doctor of Engineering degree from The University of Tokyo in 1993 for his work on reinforced concrete mechanics. He is a Director at Meinhardt and heads the Group Design Division. His work with Meinhardt has encompassed a wide range of complex and challenging structural engineering projects from planning and feasibility studies to design and construction. He has more than 23 years of experience in the design and construction of concrete, steel and composite structural systems for tall buildings in Singapore, the Middle East and South East Asia. Some of his major tall building projects in Singapore include One Raffles Quay, The Sail @ Marina Bay, Marina Bay Financial Centre and One Raffles Link. Major overseas projects include Ocean Heights, Capital Plaza and Signature Towers in the UAE, Thamrin Nine and World Trade Centre in Jakarta and Four Seasons Place in Kuala Lumpur. He is Singapore’s Country Representative for the Council on Tall Buildings and Urban Habitat (CTBUH).



Recent Innovations for Steel and Composite Steel-Concrete Structures in Australia

by Engr. **Prof. Brian Uy**

This presentation will address the recent innovations in steel and composite steel-concrete structures in Australia. Particular focus on recent research on high strength steel and steel-concrete composite structures considering beams, columns and connections will be presented. The paper will also highlight recent developments in the areas of standards development for buildings and bridges respectively by addressing the draft ASNZS2327 and ASNZS5100:6 documents.

Brian UY is Professor of Structural Engineering and Director of the Centre for Infrastructure Engineering and Safety (CIES) in the School of Civil and Environmental Engineering at The University of New South Wales. He is Chairman of the Standards Australia Committee BD32 on and a member of BD90 on Bridge Structures which are developing standards on Steel and Composite Structures for buildings and bridges respectively. He is also the Chairman of the Australia Regional Group of the Institution of Structural Engineers and the Australian Group of the International Association of Bridge and Structural Engineering (IABSE).

Symposium Speakers



Effective Use of Q690 to Q960 Steel Materials in Building Structures

by Engr. **Prof. Kwok-Fai Chung**

In Hong Kong, there is an urgent need for the local construction industry to improve its productivity through innovative use of materials, design and construction as there are many large scale infrastructure projects under construction as well as under planning. With a steady decrease in the construction costs of structural steelwork owing to abundant supply of Chinese steel materials, there is a growing increase to use high performance steel materials in heavily loaded building structures. This presentation examines the potential use of quality Q690 to Q960 steel materials in building structures.

Kwok-Fai CHUNG is a renowned academic, researcher and structural engineer with established expertise in steel construction. Currently, Professor Chung is Associate Head (Academic Development) of the Department of Civil and Environmental Engineering, the Hong Kong Polytechnic University, President of the Hong Kong Constructional Metal Structures Association, and Council Member of the Institution of Structural Engineers.

Prof. Chung works on a wide range of inter-disciplinary engineering analysis and design, especially on modern steel and composite building structures. His research interests include limit state analysis and performance-based design of structural systems, structural fire engineering and fire protection in buildings and tunnels, and design codification.



Pipe Struts vs. Laced Struts

by Engr. **Prof. S.P. Chiew**

This presentation will discuss the development and technical issues related to the use of pipe struts for the proposed East Coast Line station construction vis-à-vis the use of more traditional laced struts.

Sing-Ping CHIEW was Head of the Division of Structural Engineering and Mechanics in the School of Civil and Environmental Engineering, Nanyang Technological University from 2008 to 2014. He has served the industry and profession in various capacities and currently a Member of the Panel of Expert Advisors of the Land Transport Authority, a Member of the Building and Construction Authority Academy Advisory Panel and a Board Member of the Professional Engineers Board of Singapore. He is also a Past President and Honorary Fellow of the Singapore Structural Steel Society. He is the author of the popular textbook 'Structural Steelwork Design to Limit State Theory' and course book 'Design of Composite Steel and Composite Structures with Worked Examples to Eurocode 4'.



Technical Solutions by Hat-Type Steel Sheet Piles for enhancing Safety and Productivity in Construction

by Engr. **Matsui Nobuyuki**

Steel sheet piles has been widely utilized as structural wall such as quay wall and temporary retaining wall. Hat type steel sheet piles have 900mm width of maximum hot-rolled mono sheet piles in the world. The sheet piles can contribute to enhance safety and productivity thanks to its sectional efficiency and configuration. In this presentation, the structural test of Hat type sheet piles which was implemented in Nanyang Technological University is mainly described and some considerations as for the structural performance are discussed based on Eurocode 3.

Matsui NOBUYUKI graduated from Nagoya University in Japan in 2006(BSc(Eng.)), and obtained his master's degree from Nagoya University in 2008(MSc(Eng.)). He was engaged as a civil engineer with Nippon Steel Corporation in Japan from 2008 to 2011. On 1st October 2012, Nippon Steel Corporation merged with Sumitomo Metal Industries, Ltd. to form a new company, Nippon Steel & Sumitomo Metal Corporation (NSSMC). Therefore, from 2012 to current, Mr Matsui has been working with NSSMC. He specializes in design and development of steel sheet pile & pipe piles, and the method of construction.



Development and Application of Tensile Strength 780N/mm² Steel Plates for Building Structures

by Engr. **Yukio Murakami**

Recently in Japan, a demand to becoming it increases upsizing of the high-rise and a long span. Therefore, mainly on a lower part of buildings, the application of the high-strength steel becomes common practices. With such a background, a new type of tensile strength 780 N/mm² class high-strength steel for building structures was developed so as to realize steel buildings which remain undamaged even in a mega-earthquake and thus demonstrate sufficiently high structural safety. This presentation introduced development and application of high strength steel in Japan, and will be focused on 780N/mm² class steel plates.

Yukio MURAKAMI is the deputy general manager of the Building Engineering Section, JFE Steel Corporation. He graduated from Nihon University in 1991 (BSc in Eng) and obtained his master's degree in Nihon University in 1993. He has been working in the Kawasaki Steel Corporation since 1993 and JFE Steel Corporation since 2003.



High Strength Steel Reinforcement – A New Beginning in Smart Construction

by Engr. **Natarajan Saravanan**

Steel Reinforcement is one of the key building resources which has evolved since it's inception in Reinforced Concrete from mild steel to today's 500MPa steel. However the demand for higher Productivity and Green buildings has set a new stage for optimal use of such resources and this warrant for High strength materials which can be both Productive and Green. With the adoption of Eurocodes in Singapore, High Strength Steel Reinforcement is once such material which can reduce the steel usage by up to 20% while the strength and ductility of the structures remains unaffected. Reduction in steel usage not only translates into proportional reduction in the carbon footprint of the building it also translates into reduced member sizes which leads to reduced dead loads, lighter foundations, reduced formwork, more usable space and reduced manpower. This eventually brings in higher construction productivity with cost effectiveness.

Natarajan SARAVANAN has been working with NatSteel Holdings Pte Ltd for the past 15 years. During his tenure, he has contributed to the various functions in NatSteel and is currently the Asst. Vice President in the Marketing department. Currently, he is spearheading the introduction of New Products and Services to the Singapore construction industry. Prior to joining NatSteel he has worked like with various engineering firms across Asia. He also delivers guest lectures at BCA Academy, IES and tertiary institutions like National University of Singapore, Ngee Ann Polytechnic & Singapore Polytechnic on topics related to steel reinforcement.