Structural Steel Design Workshop

STRUCTURAL STEEL DESIGN WORKSHOP

This two-day seminar and workshop will address the very important area of structural steel design, a structural element that has always been critical in the construction of both low and high rise buildings. Unfortunately many structures today are designed by means of powerful software programs that result in designers losing the art of structural design and analysis.

This seminar and workshop is a back to basics course which will address the key areas of steel design with particular reference to the Australian source document on steel design namely the 'Structural Design Handbook' by Gorenc, Tinyou and Syam. First published in 1970 by Gorenc and Tinyou, this publication is now in its seventh edition (2005) and is invaluable to engineers wishing to design structures to the Structural Steel Code AS4100 -1998. For many years there existed two main grades of structural steel 250 MPa and 350 MPa – this all changed in 1998 with the release of AS4100.

The seminar is broken up into eight sessions and for the most part follows the text book chapter by chapter. At the end of most sessions, the registrants will then be given a period of time (usually ½ hr) to hone the skills they have been shown in the previous hour by completing a workshop tutorial exercise. Detailed solutions of these tutorial exercises will be worked through and given out. All sessions will be a blend of seminar presentation followed by workshop exercises thus calculators will be required.

PROGRAMME - Day 1

8.30 – 9.00 **Registration**

9.00 – 10.30 **Session 1 – Materials**

This session looks at the basic terms and properties of steel as well as the loading parameters required for steel design. Terms & processes involved in producing Hot & Cold rolled sections, CHS, RHS. Parallel flange sections, Welded beams and stress relieving will be addressed. Other key parameters to be outlined included temperature effects on steel (hot, cold and transition temperatures), welding, hydrogen cracking, HAZ, quenched & tempered (Bisalloy), brittle fractures, ductility, steel grades prior to 1998 (250MPa & 350MPa) and the new steel grades (300 MPa, 400MPa, 450 MPa and 500 MPa), creep, fatigue & hardness.

10.30 – 11.00 **Morning Tea**

11.00 – 12.30 **Session 2 – Design Codes**

This session will carry on from the previous section looking at the next stage in the process, namely design aspects such as building height vs. terrain, wind velocity vs. region and wind speeds. It will also cover the basic aspects of loading including capacity reduction factors, deflection limits and relevant design codes, bulk material properties and imposed actions as per AS1170.

12.30 – 1.30 **LUNCH -** (Sit down Hot & Cold Buffet)

1.30 – 3.00 **Session 3 – Structural Analysis**

This session looks at design effects in more detail such as structural framing (isolated beams, braced & unbraced frames FS1 to FS7), minimum eccentricities, first and second order effects in columns via moment amplification methods, effective lengths, joint rigidity, buckled shapes, restraint stiffness, sway stiffness ratios, unequal end moment factors.

3.00 – 3.30 **Afternoon Tea**

3.30 - 5.00 **Session 4 – Beams & Girders**

This session looks at topics such as member vs. section capacity, slenderness reduction factors, lateral restraint (and the respective categories of lateral restraint F, P, L & U), flexural torsional buckling, k values, moment magnification factors, compactness vs. slenderness for plate elements, buckling and shear capacity of webs (both stiffened and unstiffened).

PROGRAMME - Day 2

9.00 – 10.30 **Session 5 – Web Stiffeners/Tension Members**

This session addresses the requirements for the use of transverse and longitudinal web stiffeners in beams and columns. These are especially critical in beams with high shear due concentrated loads and in portal frame column-rafter connections. The second part of this session addresses tension members e.g. UB & UC's as support columns or Angles (equal and unequal) in bracing. Both bolted and welded tension members are covered and the failure modes of 'fracture vs yield' are covered. Tutorial exercise follows.

10.30 – 11.00 **Morning Tea**

11.00 – 12.30 **Session 6 – Compression Members & Beam Columns**

This session addresses in more detail compression members and beam columns both with concentric and eccentric loading. Parameters such as form factors, compression member constants, axial member capacities and design bending moments are analysed in more detail with a step by step working through detailed examples. Euler buckling loads, unequal moment factors and amplification factors are addressed in more detail allowing for reduced section capacities and biaxial effects. In plane and out of plane moment capacities will be explained again with detailed examples that precede the tutorial worksheets in the final ½ hr of this segment.

12.30 – 1.30 **LUNCH** - (Sit down Hot & Cold Buffet)

1.30 – 3.00 **Session 7 – Connections**

This session begins by looking at the basic types of bolts, i.e. snug, tensioned bearing and tensioned friction (4.6 S, 8.8 TB and 8.8 TF). Slip loads, minimum design actions on connections, tensile and shear strength (threaded vs. shank). It then addresses welding including the two main metal arc electrode categories E41XX and E48XX (alternatively W40X and W50X), fillet and butt welds, maximum and minimum fillet weld sizes, weld throat size, weld shrinkage cracking. Standardised connections e.g. angle seat, flexible end plate and base plate connections will also be highlighted. Detailed examples will be covered followed by connection tutorial exercises and solutions.

3.00 – 3.30 **Afternoon Tea**

3.30 - 5.00 **Session 8 – Framing Systems & Summary**

This final session looks at the various structural framing systems available including rigid frames, longitudinal bracing, roof trusses, open and closed sections, steel frames for low rise buildings, purlins and girts. Included in this topic will be the deflection limits, fatigue, fire and corrosion requirements.

5.00 – 5.15 **Certificate of Attendance and Feedback sheets.**

Who should attend

Engineers (structural/civil/mechanical/environmental) and all structural steel design engineers, Project Managers and Government engineers handling contract documentation dealing with steel. **Calculators required.**

Professional Development

Attendees may be credited towards IEAust Continuing Professional Development (CPD) requirements. Members of IEAust are required to undertake a minimum of 150 hours of equivalent CPD every 3 years.

SPEAKERS

Ron Tinyou BE MIEAust M. ASCE

Ron was a civil/structural Design Engineer and project manager on industrial and hydraulic structures for 16 years with Gutteridge, Haskins & Davey (GHD). He taught in the school of Civil Engineering (Sydney Institute of Technology) and later was an academic at the University of Technology Sydney (UTS) specialising in steel structures.

He served in the drawing sub-committee of the Institution of Engineers, Sydney Division, producing the Structural Engineers Drawing Handbook. He then went on to co-author the most widely used text-book on steel design in Australia, the Steel Designers Handbook, first published in 1970 (and now in its 7th edition, 2005)

Paul Uno BE BdgSc MIEAust CPEng

Paul Uno has over 30 years experience in the design and construction industry. He worked for quite a number of years in the steel industry and was a structural steel Design Engineer for Transfield and also for H.H Robertson then a Development Engineer for the Australian Institute of Steel Construction (AISC) now called the Australian Steel Institute.

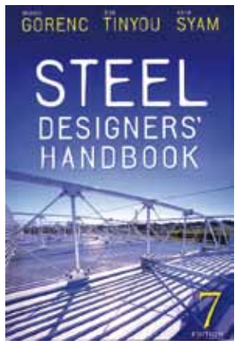
Whilst at AISC he answered many technical enquiries on steel design and also gave presentations on (a) Economical Steel Design; (b) Beam and Column Design (including lateral torsional buckling) using Safe Load Tables; (c) Bolted and Welded structures. These presentations were given at UTS (NSW), Newcastle University, Wollongong University, RMIT (VIC), Ballarat CAE, University of Adelaide, University of SA, University of WA and Curtin University WA.

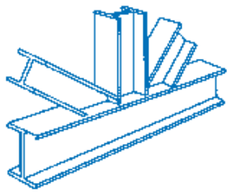
He was privileged to have worked under people such as Arthur Firkins and Ian Hooper and was also on the original AS1250 code conversion to AS4100 Standards Code committee under Tim Hogan.

For the past few years he has been running Structural Steel Design Workshops with Ron Tinyou (the co-author of Steel Designers Handbook by Gorenc, Tinyou and Syam). He is now co-presenting these steel courses with Ron Tinyou and brings a wealth of experience in both the steel and concrete industry.

Material Provided

Powerpoint course notes and other papers from the speakers will form the course notes. Registrants are also encouraged to purchase a copy of the publication Steel Designers Handbook (7th edition) as this document will be referred to quite often during the sessions of this seminar / workshop. Refer to the registration form for purchasing method. (Note people who cannot attend the seminar but only wish to purchase the publication will need to fax the completed registration form, ticking the publication box only and adding a fee of $15 to the total cost to cover postage and handling).





VENUES

Brisbane	QLD – Mercure Hotel - cnr Ann St & North Quay, Brisbane QLD - (07) 3237 2300
Melbourne	Hotel Grand Chancellor - 131 Lonsdale St Melbourne VIC - (03) 9659 4000
Sydney	Stamford Grand Hotel - cnr Herring & Epping Roads North Ryde NSW - (02) 9888 1077
Perth	TBA

COURSE REVISED & UPDATED

REGISTRATION FORM

Please return to:
Steel Seminars Australia
Structural Steel Design Workshop (Attn: Joanne)
PO Box 913 Baulkham Hills NSW 1755 or
Ph 02-9899 7447 Fax 02-9899-5995 Mobile 0413 998 031
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I / We wish to attend the Steel Design Seminar at

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	Number		Total
Two Day Seminar / Workshop		@ $ 950	
Steel Designers Handbook (7th edition 2005)		@ $ 85	

Total Payment ☐ Cheque **$**

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CALCULATORS REQUIRED

For more information on all courses download full brochure from www.cementandconcrete.com - NB A 20% processing fee applies to registration cancellations made earlier than 5 working days before the course date. Cancellations made 5 working days or less incur forfeiture of the entire registration fee. No discounts apply.