

# AS3600 - 2009 REINFORCED CONCRETE DESIGN WORKSHOP

## THE WORKSHOP

With the AS3600-2009 code now released for publication, this course will address this new code and all the relevant changes in all the sessions over the 2-3 day workshop.

The workshop is designed for engineers who wish to hone their skills with reinforced concrete design, understand the Code clauses better or just refresh the structural design principles learnt at University. With the advent of computers many engineers have either forgotten or lost the understand of basic structural design and thus need to carry out basic structural checks by hand or quick estimates of size and reinforcement requirements. The use of simple charts can often provide the preliminary structural sizing required for beams, slabs or footings.

## PROGRAMME

### DAY 1

8.30 - 9.00 Registration

9.00 - 10.30 **SESSION 1 - Basics of AS3600 - 2009**

Load Combinations to AS1170.0  
Durability Issues  
Material Properties eg: Concrete Modulus E, Flexural Strength  $f_{ct}$ , Tensile Strength  $f_{ct}$ , Mean Strength  $f_{cm}$ , Fire Design to AS3600 - 2009

10.30 - 11.00 Morning Tea

11.00 - 12.30 **SESSION 2 - Strength / Design**

Bending Strength  
Design Charts  
Ductility Requirements using 500 MPa steel  
Rectangular beams, T beams  
Singly & Doubly Reinforced Beams  
Worked Example & Tutorial Exercise

12.30 - 1.30 Lunch - Sit down - Hot and Cold Buffet

1.30 - 3.00 **SESSION 3 - Serviceability / Beams**

Allowable Deflections to AS1170.0, AS3600 - 2009  
Beam Deflection (Deemed to comply method)  
Crack Control in Beams & Slabs to AS3600 - 2009  
Worked Example & Tutorial Exercise

3.00 - 3.30 Afternoon Tea

3.30 - 5.00 **SESSION 4 - Deflection / Slabs**

Deemed to Comply (L/D) Deflection Method  
One Way Slab (single and continuous) Deflections  
Four Sided Slab Supported Deflections, Shrinkage Reinforcement  
Worked Example & Tutorial Exercise

### DAY 2

9.00 - 10.30 **SESSION 5 - Column Design**

Short & Slender Column Design th AS3600 - 2009  
Axial Load-Moment Interaction Graph derivation  
High Strength Concrete Column Design  
End Stiffness - Restraint Factors  
Worked Example & Tutorial Exercise

10.30 - 11.00 Morning Tea

11.00 - 12.30 **SESSION 6 - Wall Design / Shear**

Wall Design - Axial, Moment & Shear Strength  
Beam and Slab Transverse Shear Design  
Mohr Circle - Principal and Shear Stress  
Worked Example & Tutorial Exercise

12.30 - 1.30 Lunch - Sit down - Hot and Cold Buffet

1.30 - 3.00 **SESSION 7 - Footing Design**

Simple Square Footing Design  
Soil Pressure Basics, Kerns  
Rectangular Footing Design  
One-way Bending, One-way Shear and Two-way (Punching Shear) Footing Failure  
Worked Example & Tutorial Exercise

3.00 - 3.30 Afternoon Tea

3.30 - 5.00 **SESSION 8 - Development Lengths & Detailing of Reinforcement**

Development length  $L_{sy}$  in tension and compression  
Deemed to comply steel reinforcing detailing requirements as per AS3600 - 2009  
- Certificates of Attendance and Feedback Sheets handed out

### DAY 3 - Advanced

9.00 - 10.30 **SESSION 9 - Advanced Deflection Calculations / Crack Control**

The first segment looks at the design of beams and slabs using the 'simplified and refined methods' of analysis of AS3600 - 2009 with emphasis on effective second moment of area  $I_{eff}$  and Branson's formula using specific concrete properties. Tutorial exercise and solutions will follow.

The second segment looks at the formula behind Tables 8.6.1 (A) & (B) in the Code which relates bar spacing and bar diameter to steel stress and crack width. Tutorial exercise and solutions will follow.

10.30 - 11.00 Morning Tea

11.00 - 12.30 **SESSION 10 - Torsion in Beams**

This session looks at the design of beams which are subjected to torsional forces. The design method shown will be as per AS3600 Section 8.3 and that shown in Design Elements for Reinforced Concrete by Beletich & Uno. Tutorial exercise and solutions will follow.

12.30 - 1.30 Lunch - Sit down - Hot and Cold Buffet

1.30 - 3.00 **SESSION 11 - Two way slabs on multiple columns**

This session looks at the design of two way slabs where the designer needs to calculate static moment  $M_o$  and effective beam length  $L_o$  accounting for drop panels, then account for 'out of balance' moments during shear calculations. Tutorial exercise and solutions will follow.

3.00 - 3.30 Afternoon Tea

3.30 - 5.00 **SESSION 12 - Strut & Tie Element Design / Vibration in Beams**

The first segment looks at the design of beams, panels, corbels and other non-flexural elements using strut and tie models. This segment relates to the new version of AS3600. Tutorial exercise and solutions will follow.  
The second segment looks at the beams and slabs subject to vibration and how to avoid resonance problems especially as beams and slabs become thinner due to higher concrete grades. The design steps taken for vibration checking here is based on the Allen / Murray approach. Tutorial exercise and solutions will follow.

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

## SPEAKERS

**Argy Beletich BE Hons (Civil), Dip. Teach., Cert. IV in Training and Assessment, FIE (Aust), CPEng.**

Argy has spent many years in the Civil & Structural industry. Within the TAFE system he was head of School of Civil Engineering. He was also responsible for development, accreditation and maintenance of courses from AQF levels II to VI in civil-structural engineering, surveying, construction, geographic information systems and hydrology. During other periods in his career he was a University lecturer in Civil Engineering.

In conjunction to his other qualifications he has a TAFE teaching diploma & Certificate IV in Workplace Training and Assessment. He participated in the development of the Institution of Engineers, Australian National Competency Standards for Engineering Associates, Engineering Technologists and Professional Engineers. He is the original author and current co-author of the popular book Design Handbook for Reinforced Concrete Elements.



**Paul J. Uno BE MBdgSc MIE(Aust) CPEng Director - Cement and Concrete Services**

Paul Uno has over 30 years experience in the design and construction industry. He has worked for companies such as CSR Readymix, Transfield, Boral, Spancrete, Dept. of Housing, Australian Institute of Steel Construction, HH Robertson and the Cement And Concrete Association of Australia.

He presented precast concrete courses nationally for the NPCAA in 2005 and 2006 and was also acknowledged as a key contributor to the NPCAA/CIA publication "Precast Concrete Handbook".

He has been a member of the American Concrete Institute for the past 16 years and a member of the Concrete Institute of Australia for the past 30 years. At present he is a consultant, a presenter for Cement and Concrete Services as well as a University lecturer.

He currently lectures in Properties of Materials (Concrete) at Civil Engineering, Sydney University as well as lecturing at UNSW in the faculty of Built Environment in both in Construction Science (Materials) and in Building Structures (Concrete & Structural Steel Design).



### Requirements

- A scientific calculator
- New Concrete Code

### 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.

### Further Information

For any further information on this course please contact Joanne on mobile 0413-998-031 or landline (02) 9899 7447 or email info@cementandconcrete.com



**CALCULATORS REQUIRED**

## VENUE

- \* Sydney Stamford Grand cnr Herring & Epping Rd, North Ryde NSW (02) 9888-1077
- \* Brisbane Mercure Hotel, cnr Ann & Nth Quay, Brisbane QLD (07) 3237-2300
- \* Melbourne Hotel Grand Chancellor, 131 Lonsdale Street, Melbourne VIC (03) 9656-4000
- \* Perth TBA

## REGISTRATION FORM

Please return to:

**Cement & Concrete Services** (Attn: Joanne)  
PO Box 913 Baulkham Hills NSW 1755  
Phone (02) 9899 7447 Fax (02) 9899 5995 Mobile 0413 998 031  
Email: info@cementandconcrete.com

I / We wish to attend the **Reinforced Concrete Design Workshop** at

- Sydney (NSW) 15-16-17 March 2010
- Brisbane (QLD) 22-23-24 March 2010
- Melbourne (VIC) 3-4-5 May 2010
- Perth (WA) TBA

	Number		Total
Day 1 & 2	<input type="text"/>	@ \$990	<input type="text"/>
Day 3	<input type="text"/>	@ \$495	<input type="text"/>
Day 1, 2 & 3	<input type="text"/>	@ \$1,485	<input type="text"/>
Text Required			
• AS3600 - 2009	<input type="text"/>	@ \$210	<input type="text"/>

**Total Payment**  Cheque  **\$**

[Cheques payable to 'Cement & Concrete Services' note GST already included]

Name

Name

Company

Street / PO Box

Suburb  Postcode

Ph (  )  Fax (  )

Email

Person Handling Payment (please print)

VISA  M.CARD  AMEX 4 DIGIT ID#

Cardholders Name

Expiry Date  /  Signature

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.