



REINFORCED CONCRETE DESIGN WORKSHOP – MODULE TWO

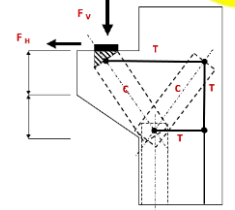


PAUL UNO

- BE MBdgSc MIE(Aust) CPEng NER RPEQ APEC Engineer IntPE(Aus)
- Over 40 years' experience in design & construction industry.
 - Former Senior Part-Time Lecturer – UNSW & USyd
 - Chairman -Australian Standards committee BD-066 - Precast/Tilt-Up (Prefabricated) Concrete Standard AS3850.

Recommended Text:

Reinforced Concrete: The Designers Handbook
(2015 Revised Edition)
Beletich, Hymas, Reid and Uno



WORKSHOP SUMMARY 16 hours of CPD

This course will address reinforced concrete at an intermediate level for areas covered by AS3600-2018 as well as the new sections in the Code.

This workshop is a continuation of the *Reinforced Concrete Design Workshop - Module One*. It is targeted at engineers who understand the basics of reinforced concrete design but wish to gain a better understanding of the 2018 version of the Concrete Structures Standard. It particularly focuses on 'specialized areas' of concrete design that engineers may not cover on a regular basis.

All sessions provide worked examples, tutorial exercises and solutions.

DAY 1 (8.30am AEST Zoom invite will be emailed)

9.00 - 11.00 Session 1

- DEFLECTION CALCULATIONS

- Methods of calculating the deflection of beams and slabs using the 'Simplified Method' of analysis of Section 8.5 from AS3600 – 2018.
 - Emphasis on effective second moment of area I_{ef} and comparisons of earlier Branson formula vs new Bischoff formula for the new effective I value. Cracked I value will also be covered.
- Slab deflection methods (eg rectangular slabs with 4 side support).

11.00 - 11.15 Morning Break

11.15 - 1.00 Session 2

- FIRE DESIGN IN CONCRETE

- How fire affects concrete and steel at various temperatures.
- Fire design according to Section 5 of AS3600-2018.
- Meaning of FRL values according to the BCA.
 - How to determine the FRL to satisfy Structural Adequacy, Structural Integrity and Insulation for beams and slabs.

1.00 - 1.30 Lunch Break

1.30 - 3.00 Session 3

- TWO WAY SLABS (supported by columns)

- Design of two-way flat slabs supported by columns where the designer is required to calculate the effective span length L_o , the static moment M_o , the design moments at mid-span and the supports for the design strips in each orthogonal direction.
- The out-of-balance moments M^*_v at the supports are used to design for shear and torsion at the supports.

3.00 - 3.15 Afternoon Break

CALCULATORS REQUIRED

3.15 - 5.00 Session 4

- TORSION and SHEAR IN BEAMS

- Design of beams subjected to direct or indirect torsion and shear.
 - New Modified Compression Field Theory for Shear and Torsion
 - Design method as per section 8.2 of AS3600-2018.
- Parameters covered include longitudinal strain ϵ_x , aggregate factor k_{dg} , torsion modulus J_t , polygonal area A_t , and torsion perimeter u_t .

Two day course – \$1,440

FURTHER INFORMATION

- (02) 9899 7447
- +61 413 998 031
- registrations@etia.net.au

• To register, visit our website www.etia.net.au
OR scan the QR Code.



HYBRID COURSES ARE CONDUCTED FACE-TO-FACE & VIA ZOOM



DAY 2

9.00 - 11.00 Session 5

- SLENDER COLUMN DESIGN (using High Strength Concrete >50 MPa)

- Slender column design with an emphasis on using high strength concrete (ie above 50 MPa) and the effect of the new ϕ factors.
- Use of end restraint coefficients to quantify effective length factors for column slenderness effects.
- Requirements for fitment spacing and confinement reinforcement as per Section 10.7 of AS3600-2018.

11.00 - 11.15 Morning Break

11.15 - 1.00 Session 6

- STRUT & TIE DESIGN - LONGITUDINAL SHEAR

- Design of beams, panels, corbels and other non-flexural elements using strut and tie models (relates to section 7 of AS3600-2018).
- Strut Efficiency factors, Fan vs Bottle shaped fields, prismatic compression members, bursting reinforcement, nodes and ties.
- Longitudinal shear in both beams and hollow core slabs.
- Formulas #8.4.2, #8.4.3 in AS3600-2018 covering design shear stress and shear stress capacity, and coefficients for shear plane surfaces.

1.00 - 1.30 Lunch Break

1.30 - 3.00 Session 7

- DESIGN USING FIBRES (steel and plastic)

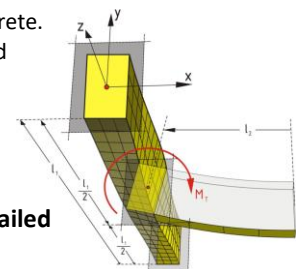
- This session will address the design of concrete elements containing steel fibres to the new Section 16 in AS360-2018 covering this topic.
- Plastic fibres (ie macro fibres) will also be addressed.
- Comparison of earlier method of analysis ie R_{e3} method vs Crack Mouth Opening Displacement (CMOD) method.

3.00 - 3.15 Afternoon Break

3.15 - 5.00 Session 8

- VIBRATION & FATIGUE

- Analysis of beams and slabs subject to vibration and fatigue
 - How to avoid problems as beams and slabs become thinner due to the use of higher grades of concrete.
- Explanation of damping, resonance and natural frequency.
- Addressing new Section 18 of AS3600-2018 on Fatigue Design in concrete elements.



Certificate of Attendance will be emailed