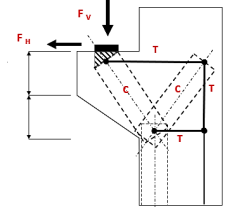



PAUL UNO
BE MBdgSc MIE(Aust) CPEng NER RPEQ APEC Engineer IntPE(Aus)

- Over 40 years' experience in design & construction industry.
- Former Senior Part-Time Lecturer – UNSW, UTS & 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 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 – \$1,460
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.


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**

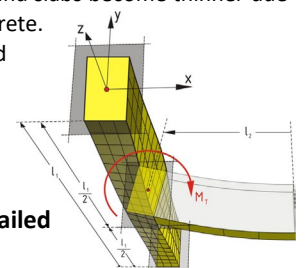
- Design of beams, panels, corbels and other non-flexural elements using strut and tie models (relates to section 7 of AS3600-2018).
- Strut Efficiency factors, Fan vs Bottle shaped fields, prismatic compression members, bursting reinforcement, nodes and ties.
- Longitudinal shear in both beams and hollow 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