



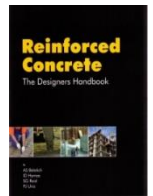
PAUL UNO BE MBdgSc MIE(Aust) CPEng NER RPEQ

- Over 40 years of experience in the design and construction industry.
- UNSW P/T Senior Lecturer - School of Construction Management.
- 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

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 (8.30 - 9.00 Registration)

9.00 - 10.30 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).

10.30 - 11.00 Morning Tea

11.00 - 12.30 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.

12.30 - 1.30 Lunch (Provided at Venue)

1.30 - 3.00 Session 3

- TWO WAY SLABS (supported by columns)

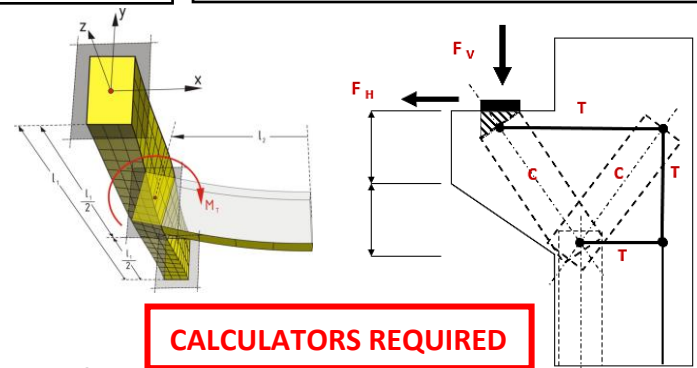
- Design of two-way flat slabs supported by columns where the designer is required to calculate the effective span length L_o , the static moment M_o , the design moments at mid-span and the supports for the design strips in each orthogonal direction.
- The out-of-balance moments M^*_v at the supports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

3.00 - 3.30 Afternoon Tea

3.30 - 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 .



CALCULATORS REQUIRED

DAY 2

9.00 - 10.30 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.

10.30 - 11.00 Morning Tea

11.00 - 12.30 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.

12.30 - 1.30 Lunch (Provided at Venue)

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 - 3.30 Afternoon Tea

3.30 - 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

5.00 - 5.15 Certificate of Attendance & Feedback sheets

COURSE COST

- 2 day course – **\$1,420 pp**

DATES, VENUES & REGISTRATION

- Registration form (back of catalogue)
- Visit our website www.etia.net.au

FURTHER INFORMATION

- Office (02) 9899 7447
- Mobile 0413 998 031
- Email registrations@etia.net.au