



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

- Over 40 years of experience in the design and construction industry.
- Former Senior Part-Time Lecturer – UNSW and University of Sydney
- Previous experience: NSW Materials Engineer (Cement & Concrete Association of Australia); NSW Technical Manager (CSR Readymix - now Holcim); Materials Engineer (Boral)

Event Sponsors:



**Independent
Cement**

WORKSHOP SUMMARY 8 hours of CPD

This course is primarily aimed at engineers who wish to understand cement and concrete at a more professional technical level.

Emphasis on this course will be directed to more prominent engineered structures (eg. High Rise Buildings, Bridges etc) and their respective specifications and codes (eg. B80 Bridge Spec, AS3600, AS5100, AS1379).

Design life requirements for various structures will be addressed (eg. 50 year design life for normal structures vs 100 year design life for prominent structures).

PROGRAMME (8.30am Zoom invite will be emailed)

9.00 - 11.00 Session 1

- CEMENT & SUPPLEMENTARY CEMENTITIOUS MATERIALS (Properties & Reactions)

- Portland cement types – General Purpose, Blended, Low Heat, High Early Strength, Low Shrinkage, Sulphate Resistant, Off-White
- Outlining the 4 main phases of cement (ie. C_3S , C_3A , C_2S and C_4AF) and their effects on cement properties.
- Non-Standard cement types (eg. High Alumina cements and geopolymers)
- Supplementary cementitious materials – Flyash vs slag vs silica fume, including formulas showing the pozzolanic reactions
- Green Star Ratings and Sustainability issues
- Tutorial exercises and solutions provided

11.00 - 11.15 Morning Break

CALCULATORS REQUIRED

11.15 - 1.00 Session 2

- CONCRETE MIX DESIGN (Theory & Practice)

- British Method vs Trial Mix Method vs ACI Method (including a detailed worked example)
- Water to Cement Ratio vs Compressive Strength vs Permeability
- Statistical Parameters (eg. Characteristic strength f'_c vs mean strength f_{cm} (target strength), standard deviation σ , coefficient of variation COV)
- Operating Characteristics Curves vs Optimum mix design
- Effects of Admixtures (eg. Accelerators, retarders, water-reducers, superplasticisers, air entraining agents, corrosion inhibitors)
- Tutorial exercises and solutions provided

1.00 - 1.30 Lunch Break

1.30 - 3.00 Session 3

- CONCRETE PROPERTIES & TESTS VS SPECIFICATIONS (eg. B80 Bridge Spec)

- Plastic Shrinkage Cracking principles (eg. Bleed evaporation rates vs Weather conditions vs APP's)
- Plastic Shrinkage Cracking potential, determination using the UNO evaporation equations and/or ACI nomographs
- Plastic settlement factors and identification of these types of cracks
- Thermal Cracks in concrete – what factors determine the potential for thermal cracking
- Long Term Concrete Shrinkage determination and Code limitations on crack size (AS2327 vs AS3600 vs AS5100 vs B80)
- Miscellaneous factors: curing, setting time, strength development vs time, concrete maturity, permeability vs porosity, VPV, fibres in concrete, permeability, slump drop vs spread, creep, impact rebound testing (Schmidt hammer).
- Tutorial exercises and solutions provided

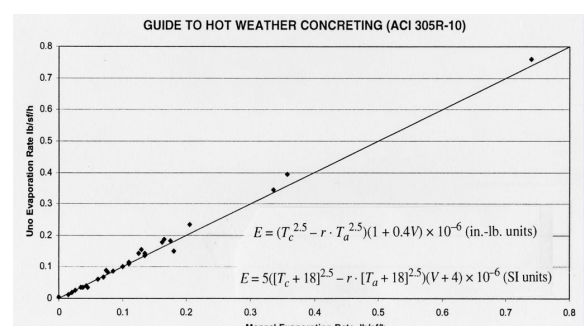
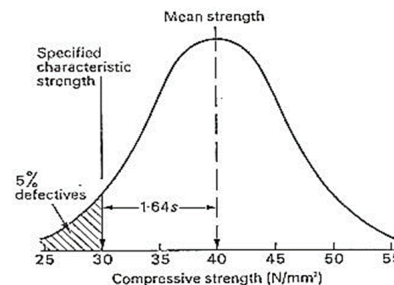
3.00 - 3.15 Afternoon Break

3.15 - 5.00 Session 4

- CONCRETE DURABILITY & CORROSION vs SPECIFICATIONS (eg. B80 Bridge Spec)

- Ion Diffusion Process
- Carbonation (eg. Klopfer formula)
- Chloride Ingress (eg. Fick's formula)
- Corrosion process and steel corrosion formulas
- Effective Chloride Transport Coefficient determination using Nordtest NT Build 443 (as required by B80)
- Non-Steady State Migration Coefficient determination using Nordtest NT Build 443 (as required by B80)
- Acid-Sulphate Soils
- Alkali Aggregate Reaction AAR
- Tutorial exercises and solutions provided

Certificate of Attendance will be emailed



Livestreamed via  **zoom**

• One day course – **\$880 pp**

FURTHER INFORMATION

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- registrations@etia.net.au

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

