INDUSTRIAL CONCRETE FLOORS & PAVEMENTS DESIGN WORKSHOP

PAUL UNO

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

- Over 40 years' experience in design & construction.
- Former Senior Lecturer – UNSW and USyd
- Created "*CCS Software Design for Industrial Floors STIF Program (Ver 3)*"

KIPP RICHTER *BE Civil (USA)*

- Over 15 years' experience in construction engineering
- Technical Manager specialising in Flooring and Pavement at Ramsetreid (a division of ITW).

Recommended CR-ROM:

CCS Software Design STIF Program (Ver3)

(includes T48 –2009 method & Westergaard Method)

WORKSHOP SUMMARY

This course provides design engineers the opportunity to design concrete industrial floors from first principles and compare solutions obtained using software programs eg FINE Geo5 (Beam + Slab) vs STIF.

It also provides insights into overseas Codes and their design guidelines [eg American (PCA), British (T34), NZ (TM38) and South African (PCI)].

Finally, the workshop addresses practical aspects of floor construction.

All sessions provide worked examples, tutorial exercises and solutions.

PROGRAMME *(8.30am AEST Zoom invite will be emailed)*

9.00 - 11.00 Session 1
- SOIL PROPERTIES AND SOIL TESTS
- CONCRETE FLEXURAL STRENGTHS
- FATIGUE TESTS

- Soil properties and tests such as:
  - CBR ... California Bearing Ratio
  - k ... Modulus of Subgrade Reaction
  - Atterberg Limits (LL ... Liquid Limit; PL ... Plastic Limit; PI ... Plasticity Index)
  - SPT ... Standard Penetration Test
  - CPT ... Cone Penetration Test (Dutch cone)
  - UCS ... Unified Classification System for Soils (eg CH, ML)
  - Es ... Soil Modulus Es
  - Ese ... Equivalent Youngs Modulus for Soil
- Concrete properties including flexural strength and tensile strength of concrete (and associated testing) according to AS3600-2018 and the alternative values suggested by the CCAA, RMS (prev RTA-NSW), VICRoads, QLD Transport Main Roads, Main Roads WA.

11.00 - 11.15 Morning Break

11.15 - 1.00 Session 2
- BASIC DESIGN THEORY CONCRETE SLAB
- PAVEMENT THICKNESS DESIGN

- History and derivation of concrete pavement models & tests adopted over the past 100 years.
- Various thickness formulas that exist in the marketplace today and how they differ from each other (e.g Elastic vs Plastic Design)
- Design models (eg soil springs vs elastic soil modulus)
- Formulas of Boussinesq, Winkler, Westergaard, Meyerhof, Kelly, Pickett, T34–1985 (CCAA), T48–2009 (CCAA), TR34 (Concrete Society-UK). These will be compared to FINE (Geo5) software solutions.
- Tests carried out over the years to substantiate these formulas.
- Tutorial to work through the thickness formulas and calculate a pavement thickness according to local and overseas guidelines.

1.00 - 1.30 Lunch Break

Live streamed via zoom

$$Meyerhof: \quad P_u = 2\pi\left(M_p + M_n\right) \quad \ldots a/L \le 0.2$$

$$Westergaard: \sigma_i = 0.316\frac{P}{h^2}\left[4\log\left(\frac{l}{b}\right)+1.069\right]$$

$$Uno: \quad t \approx 60\sqrt{P_t} \quad \ldots where\ t = Axle\ Load\ (tonne)$$

1.30 - 3.00 Session 3
- LOADS (WHEEL, POST, UNIFORMLY DISTRIBUTED AND COMBINED)

- Parameters are compared eg CCAA method vs T34-2016 UK method (based on Meyerhof) vs Winkler-Westergaard method.
  - Interior Loading vs Edge Loading
  - Wheel loads vs Post loads (eg Racking loads)
  - UDL's
- Punching shear calculations and deflections under UDL's (with respect to CCAA-2009 manual and the T34-2016 UK publication).
- FINE (Geo5) Software vs STIF addressing conventional slab design.

3.00 - 3.15 Afternoon Break

3.15 - 5.00 Session 4
- ON SITE PRACTICAL CONSTRUCTION ISSUES

- Floor Flatness & Levelness
  - F-number system used in the USA (for flatness and levelness) that is more superior to that adopted in Australia at present (namely Class A, B and C floor tolerance system).
- Abrasion Resistance
  - Early saw-cutting and proper finishing techniques to achieve proper floor abrasion properties.
- Steel vs Plastic Fibres
  - Pro's and con's
  - Explanations of terms such as R_{e3} values and CMOD values.
- Curling & Delamination
- Plastic Shrinkage Cracks
- Plastic Settlement Cracks
- Reasons why curling, delamination and cracks occur and how to stop it from happening.
- Dowels & Joint Design

Certificate of Attendance will be emailed

Download *FINE GEO5* demo version via the link www.etia.net.au/geo5-demo-version

Beam Slab

CALCULATORS REQUIRED

- One day course – **$755 pp**

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.*

Cancellations made more than 5 working days prior to a course will incur a 20% processing fee of the full registration amount.
Cancellations made 5 working days or less will incur forfeiture of the full registration fee.