

INDUSTRIAL CONCRETE FLOORS & PAVEMENTS DESIGN WORKSHOP



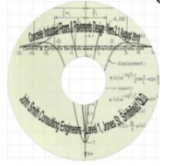
PAUL UNO BE MBdgSc MIEAust CPEng NER RPEQ

- Over 40 years of experience in the design and construction industry.
- UNSW Sessional Lecturer at the School of Construction Management.
- Author of the "CCS Software Design for Industrial Floors STIF Program (Ver 3)"

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 then understand the workings of software programs designed to speed up the process.

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 (8.30 - 9.00 Registration)

9.00 - 10.30 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
 - 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
 - E_{se} ... Equivalent Youngs Modulus for Soil
- Concrete properties including flexural strength and tensile strength of concrete (and associated testing) according to AS3600-2009 and the alternative values suggested by the CCAA, RMS (prev RTA-NSW), VICRoads, QLD Transport Main Roads, Main Roads WA.

10.30 - 11.00 Morning Tea

11.00 - 12.30 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.
- Design models (eg soil springs vs elastic soil modulus)
- Formulas of Boussinesq, Winkler, Westergaard, Meyerhof, Kelly, Pickett plus FEM, T34 –1985 (CCAA-Aust), T48 –2009 (CCAAust), TR34 (Concrete Society-UK).
- 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.

12.30 - 1.30 Lunch (Provided at Venue)

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

Uno formula
$$t = 60 \sqrt{P_T}$$

(gives approx answer where P_T = Axle load in tonne)

1.30 - 3.00 Session 3

- LOADS (WHEEL, POST, UNIFORMLY DISTRIBUTED AND COMBINED)

- Parameters are compared, primarily using the CCAA manual vs Meyerhof and 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).
- Software addressing conventional slab design.

3.00 - 3.30 Afternoon Tea

3.30 - 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).
- Dowels & Joint Design
- 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 Re3 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.

5.00 - 5.15 Certificate of Attendance & Feedback sheets



CALCULATORS REQUIRED

COURSE COST

- 1 day course – \$735 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