WIND DESIGN WORKSHOP – DYNAMIC & HIGH RISE STRUCTURES

DR GRAEME WOOD *BEng PhD(UK) MIE(Aust)*

- Associate Principal, ARUP.
- Over 20 years of experience in wind engineering and dynamics research and consultancy.
- Lectures a Master's degree at the University of Sydney.

FACE-TO-FACE (SYDNEY)
Rydges Norwest
(1 Columbia Ct, Baulkham Hills, NSW)
RYDGES

2021 CODE
AS/NZS 1170.2-2021 STANDARD

WORKSHOP SUMMARY 8 hours of CPD

This workshop will address key aspects of wind design related to dynamic and high rise structures and thus dynamic forces and effects as per AS/NZS 1170.2-2021.

This course is designed for engineers who wish to analyse dynamic and high rise structures that are subjected to dynamic loading (ie frequency < 1 Hz, cross wind responses, turbulence intensity and damping).

The Engineering Training Institute Australia also offer a basic course on Wind Design titled "Wind Design Workshop – Low & Medium Rise Structures".

Attendees are advised to bring their Wind Code to this workshop.

PROGRAMME *(8.30am Registrations at the Venue)*

9.00 - 11.00 Session 1 - WIND DYNAMICS THEORY

- Wind is by far the most crucial loading in Australia (once dead and live loads have been addressed). Its complexities and unusual behaviour require a more detailed analysis than that required for permanent and imposed actions.
- Advanced principles of dynamics (eg simple harmonic motion, natural frequency, modes of vibration, spring stiffness vs mass effects) and how they relate to wind design as per well as AS/NZS 1170.2-2021 and other Standards and test results from Wind Tunnel testing.

11.00 - 11.15 Morning Break

11.15 - 1.00 Session 2 - MEDIUM AND HIGH RISE BUILDINGS: WIND DESIGN

- Steps for designing either a medium height office building (eg 50m high) or a tall tower office building (eg 200m high) are outlined.
- The medium height building example is a 16 storey (48m high) building located in a city such as Darwin. It is a concrete framed building with glazed window panels, typical within any Australian capital city.
  - Standard wind input parameters would still be: Location, Terrain, Topography, Building Dimensions, Building Orientation, Regional Wind Speed and Aerodynamic Shape Factor, however tall structures require the calculation of Dynamics effects, Base Moments and Sway Frequencies.
- The tall building example is located in Brisbane QLD (but applies equally to all Australian states). The building is a 60 storey building (183m) with ultimate wind velocities of 60 m/s (for average recurrence interval R = 1/1000 ie return period = 1000 years) as per Region B. Design wind speeds are also calculated for special cases, namely: (A) Acceleration checks (using Vdes,θ = 30 m/s); (B) Cladding checks (using Vdes,θ = 73.8 m/s); (C) Main Structure Checks (using Vdes,θ = 70.1 m/s).
  - Specialised parameters such as 'Along' Wind Response and 'Cross' Wind Response are calculated as are Base Moments and Torsion contribution.

1.00 - 1.30 Lunch Break

1.30 - 3.00 Session 3 - LATTICE TOWERS AND CIRCULAR STACKS: WIND DESIGN

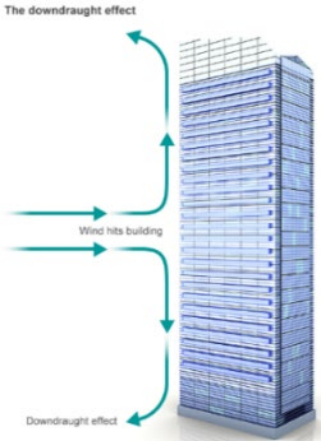
- Design of wind on a range of miscellaneous structures such as steel lattice towers and steel chimney stacks. It is imperative to allow for dynamic effects on these structures (cross wind response being a critical element of this process) as well as factors such as their solidity ratio, sway frequency, surface roughness, drag force coefficients and amplitude of movement under wind loads.
- Lattice towers (typical examples include communication towers), and chimney stacks (or even tall circular concrete or steel light poles) all require a static and dynamic analysis to allow for all potential loads that can be imposed on these structures so the C_{dyn} calculation is a key parameter to be quantified in this process.

3.00 - 3.15 Afternoon Break

3.15 - 5.00 Session 4 - WIND TUNNEL TESTING FOR DYNAMIC EFFECTS ON STRUCTURES

- Pros and cons of conducting wind tunnel testing. (Graeme Wood operated a very large wind tunnel in Sydney and thus has first-hand experience in this area).
- Explain the various aspects of wind tunnel testing and how it can most times benefit the designer by showing exactly where the major pressures zones are on a complicated structure and where savings can be made in materials and design.
- Examples will be given as to where wind tunnel testing can reveal areas on a structure that are actually worse than predicted, by simple static design and reference to AS/NZS 1170.2-2021. This is where changes can be made in construction before major flaws are built into a structure.

Certificate of Attendance will be emailed



- One day course – **$850 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.