

Wind Case Studies - Landmark Projects

www.vipac.com.au

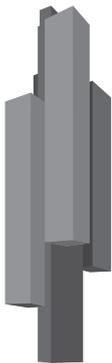
Vipac is a multi-disciplinary engineering consultancy with 5 offices and 150 staff, many qualified to PhD level. With acoustics and vibration consultants on the same site as our wind tunnels, we adopt a holistic approach to problem-solving, providing clients with one hassle-free point of contact.

Our Capabilities:

By understanding how wind loads and buildings interact, we can increase the saleable floor space, minimise the amount of building materials needed, reduce unnecessary risks, get planning applications approved faster and ensure a reliable design that offers occupancy comfort and structural safety.

Our Facilities:

- Five Australian offices
- Two open-circuit boundary layer wind tunnels, a full-scale field testing site and façade testing facility
- An onsite model-making studio, where models of your development are made at a scale of 1:400
- NATA-accredited, independent testing laboratories.



World's Most Unique Design

Project: Scotts Tower

Location: Singapore

Features: 153 metres tall, 20,000m² built floor area and 68 high-end apartment units.

Challenge: Four individual apartment towers vertically offset from one another and suspended from a central core.

Vipac's Role: To run a structural wind load study to determine all the required design parameters, including base moments in the sway directions and torsion and acceleration at the top habitable floor.

Benefit: The predicted acceleration was evaluated on time and on budget, satisfying internationally accepted criteria to ensure the occupants' comfort.



World's Tallest Residential Building

Project: Princess Tower

Location: Dubai, UAE

Features: 414 metres high and 101 storeys tall with 763 individual units.

Challenge: To ensure occupant comfort in balconies and terraces and devise a control system in case of storms.

Vipac's Role: To develop measures that ensure the comfort and safety of occupants using their balconies.

Benefit: Helped develop a high-tech system which notifies occupants and building managers when occupants leave their apartments without closing all of their windows. Also, Vipac installed balustrades to ensure outdoor furniture is secure and occupants safe.



World's Tallest Building

Project: Burj Khalifa (previously Burj Dubai)

Location: Dubai, UAE

Features: At 829.8 metres high, it is the centrepiece to a large scale development of 30,000 homes.

Challenge: Due to never before seen heights, the interaction between lateral winds and gravity loads was unexplored territory. Other challenges were massive loads, large thermal expansion on electrical busbars, isolation, pipe stresses and seismic rating.

Vipac's Role: Appointed by the contractor to consult on MEP noise, vibration control, seismic and pipe stress, and to test the building façade to ensure no vibration or wind-noise.

Benefit: A building capable of surviving all exposure conditions, with the façade producing acceptable wind-noise and vibration levels.



Cutting Edge Environmentally Sustainable Design

Project: Lilli Apartments

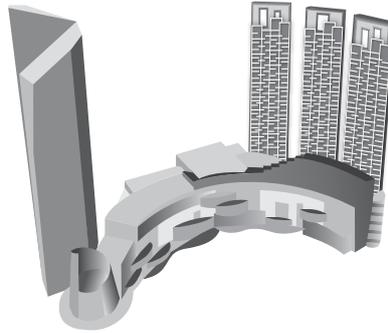
Location: Melbourne, Australia

Features: Contorted façade shape with a biomimicry-inspired design to facilitate natural ventilation.

Challenge: To apply a high-tech solution to deliver a rare amenity: passive ventilation, where wind is trained across the façade and then sucked laterally through the apartment interior, in one opening and out the other.

Vipac's Role: To determine wind comfort and natural ventilation of the internal spaces using wind tunnel testing, computer modeling and full scale measurements.

Benefit: The façade elements were modelled to provide sunshading and emphasise pressure differentials between the balconies off the living rooms and windows in the bedrooms. This natural ventilation led to reduced reliance on air conditioners, minimising the electricity costs and carbon footprint of the tenants.



World's Eighth Largest Building

Project: Central Park

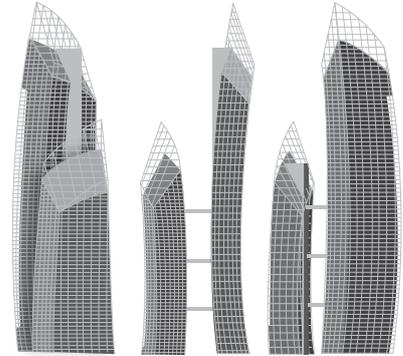
Location: Jakarta, Indonesia

Features: A mixed-use complex including a shopping mall, an office tower, three apartments and a hotel covering 655,000m².

Challenge: To ensure occupant comfort in all areas of the complex, particularly the ground level recreation area.

Vipac's Role: To determine the wind effects at pedestrian level, to rationalise the wind load distributions, to reliably predict the external wind pressures acting on the building façade and to ensure building strength and reliability.

Benefit: To enable the designer to account for localised extreme pressures specific to this development, which may not be adequately accounted for in the wind loading codes. Also, to help designers minimise costs by providing results optimised specific to the project on time and on budget.



World-First Design

Project: Keppel Bay Towers

Location: Singapore

Features: On 840,000m² of land with 750 metres of shoreline, 1129 units and six towers ranging from 24-41 storeys.

Challenge: The buildings' curved shape and sky bridges made structural loads and occupancy comfort difficult to determine.

Vipac's Role: To provide cladding pressure, structural wind loads and pedestrian level wind studies for the six Keppel towers to ensure the building achieved comfort at pedestrian level.

Benefit: Helped designers control costs through efficient use of materials, creating the byproduct of more saleable floor area. Also, through wind tunnel studies, determined all the structural load information, ensuring comfort on the sky bridge and identifying low wind areas at ground level.

Vipac delivers design solutions worldwide that shape the building landscape and help build a more sustainable future. Our two boundary layer wind tunnels form one of the largest commercial facilities in the world, and is unique to Australia and South East Asia.