

Advanced
and robust
analysis of
wind effects

Introduction



Windtech Consultants is an industry leading, global consultancy firm specialising in providing wind engineering services to owners, developers, architects, structural and façade engineers around the world.

Windtech offers the most rigorous method of combining wind tunnel results with local wind climate data. This method has been independently confirmed to be the most accurate and robust method possible.

Since 1991 we have provided wind engineering services for over 2,500 major building projects in over 35 countries around the world. This demonstrates Windtech's depth



Some numbers:

2500+ projects
assisted by Windtech
since 1991

5 percent of
resources devoted to
ongoing research
and development

35 countries
Windtech has
provided wind
engineering services
in all major regions

3 wind tunnels,
purpose built at
Windtech's facility
utilising the
most advanced
instrumentation

150+ years of
combined experience
in both research and
practical application
amongst the current
key wind engineering
staff at Windtech

and breadth of experience in the multi-faceted fields of wind engineering.

Windtech's directors are actively involved on standards committees, technical review committees and have been instrumental in contributing to the development of standards and guidelines for the wind engineering profession.

Windtech is at the forefront of wind engineering through the engagement of the most

highly skilled engineers with extensive research experience and its ongoing research and development activities. Since 1991, Windtech's research has focussed on the needs of our clients and has served to enhance our comprehensive quality control procedures.

Let us demonstrate our unrivalled expertise, techniques and innovative approach in providing the most cost-effective and elegant solutions possible for your project.

Tall Buildings

Marina 106, Dubai



Windtech has been instrumental in the advancement of analysis techniques used to determine the wind-induced response of tall building structures exhibiting complex behaviour.

This has enabled Windtech to accurately determine the wind-induced dynamic response for tall building projects of any level of complexity in both form and dynamic behaviour. An example is the 340m high Conlay8 Towers in Kuala Lumpur which incorporates slender interlinked sloping tower substructures.

In addition, our pressure measurement system is developed in-house, to much higher specifications than off-the-shelf systems used by other

Monitoring GAMA Tower, Jakarta



Greenland Centre, Sydney



Fine tuning and commissioning of a damper



wind engineering consultants. This enables increased clarity in the pressure signal for critical parts of the building surface.

Windtech is a world leader in the modelling of stack effects for proposed and existing tall buildings located in extreme climates, where temperature differences between the exterior and interior can result in excessive internal air flows. Windtech has also developed world's best practice techniques for the assessment

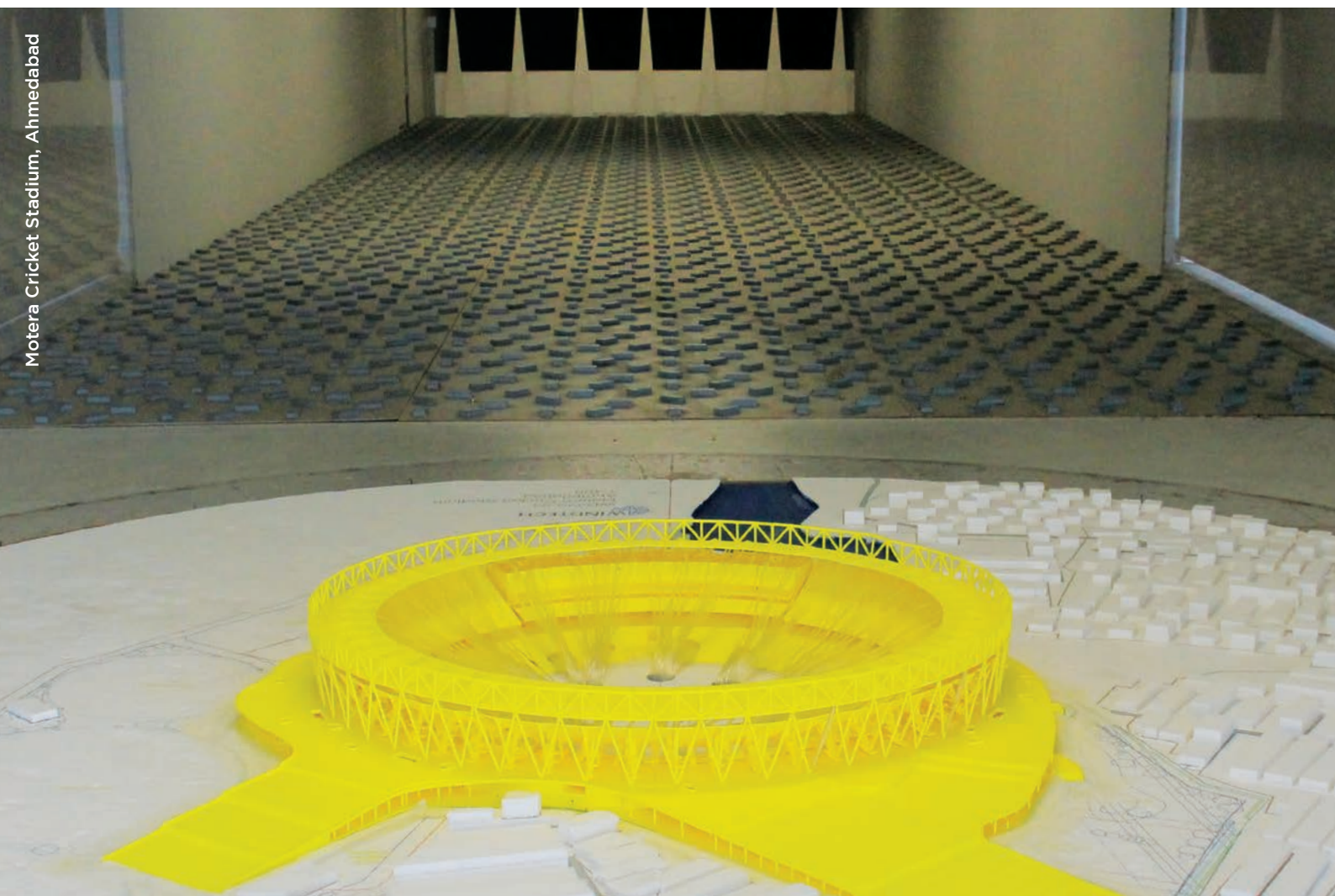
of wind noise generated by building façades.

When it comes to formulating wind mitigation measures for pedestrian comfort, we are unique in our ability to demonstrate an innate understanding of wind flows around various building forms as well as an understanding of sustainable design principles. These are combined with innovative thinking to arrive at solutions that complement the architecture.

Windtech specialises in the design and commissioning of dampers for tall buildings and has recently developed an innovative, efficient form of liquid damper.

Windtech also provides long term remote monitoring systems for the natural frequencies, damping and mode shapes of tall buildings. This assists in maintaining correct tuning of dampers and for structural health monitoring.

Stadium and long-span roofs

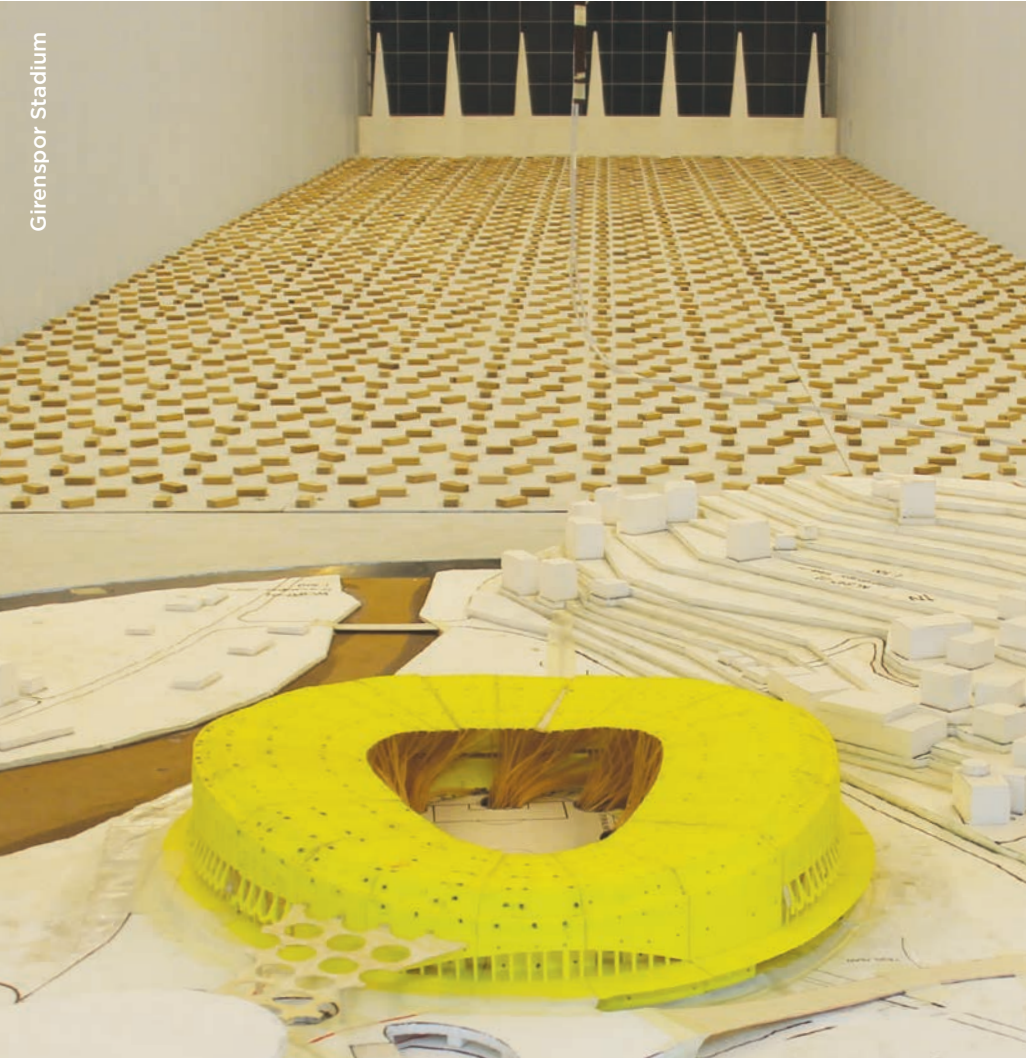


Motera Cricket Stadium, Ahmedabad

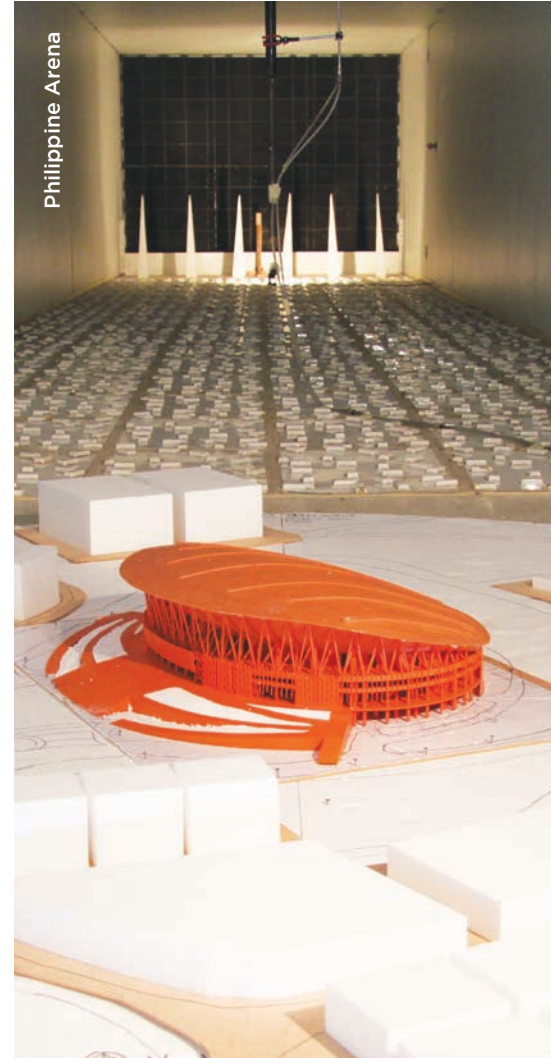
Windtech offers the most advanced analysis techniques to determine not only the cladding pressures and equivalent static wind load distribution for the dynamic wind actions on stadium, arena and long-span roof structures, but also offers detailed analysis of the following:

- Directional peak responses for key load effects such as mid-span deflections, stresses, axial loads and reactions (Load Response Correlation method) coupled with accurate critical load cases that correspond with the peak load effects.
- Fatigue life analysis for critical connections between main structural members.

Girenspor Stadium



Philippine Arena



- The effect of the proposed cladding material and shading on the thermal comfort within the spectator areas through the use of advanced hybrid wind tunnel and computational fluid dynamics modelling.
- The potential impact of glare from the cladding on motor vehicle drivers in surrounding streets as well as studying the effect of shadows cast by roof trusses on the arena or courts.
- A range of environmental studies for pedestrians and spectators. These include the assessment of spectator wind comfort, adequacy of the air ventilation required for the health of natural turf used for the arena as well as protection from wind driven rain.

Utilising these state-of-the-art analysis techniques, Windtech is able to ensure a positive overall experience for both spectators and participants as well as help in delivering the most robust and cost effective design solution.

Masterplan and Sustainability Studies

ISOHO Kuala Lumpur render

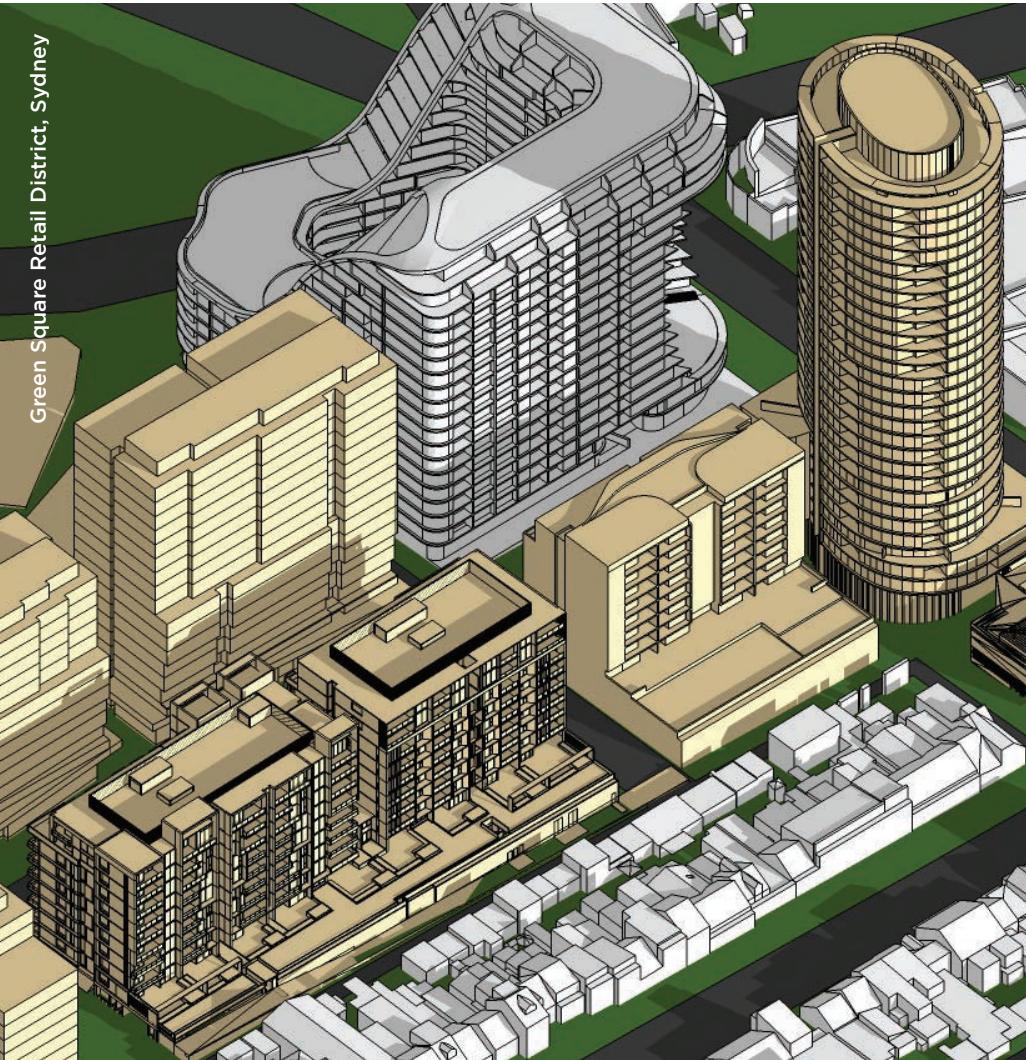


Windtech has provided input to major development masterplans for both developers and local government authorities, in capital cities around the world.

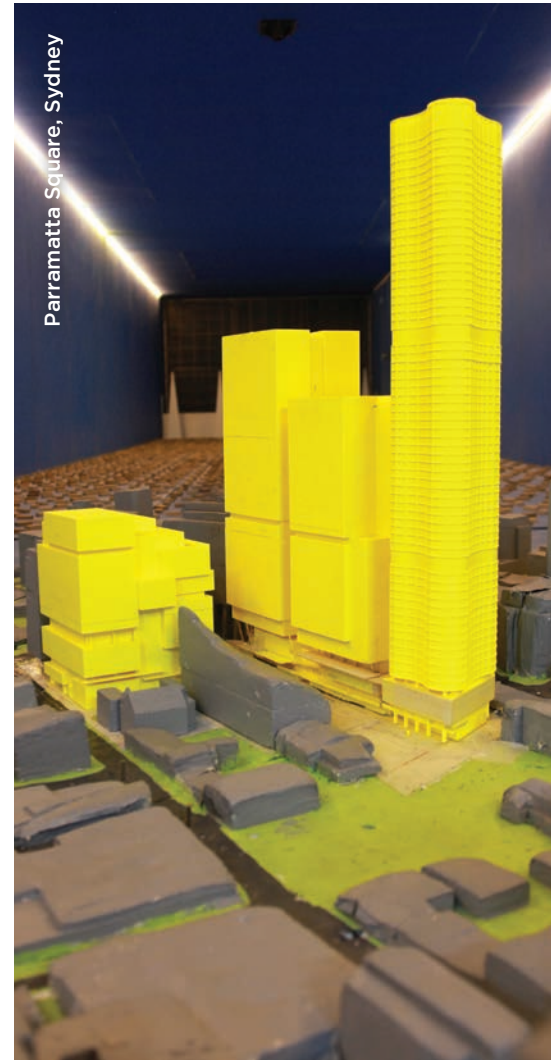
Windtech provides advice with regards to the optimal building massing for masterplans.

Design guidance includes wind environment effects, outdoor air ventilation, air quality for sites located adjacent to pollution sources, solar access and shadows. Windtech has provided advice on wind-driven rain as well as outdoor thermal comfort.

Green Square Retail District, Sydney

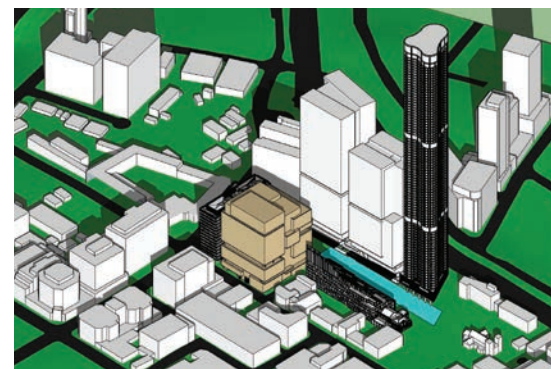


Parramatta Square, Sydney



Windtech is a leader in the modelling and design of natural ventilation in buildings, from high-rise buildings to single dwellings. Windtech undertakes modelling of annual heating and cooling loads for residential developments and assists in achieving a high standard of thermal performance as well as advising on the provision of the required standards of daylight and solar access through good design.

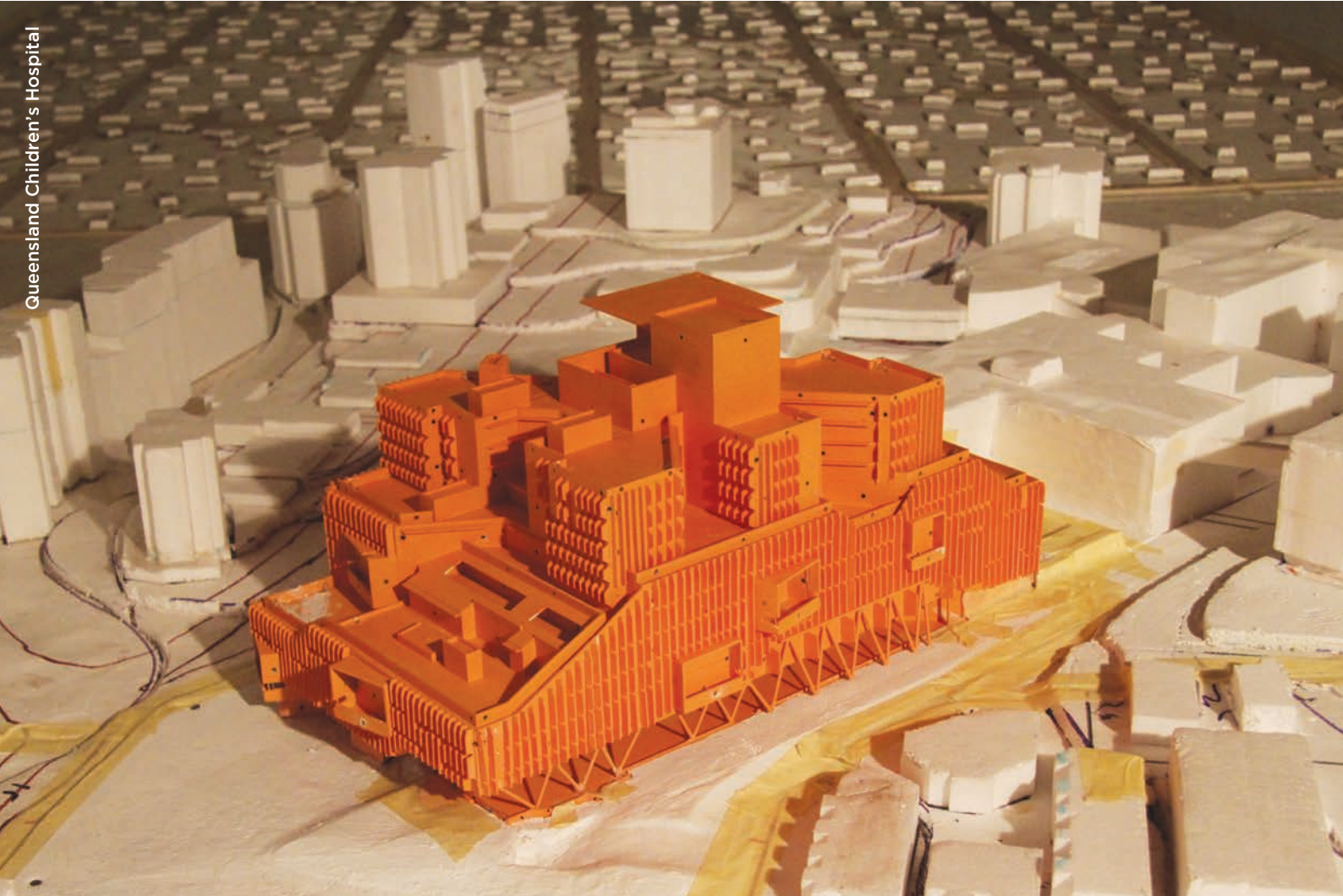
Windtech is unique in its ability to integrate its in-depth understanding of sustainable design into its recommendations for wind mitigation, resulting in an overall enhancement of the quality of the building and the quality of experience of the occupant. This has led to Windtech being associated with numerous award winning buildings.



Parramatta Square, Sydney

Hospitals and other special projects

Queensland Children's Hospital



Windtech has extensive experience and understanding of the special modelling requirements for hospital buildings.

This includes prop-wash from helipads; impact of gas emissions on air quality; wind entry; wind noise and wind loads for the design of the facade cladding.

Windtech has been involved with many unusual and challenging special projects around the world. These include:

- single dwellings significantly exposed to wind due to topographic effects.
- a 107m (350ft) high statue in central India on top of a hill.



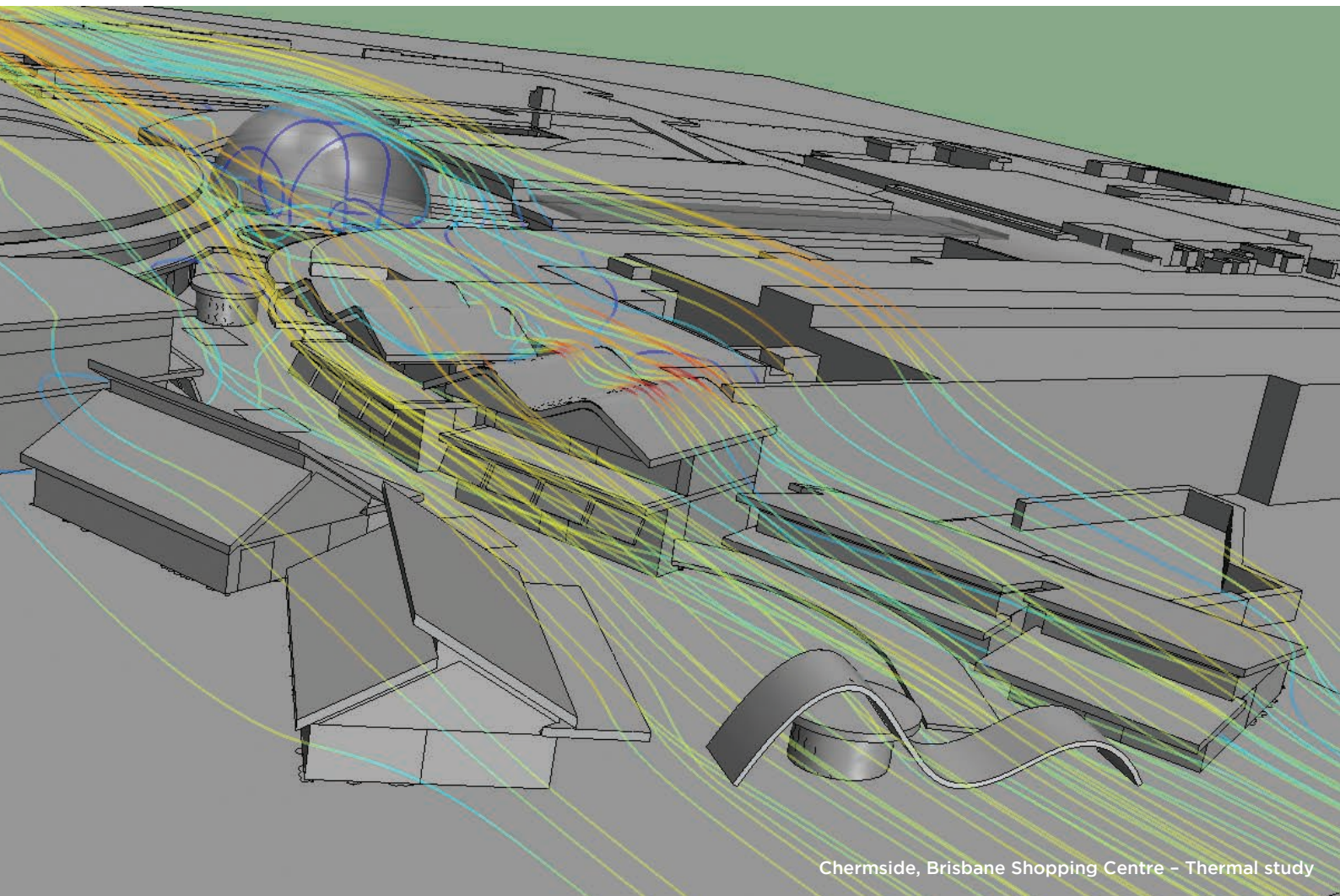
Wind noise tests

- precise deflections of 25m diameter revolving concentric rings used for the Asian Games in Doha, with a 2 inch clearance.
- Discharge co-efficient and effective area ratio of louvred and other porous panels.
- Wind-driven rain penetration testing of façade, window and vent samples.
- Wind drag on external and semi-outdoor artwork.

- Wind drag and wind-noise from motor bike helmets.
- Performance testing of fume jets.

Windtech staff have an understanding of the critical modelling parameters that need to be matched for these unique projects to provide accurate predictions as well as practical solutions.

Retail and Leisure buildings



Chermside, Brisbane Shopping Centre – Thermal study

Windtech understands the special demands and expectations of high-end retail tenants and patrons and through its extensive experience in this field, is able to assist clients in meeting the necessary stringent comfort criteria.

Studies normally undertaken include:

- Wind entry and wind comfort for patrons.
- Detailed modelling of thermal comfort – especially for semi-outdoor areas.
- Wind-driven rain.
- Daylight study, solar access and shadow studies.
- Modelling and mitigation of air conditioning and kitchen exhausts.
- Air-quality study for car parks.



Westfield Sydney CBD

Windtech has worked on numerous retail projects around the world. These include:

- Modelling for new shopping malls.
- Upgrades and expansions for existing large shopping malls.
- Remedial studies for existing shopping malls or shopping strips.

The modelling of thermal comfort in semi-outdoor areas requires specialist expertise

in both wind engineering and fluid dynamics to properly predict the likely conditions as well as formulate appropriate recommendations. In these cases Windtech has developed an advanced hybrid wind tunnel and Computation Fluid Dynamics approach, which provides optimum accuracy, enabling a greater level of certainty of outcome for Windtech's clients. This modelling approach also provides optimum accuracy

when modelling air quality in shopping centre car parks, whether they are naturally ventilated or utilise mixed mode ventilation.

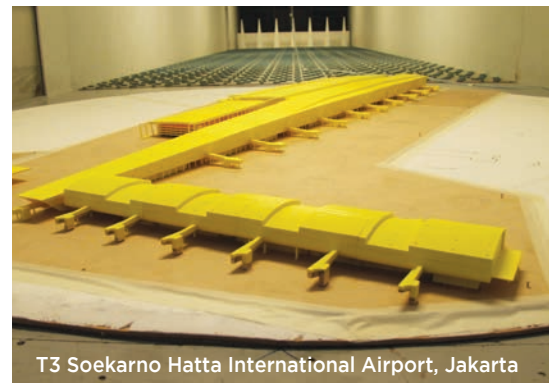
Airports and Transport



Windtech has worked on numerous key transport nodes around the world such as airport terminals and metro stations.

Our studies for airport buildings include:

- Studies of wake interference effects on landing aircraft.
- Glare impact from façade and roof cladding or from solar panels on visibility of pilots and motor vehicle drivers.
- Wind entry and design loads for the façade and roof cladding.
- Wind loads on key structural members for large roof spans.
- Piston effect of high-speed trains.



T3 Soekarno Hatta International Airport, Jakarta



Jewel Changi Airport, Singapore

Bridges



Pedestrian Suspension Bridge, Riyadh



Windtech has an advanced test rig which enables a quick and efficient replication of the dynamic properties of a bridge deck section.

This study is essential to identify inherent aerodynamic instabilities on the bridge deck profile. Our advanced rig design enables a fast and cost effective service to our clients.

Windtech staff and their affiliates also have experience in undertaking full aeroelastic modelling of lightweight, long-span bridges where a full bridge model is required due to an unusual form or local topographic effects.

