cpp

CERMAK
PETERKA
PETERSEN

OVERVIEW OF SERVICES

WIND ENGINEERING AND AIR QUALITY CONSULTANTS

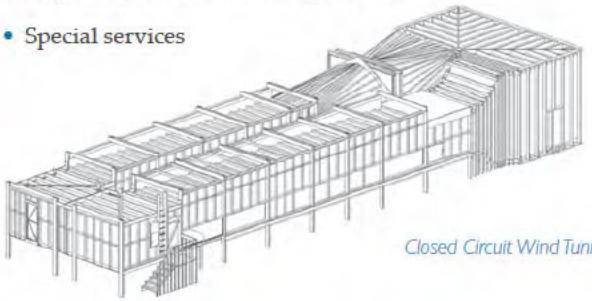
About Wind Engineering

Moving air interacts with buildings and structures in many complex ways. The field of wind engineering works to understand those interactions and to use that knowledge to improve the quality of buildings, structures, and their surroundings.

Wind engineers enhance the value of a building project by working with architects, engineers, and owners to identify and address wind-and airflow-related issues. The result is a more efficient design that ensures a reliable and comfortable built environment.

Wind engineering services can be grouped into several categories. Some of those service categories are:

- Air quality services
- Wind energy services
- Wind loading services
- Regulatory & Air Permitting Services
- Special services



Closed Circuit Wind Tunnel

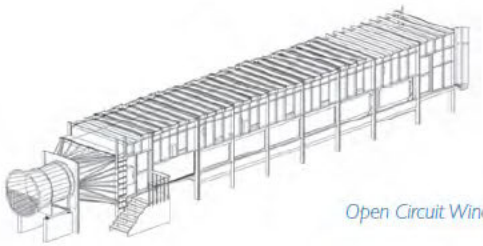
CPP's Facilities

International Resources

To better serve our growing number of international clients and projects, CPP has added facilities in Sydney, Australia. With technical and business leaders in Fort Collins and Sydney, CPP provides responsive wind engineering expertise to owners, developers, and design professionals around the world.

CPP's Facilities Include:

- Locations in Fort Collins, Colorado and Sydney, Australia
- Recirculating and open-circuit boundary-layer wind tunnels
- A multiple-CPU computing cluster for CFD simulations
- A full-scale field testing site
- An on-site model design and fabrication center



Open Circuit Wind Tunnel

Dr. David Banks showing airflow around a building

Urban surroundings on a turntable model

Detail of a wind tunnel test model

Air Quality Services

To create safe, comfortable, sustainable buildings, owners and designers must address potential issues of building exhaust and indoor airflow.

CPP provides services that support healthy, comfortable indoor and outdoor environments.

Standard Services Include:

- Exhaust dispersion analysis
- Exhaust system optimization
- Pollutant concentrations in public areas
- Indoor airflow
- Natural ventilation
- Atrium fire and smoke behavior

Laboratories and research facilities, academic buildings, hospitals and healthcare facilities, sports arenas and stadiums, hotels, industrial facilities, office and residential buildings all benefit from air quality services.

Wind Energy Services

CPP's wind energy services ensure good turbine placement and design and protect investments in wind energy.

Wind Farm and Turbine Siting

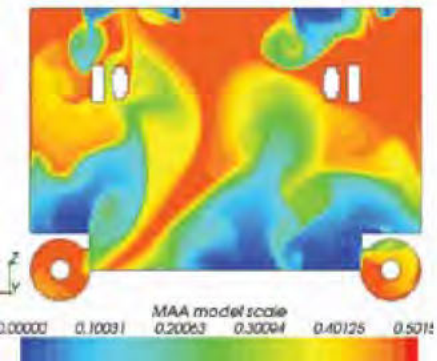
Surrounding terrain has a large effect on the wind conditions—and therefore the productivity—of a wind farm site. High turbulence and excessive wind shear can impair wind turbine performance. Proper siting of wind farms and turbines protects output levels and provides a quicker return on investment.

To ensure optimal siting, CPP uses physical and computational models to accurately map and predict regional and local wind environments, changes in seasonal, daily, and hourly winds, and the effects of complex terrain on wind conditions.

Small Turbine Performance Testing

CPP uses customized hybrid methods to evaluate new and unique wind turbine designs. Through computer simulations, scaled physical models, and full-scale field testing, CPP provides quicker, more accurate results for less than the cost of traditional testing methods.

CFD simulation of airflow in a parking structure



Exhaust being drawn upwind

Experimental wind turbine

Terrain model for wind farm siting tests

Wind Loading Services

To increase the quality of a building project, owners, engineers, and architects consult wind engineers to enhance the reliability and efficiency of their design.

By understanding how wind interacts with buildings and structures, wind engineers help design professionals control costs by using materials more efficiently while ensuring safety and reliability.

Standard Services Include:

- Wind-induced structural loads and responses
- Wind pressures on cladding
- Wind loads on building components
- Wind conditions in pedestrian and recreational areas

Codes or Testing?

As the standard wind loading codes themselves state:

1. The codes do not account for unique or unusual architectural shapes
2. The codes do not accurately address crosswind effects for even simple shapes
3. The codes represent wind climate and the effects of nearby buildings and terrain in a simplified manner

Wind tunnel testing can account for all of these variables and their complex interactions in ways that codes cannot.

High-frequency base balance model

Wind tunnel model of Marina Bay Sands, Singapore

Topographic model of Hong Kong

Regulatory Services

One way government agencies (the EPA in the US, for example) protect air quality is to require the use of approved numerical models to assess compliance with government standards. However, these models do not adequately account for the effects of upwind terrain, multiple buildings, complex building geometry, or latticed and cylindrical structures.

For these situations, CPP offers wind tunnel modeling and analysis services that bring greater accuracy to the models. By applying our expertise in physical modeling and pollutant dispersion, we can help companies plan and design more efficient regulatory projects while protecting human health and the environment.

Our Regulatory Services Include:

- Equivalent Building Dimensions (EBD): More accurate building input data for AERMOD, ISC, or CALPUFF
- Determinations of excessive concentrations and Good Engineering Practice (GEP) stack heights
- Computer and physical modeling for emergency response, safety, and mitigation scenarios
- Site-specific dispersion modeling for complex sites or problems
- Development and validation of dispersion models

Special Projects

Some wind-related issues are not easy to categorize. CPP specializes in unusual wind and airflow challenges that require innovative approaches.

Special projects drive the progress and innovation that improve procedures throughout the industry.

Some Special Projects

CPP has analyzed the effects of wind on…

…power line capacity

…solar collectors and satellite receivers

…amusement park rides

…door operability

…pre-launched space vehicles and launch pad structures

…roof shingles

…driving rain and water ingress

…helipads and flight operations

…snow drifting and loading

CPP also performs full-scale field testing and monitoring, and forensic services for structural accidents and failures.

Wind tunnel model of a power plant

Wind tunnel test of plume dispersion

Wind tunnel model of a launch vehicle

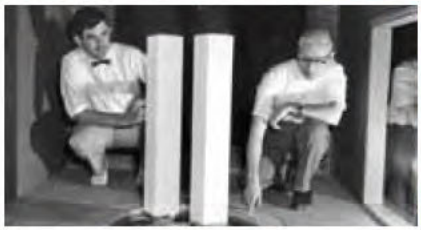
Solar panel array, similar to those tested by CPP

About CPP

Modern wind engineering began in the 1950s with the work of Dr. Jack Cermak, his colleagues, and students. As a professor and researcher at Colorado State University, Dr. Cermak pioneered now-standard methods of modeling and testing pollutant dispersion and the effects of wind on buildings and structures. In 1964, his laboratory tested the design of the World Trade Center Twin Towers in New York City, bringing wind engineering to the attention of architects and engineers around the world.

In 1981, Dr. Cermak and Dr. Jon Peterka co-founded Cermak Peterka and Associates, America's first commercial wind engineering company. Three years later, Dr. Ron Petersen joined and the company was renamed Cermak Peterka Petersen (CPP).

With a staff of more than 80 and the addition of facilities in Sydney, Australia, CPP now provides even better service to owners, developers, and design professionals around the world.



With more than 3000 projects on 7 continents, CPP is the largest, most experienced US wind engineering company.

CPP Experience

CPP's wind engineers are some of the most experienced in the world. By themselves, our three founding principals (Drs. Cermak, Peterka, and Petersen) represent more than 110 years of experience, knowledge, and innovation. Our associates and engineers have spent years working and learning from these industry pioneers and are now respected leaders in their own right.

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