CPP WIND ENGINEERING CONSULTANTS

Laboratory exhaust fan energy optimization

Operating a laboratory exhaust system can be a large initial and ongoing investment. Ensuring the system is as effcient as possible, without compromising occupant health or comfort is crucial.

The traditional constant volume laboratory exhaust system consists of multiple fans operating at **full speed 24 hours a day, 365 days a year**. The difference between the airflow out of the building and the volume flow rate through the exhaust fans is accounted for with bypass dampers that balance out the difference in the volume flow rates by maintaining the desired static pressure within the exhaust duct. While this may be a safe operating condition, it creates situations where laboratory exhaust fans may be responsible for up to **30% of the electrical energy consumption** of the entire laboratory building.

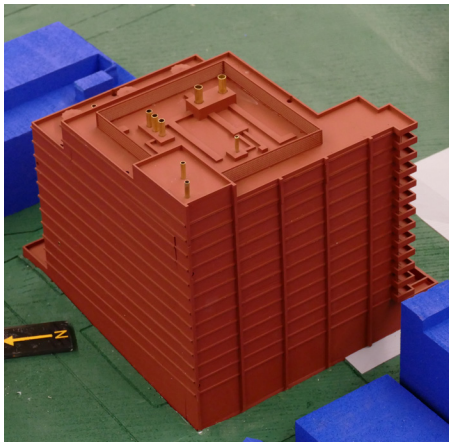
By applying state-of-the-art Variable Air Volume (VAV) technology, significant energy savings can be achieved for manifolded laboratory exhaust systems using the methods CPP has developed over the last 15 years to minimize the amount of air that needs to flow through these bypass dampers. While the most effective control strategy depends on site and building specifics, there are generally three types of strategies for safely implementing VAV control.

A simple turndown approach where a single minimum volume flow rate is defined based on dispersion modeling.

A wind responsive system where minimum volume flow rates are dependent upon the local wind speed and wind direction.

A monitored system where the constituents of the exhaust are measured, and volume flow rates are adjusted accordingly.

CPP Wind has extensive experience designing and implementing these control strategies. With **more than 300 installed systems** throughout the United States, Canada, and the United Kingdom, we can help you design a more efficient system, reduce your carbon footprint, and achieve significant savings.



Testing a scale model in one of CPP's state-of-the-art boundary layer wind tunnels.

> CPP consults with laboratory owners and designers to choose the best control strategy for their application.

30%

Traditional constant volume laboratory exhaust systems may be responsible for up to 30% of the electrical energy consumption of the entire laboratory building

150,000 MW

Megawatt hours of electricity saved through CPP's lab exhaust implementations, valued at $20M in savings.

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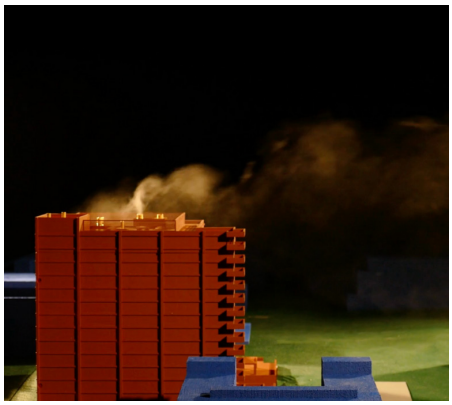
DISPERSION MODELING

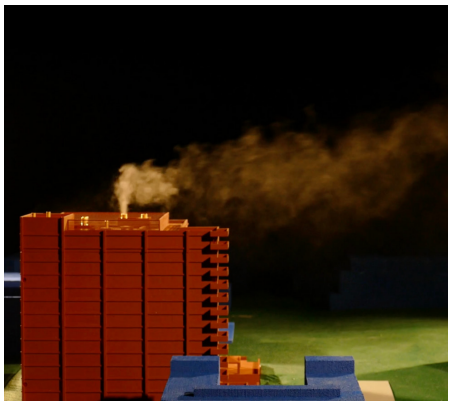
The backbone of a safe and efficient laboratory exhaust control system involves a dispersion modeling assessment. These assessments define the minimum volume flow rates and exit velocities that maintain acceptable air quality at all downwind locations. To perform these assessments, CPP utilizes their proprietary numerical model, or conducts physical modeling in one of their four **state-of-the-art** atmospheric boundary layer wind tunnels.

CPP applies the results of this dispersion assessment to consult with laboratory owners and designers to choose the best control strategy for their application.

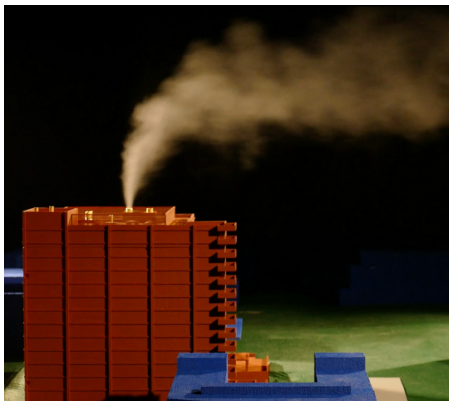
> We can help you design a more efficient system, reduce your carbon footprint, and achieve significant savings.



Adverse Air Quality - *Low flow and low energy. Under-designed specifications.*



Safe and Energy Efficient - *Optimum balance between energy and air quality.*



Wasted Energy - *High flow and high energy. Typical manufacturer specifications.*

IMPLEMENTATION

CPP has the in-house capability to develop a Sequence of Operations (SOO) for the desired control system for the laboratory owner or designer. The SOO utilizes a three-tier priority system to:

- Maintain duct static pressure
- Maintain adequate plume rise from the exhaust fans
- Minimize energy consumption

CPP can also oversee the implementation and commissioning of the new control system. Implementation can be accomplished quickly with **minimal interruption** to laboratory operations.

FEASIBILITY ASSESSMENTS

Payback periods for converting existing systems to VAV control can range from a few months or up to 5-10 years. The faster payback periods are associated with larger exhaust systems (> 20,000 cfm). CPP provides a **free feasibility assessment** to accurately estimate the potential energy savings and installation costs.

You will find that the amount of energy savings far outweighs the time and effort required to implement CPP's proven system, and thus, should rank high on any lab owner's list of energy saving measures.

Contact CPP Wind Engineering Consultants today to ensure your laboratory ventilation system operates in a safe and efficient manner.

ABOUT CPP

For more than 40 years, CPP has attracted and developed some of the finest wind engineers in the field.

CPP is the largest, most experienced US wind engineering company.

LEADING THE WAY IN...

- Structural Wind Loads & Responses
- Cladding Pressures
- Wind on Solar Arrays
- Solar Glare & Reflectivity
- Thermal Comfort
- Pedestrian Winds
- Indoor Airflow & Natural Ventilation

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