

iPRO 323:

Development of modular flow guiding, wind turbine panels for surface applications.

The urban environment sits as an untapped wind power source.

It is the goal of this iPro to develop a mountable panel system that harnesses this potential by directing airflow into a wind turbine.

- Integrate wind energy technology into any swept surface.
- Create a flow guiding device to maximize output of a Savonius-type wind turbine. Existing research and patents have shown good result

These goals have lead us to:

- Research existing wind energy devices and concepts.
- Adapt a method of representing a turbine using only a wire mesh.
- Refine an architectural concept based on MMAE wind tunnel testing.

Architecture

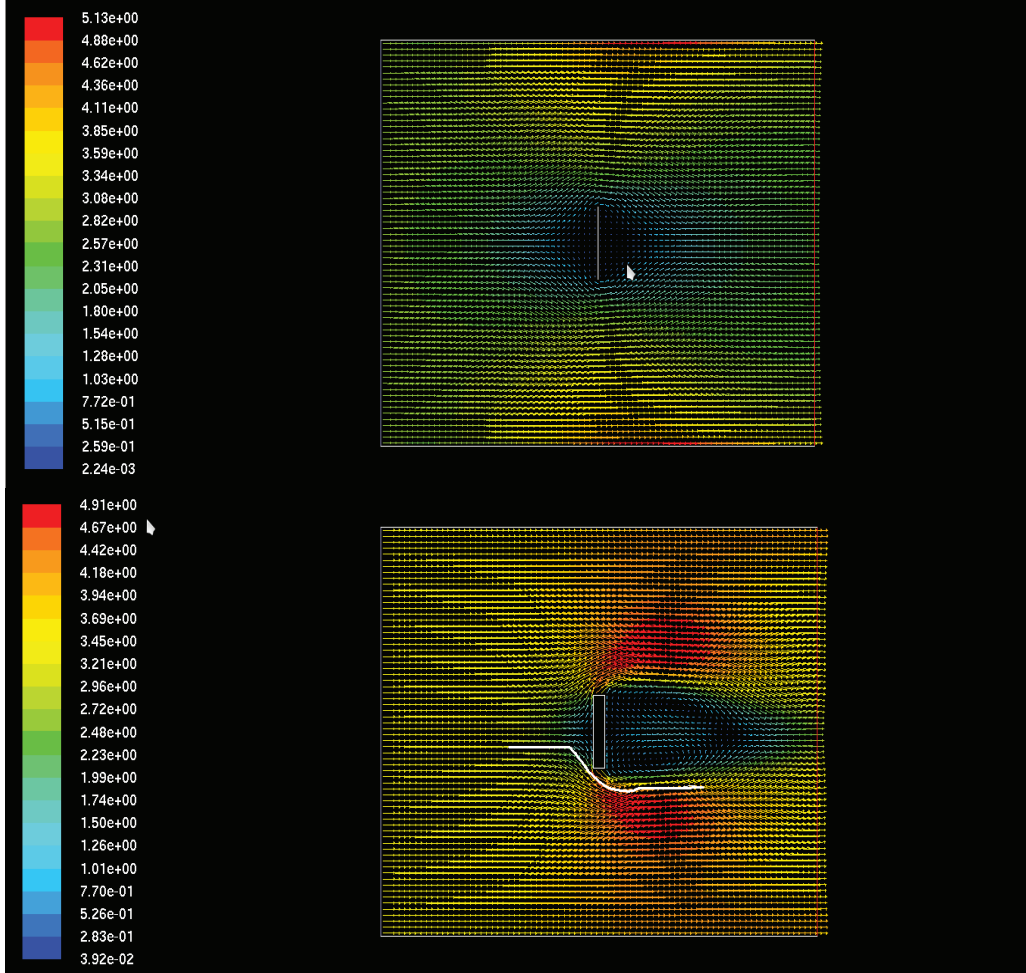
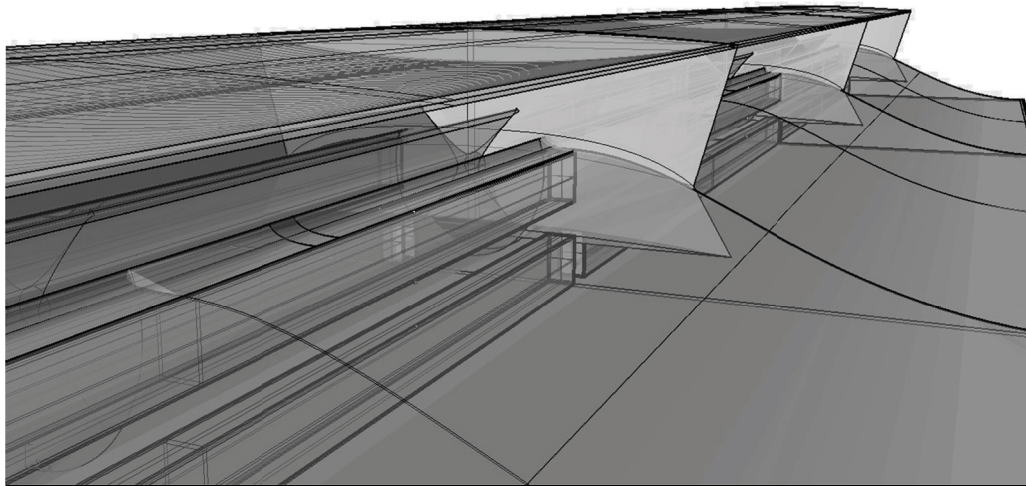
- Address the problems currently present in structurally mounted wind energy devices and the turbulence of urban wind regimes.
- Gather information on building power consumption and current wind energy needs for comparison with device output.
- Develop a strategy for mounting panelized turbines to new and existing buildings and built surfaces.

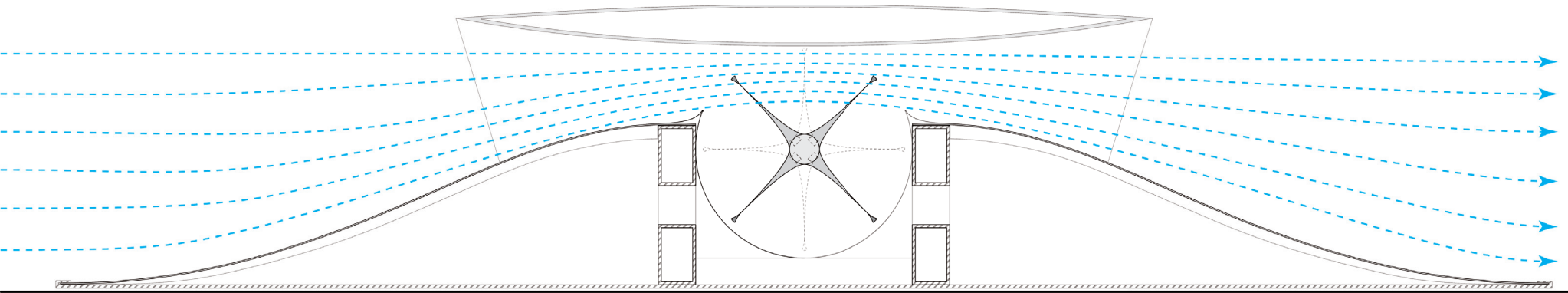
Mechanical and Aerospace

- Use the MMAE department's wind tunnels to test architectural component concepts for potential wind energy devices.
- Use Computational Fluid Dynamics to quickly analyze different design ideas and speed refinement of concepts and prototypes.
- Analyze, compare and present aquired data back to architecture team for further refinement.

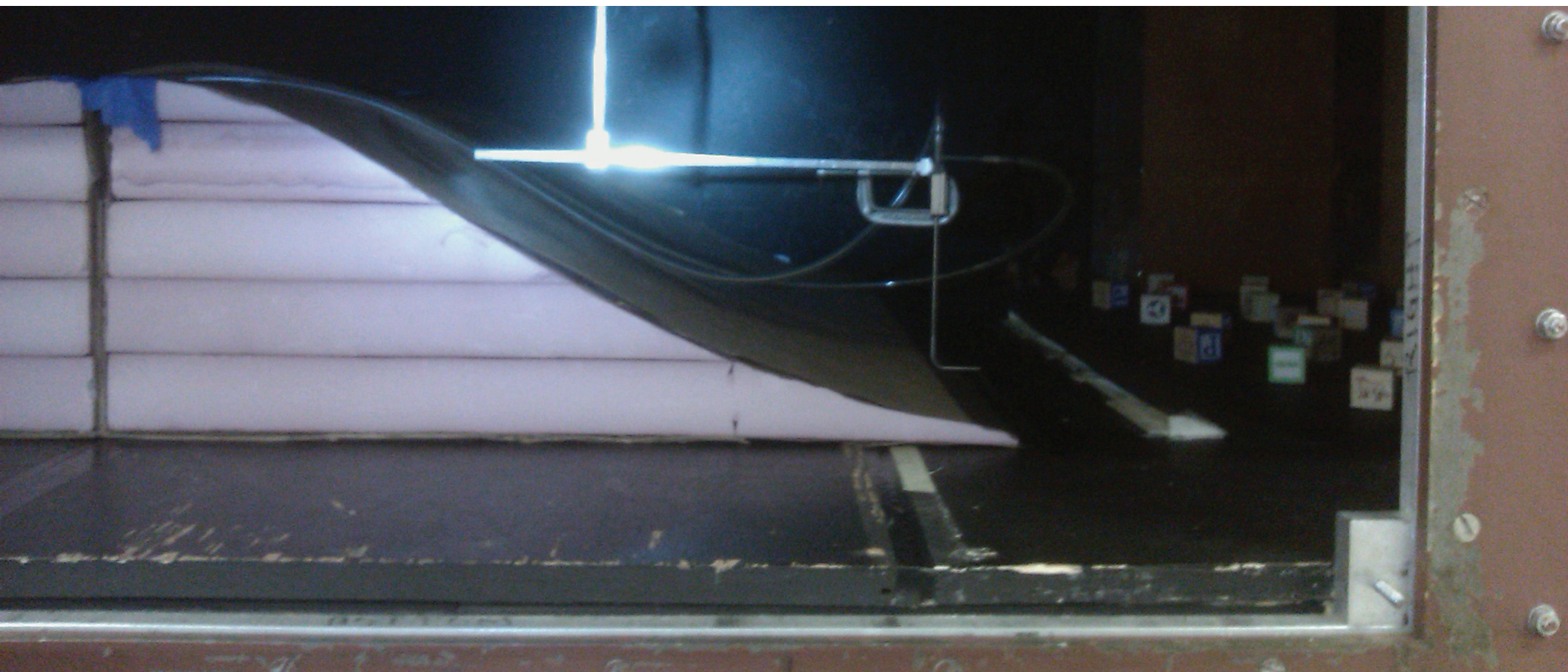
Semester Progress

- Based on an existing design and further research a simplified prototype has been developed and testing has begun to assess its viability and potential.
- The complexities of building an actual wind turbine a porous plate with similar wake effects to a rotating turbine has been developed and deemed a sufficient model.
- An initial flow shaping structure has been constructed, will have the porous plate mounted to it, and is going to be tested as a whole presently.





concept developed through College of Architecture



Wind tunnel testing in the M.V. Morkovin wind tunnel