Supersonic Wind Tunnel Dampener

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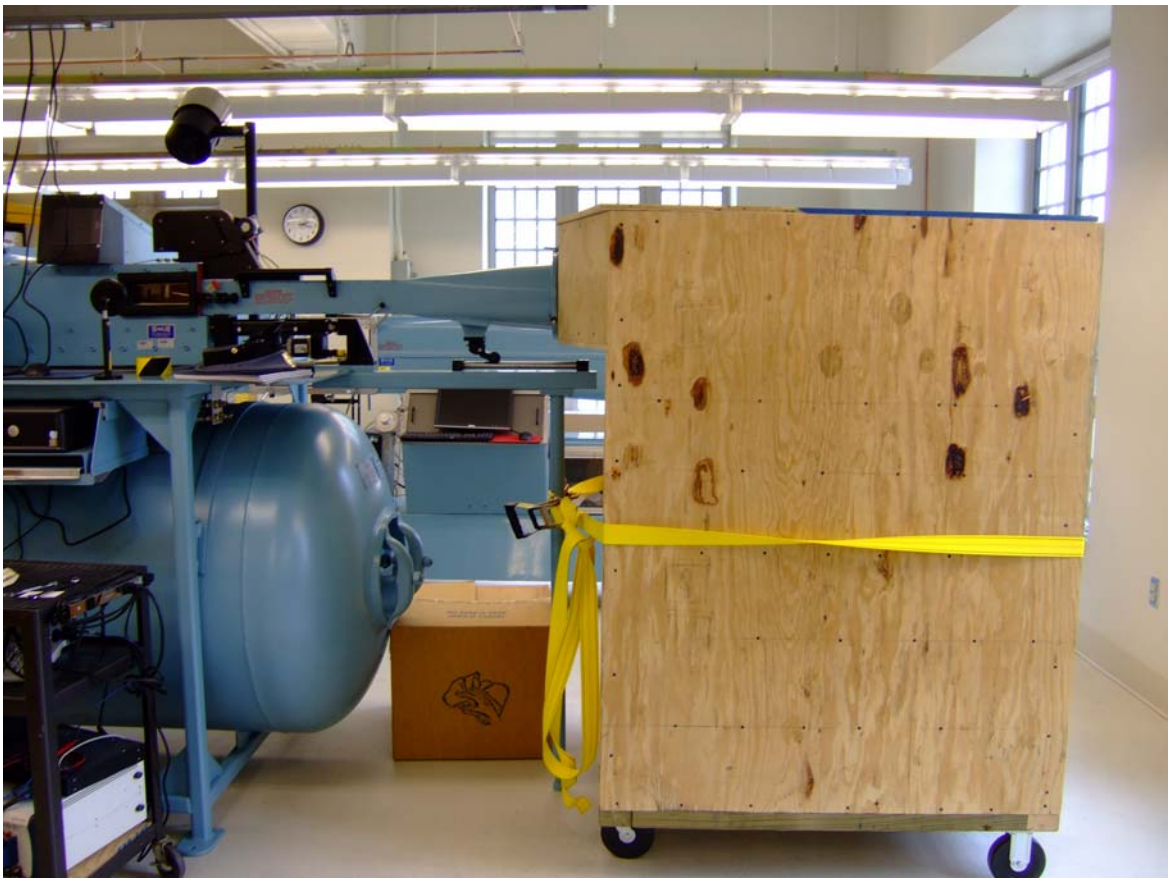

The VMI Mechanical Engineering department was lucky enough to introduce a supersonic wind tunnel in its lineup of experimental testing machines. This wind tunnel will aid in the cadets' understanding of supersonic air flow while allowing them to visualize the concepts they study.

As helpful and instructional as the wind tunnel may be, the sound level produced by the machine is problematic. While running, the machine is loud and hinders communication with the people around it. To alleviate this problem, the design team has been assigned the task of designing a sound damping tool to reduce the overall noise level of the machine without hindering its performance. It is nearly impossible to completely silence the machine; however, the overall objective is to significantly reduce the noise level in the classroom in order to enhance the concurrent learning process while minimizing cost and space occupied.

The wind tunnel silencer was built using simple materials (i.e. plywood, insulation foam, 4 X 4 studs, etc.) to stay within the limits of the budget. After a few weeks of construction, the silencer was transported to the energy lab and attached to the wind tunnel. Using the department's new sound measuring device, the sound level of the wind tunnel was recorded with the silencer attached and without.

Inside the Silencer

After analyzing all of the graphs and the test data, it can be concluded that the dampener is indeed working as designed. In some aspects it has performed better than was expected and has reduced the decibel levels by more than the goal of 10 dB.

In summary, the tests at Mach 2.5 show a decrease of 13.5 dB with the dampener attached to the wind tunnel. At Mach 3.5 the dampener produced a decrease of 20.5 dB. In both sets of trials, the targeted higher frequencies were reduced significantly. There was no reported damage to the dampener throughout the entirety

of testing, and there was no apparent change to the wind tunnel in the test section. The team has ensured that the dampener is easy to attach and detach, and adhered to the allotted budget of $300 dollars.