Fan Performance Test Facility

POLE STAR PRODUCTS LIMITED

UNIVERSITY OF LINCOLN

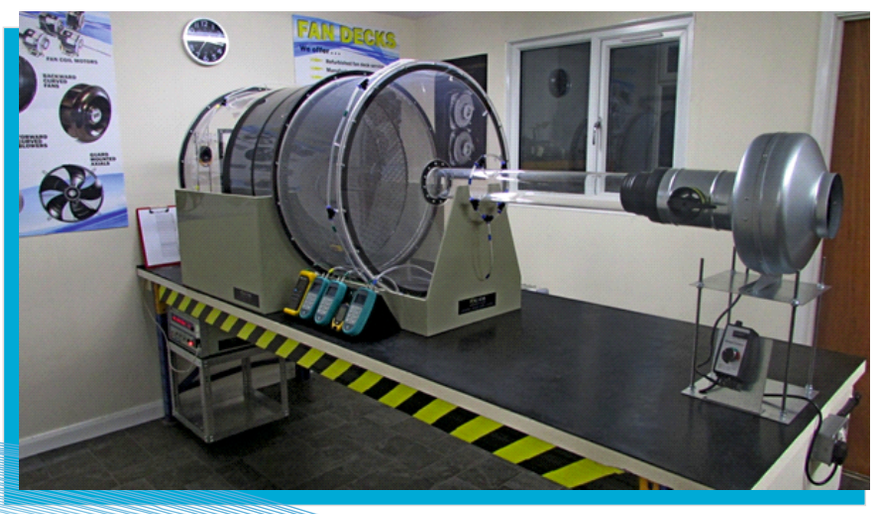
Getting the right airflow from a fan is critical to the overall performance of any refrigeration equipment. Manufacturers run many exhaustive tests to ensure that the correct motor power, speed, fan blade diameter and pitch are selected to give the best overall performance for their piece of equipment.

With the introduction of the energy saving EC (electronically commutated) fan motors, many companies are retro-fitting stores refrigeration equipment to achieve much improved energy consumption but are they fitting the correct fan/motor combinations in line with the original equipment design?

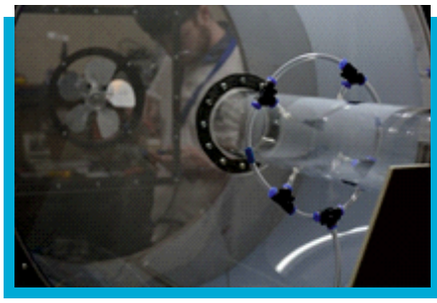
With fan exchange & compatibility in mind, Pole Star Products Limited has enlisted the help of (MEng) Mechanical Engineering students at The School of Engineering, University of Lincoln, to build a test facility (closely following the guidelines laid out by the AMCA.210 standards) capable of producing accurate performance data and detailed fan curves. Armed with this data, customers can be sure that the original fans will be replaced with units giving very similar airflow as specified by the original manufacturer.

Under the guidance of Dr. Jun Yao, a specialist in computational fluid dynamics and Dr. Rebecca Margetts, an expert in dynamics and vibration, the 4th year Masters students have developed a subsonic wind tunnel (test rig), which can meet the standards set by the AMCA.210 *(American National Standards Institute (ANSI) and the European ISO standards).*

Typical Airflow Chart



The open circuit axial-flow fan type test “Rig” is constructed from clear Perspex with Pitot rings mounted in 3 locations around the “Rig” to monitor the pressure distributions.



Pitot Ring Pressure Point (3)

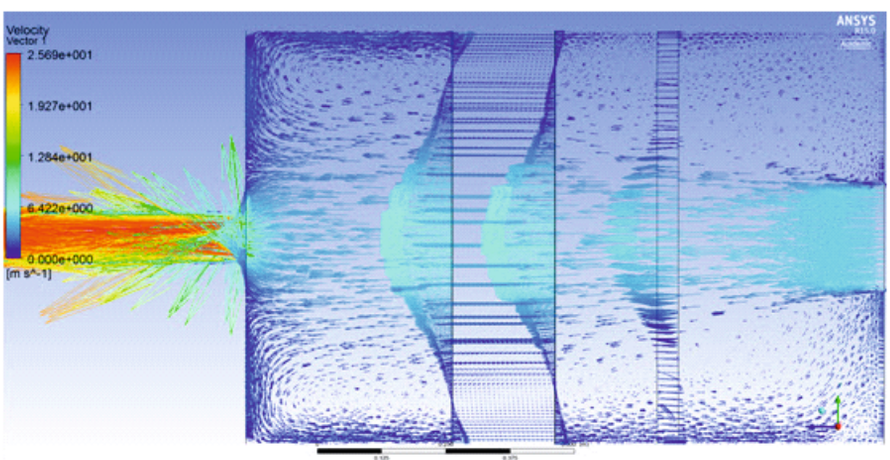
Air settling means are installed inside the main chamber and an air damper fitted to the outlet to adjust internal pressure.

Using a transparent material in the design enables the students to introduce “Smoke” which will give the students the chance to visually study airflow movement.

Airflow Settling Means

Installed fans will also be monitored for electrical performance to give accurate power consumption. We are able to test at any voltage and any frequency.

Computational Fluid Dynamics (CFD) is then employed to quantify detailed flow structures for the wind tunnel system and performance assessment.



Conclusively, the new facility will give Pole Star Products the ability to thoroughly test new products (specifically EC fans) ensuring that they meet the specifications of the original cabinet manufacturers.