PAX Scientific, Inc.

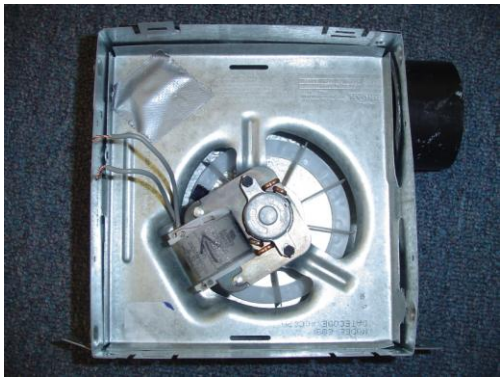
Fan Case Studies

Project: PAX vs. Industry Leading Bathroom Fan

Situation: Moisture in the home can lead to a number of unhealthy household problems ranging from mold and mildew to wood rot and ruined insulation. To avoid these problems, adequate ventilation is essential - and federally mandated. Ventilation products are available to exhaust this moist air out of the home and prevent unhealthy conditions.

Problem: In the domestic exhaust fan industry, manufacturers are interested in reducing costs and developing quiet, efficient ventilation products.

Solution: At the request of the client, PAX technology was employed to improve the energy efficiency, decrease the noise, and reduce the cost of a popular economy bathroom fan with annual sales of 1.5 million units per year. PAX streamlining geometries were employed to develop a new fan blade and housing that resulted in a 20% decrease in sound and a 50% decrease in energy consumption while maintaining the same airflow. This substantial decrease in energy consumption will, in turn, allow the manufacturer to reduce the cost of the motor. The fan housing geometry also allows for a simpler manufacturing process, thereby reducing the cost of the entire product.



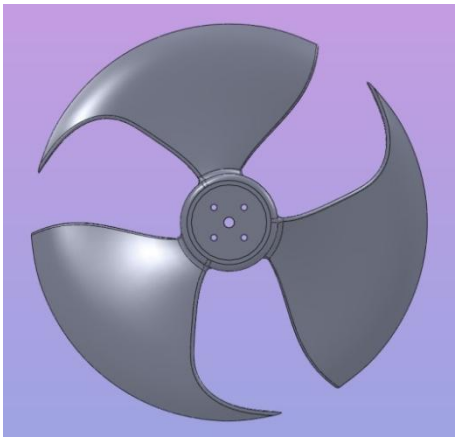
Project: PAX vs. Leading Commercial Refrigeration Condenser Fan

Situation: With energy costs rising, the commercial refrigeration market is competitive in its need for both low capital cost and high operating efficiency for warehouse, supermarket, and vending machine installations.

Problem: Shoppers and employees are increasingly sensitive to noise levels.

Solution: At the request of the client, PAX technology was used to reduce the noise of the condenser fan in a commercial refrigeration unit while maintaining airflow. PAX streamlining geometries were employed to develop a new fan blade that reduced noise by eight decibels and power use by 45% while maintaining the same airflow as the original fan.

VF16 Unit (120V)					
Fan	Airflow	True Power	Speed	Current	A-Weighted SPL
	[CFM]	[W]	[RPM]	[A]	[dB]
Original	245	22.3	1798	0.282	55.6
PAX WB1I	234	12.3	1798	0.178	48.4

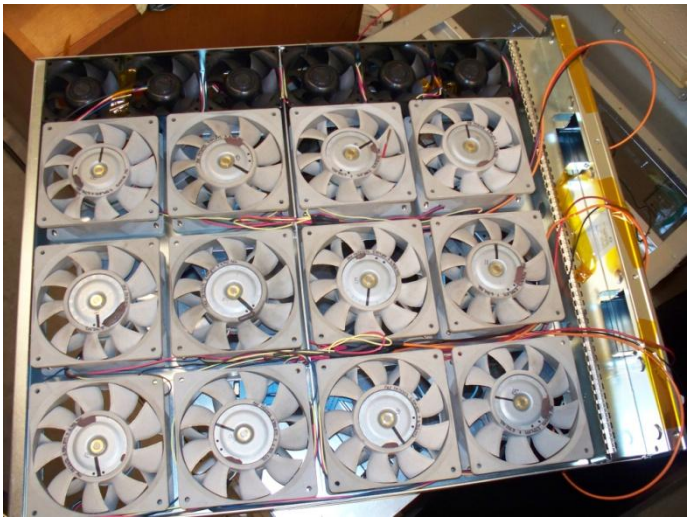


Project: PAX vs. Leading Computer Server Fan

Situation: A large increase in the number of computer server units is needed to feed the information appliances network, which will total in the hundreds of millions. It is estimated that more than one billion devices will need information from computer servers by 2016. These servers will be relied upon to connect information/web appliances and to synchronize information sharing between multiple devices, coordinate data storage, data transfers and other functions.

Problem: Servers contain from two to two dozen axial fans, which are run at increasingly high speeds and pressures to increase cooling air flow; this results in increased noise and greater energy use.

Solution: PAX developed a 120mmx38mm fan which provided equal cooling when installed in a server chassis, while dropping energy use by 46% compared to the competitor fan. The PAX fan also dropped sound by three decibels.



Project: PAX vs. Leading Domestic Refrigerator Fan

Situation: To maintain competitiveness in the home appliance market, manufacturers are developing products which qualify for an ENERGY STAR rating. The EPA-awarded ENERGY STAR label recognizes that a product is energy efficient, and has become a powerful marketing platform for reducing consumer costs while improving the environment.

Problem: In the home refrigerator market, a number of components contribute to the energy use and efficiency of the appliance.

Solution: At the request of the client, a leading motor manufacturer, PAX technology was used to improve the energy efficiency of the evaporator fan in a well-known home refrigerator. PAX streamlining geometries were employed to develop a new fan blade that increased fan efficiency by 33% while maintaining the same airflow as the original fan. The introduction of PAX technology enabled a substantial energy savings in the evaporator unit, which in turn allowed the manufacturer greater flexibility in design options and cost savings throughout the entire refrigerator. The net reduced power consumption should enable the refrigerator manufacturer to improve its ENERGY STAR rating.

Project: PAX vs. Leading Air Conditioner Fan

Situation: Over 40% of existing US homes have central air conditioning. In addition to this, 77% of new homes are now being equipped with air conditioning units as well. In the U.S. the majority of such systems are air conditioning/furnace split systems. The air conditioning portion of this type of unit sits outside of a home and consists of an exhaust fan that pulls outside air across a large heat exchanger and a compressor, while the furnace is usually located within the home.

Problem: Although much of the power usage and noise attributed to an air conditioning split system is accredited to the compressor itself, a significant portion of the noise is contributed by the exhaust fan. Improvements in the design of the exhaust fan can have larger improvement implications for the heat exchange capability of the air conditioning unit.

Solution: At the request of two companies, a leader in motor manufacturing, and a leader in heat exchange technology, PAX technology was employed able to make considerable improvements over an existing air conditioning exhaust fan.

There were two possible solutions that resulted from the use of PAX geometries. The first enabled the client to drop the torque required to run the fan by more than 35% while matching the output of the original fan. This reduction in torque results in a 25% reduction in power in the air conditioning unit and a 3dBa drop in fan/motor sound power level. This large drop in energy used could be further increased by using a smaller cheaper motor and could also be utilized to reach a higher SEER (energy efficiency) rating.

The second solution increased the output by 18% over the original fan, decrease the fan/motor sound power level 4dBa, all while matching the power usage of the original fan. This 18% increase in output could be used to save cost and decrease overall unit size by allowing a substantial reduction in heat exchanger area, or could be used to further reduce cost, power, and noise by allowing for the integration of a smaller compressor.