

Recent Innovations

in Axial Air Movers

Active cooling of electronics typically implies the use of fans to move air to cool electronic components, chipsets or racks. Active heat sinks include an integral fan that blows air across the sink fins for more effective cooling performance.

The most common fan type is the axial design. The axial flow fans have blades that force air to move parallel to the shaft about which the blades rotate. Axial fans blow air along the axis of the fan, linearly, hence their name. Their design provides relatively high flow rates and low pressures. Axial fans do offer the greatest variety of sizes and airflow performance, and are used extensively, from CPUs to power supplies, boards to racks, telecom to office automation.

While popular, providers of axial fans continue to innovate for improved performance, lower cost and special needs.



Figure 1: Axial Fans Draw in and Exit the Air in the Same Axial Direction. [1]

EC Axial Fans Provide Extra Efficiency

Rosenberg USA [2] recently introduced two new models of electronically commutated (EC) axial fans. Rosenberg's EC axial range now includes 500 mm (20 inch) and 560 mm (22 inch) fans that deliver maximum efficiency for specialized applications, such as data center cooling. Other EC fans are available up to 1000 mm (40 inches).

Commutation is the application of current to motor phases for production of optimum motor torque. Electronically commutated motors consume only as much as half of the power consumed by conventional AC motors. Some of the latest electronically commutated motors are about 80% efficient, compared to the 45% efficiency of certain AC motors.



Figure 2: New Axial Fan Blades Custom Pitched to Increase Efficiency. [2]

The new fans feature finned blades with a special pitch that increases fan efficiency. The 500 mm model can deliver up to 6,000 CFM of airflow. The 560 mm model offers a top airflow of 7,000 CFM. The finned blade design also helps reduce fan noise. Similar size and performing fans are also available from EBM Papst in their HyBlade series.

More Efficient Performers



Figure 3: The Newly Designed TurboFan Series Offers a Highly Efficient Motor for Next Generation High End Server Applications. [3]

NMB Technologies Corporation [3] recently released their new DC axial TurboFan Series. These new cooling fans are specially designed for applications where performance and efficiency is required. The new TurboFan Series is available in frame sizes of 40 x 28 mm, 40 x 48 mm (max. airflow: 29.3 CFM, max. static pressure: 670 Pa), 40 x 56 mm (max. airflow: 30.0 CFM, max. static pressure: 885 Pa) and 80 X 56 mm (max. airflow: 138 CFM, max. static pressure: 905 Pa).

The TurboFans have been designed with an integral stationary blade for increased pressure and efficiency, and a single high speed impeller and casing design for aerodynamics optimization. High magnetic flow density is achieved with a neodymium magnetic material design and a high

speed bearing lubricant developed by NMB, which increases the life and reliability of the ball bearings.

Standard features for the TurboFan Series include speed control via PWM (pulse width modulation), open collector tach output, dual NMB ball bearings, auto restart, and reverse polarity protection, among others.

Axial Fans for Harsh Environments

Cooltron [4] has introduced a line of DC waterproof fans with the ingress protection (IP) rating, designed to protect against a wide variety of dust, moisture and direct water exposure. Most of Cooltron's dual ball bearing fans are able to apply an extra coating for water protection with three IP rating options: IP55 (protection against water jet), IP44 (protection against splashes), IP43 (protection against water shower at temperatures up to 50°C). These fans have passed the test of salt spray erosion (GR487), indicating the high standard of Cooltron fan quality.

These new fans will be ideal for all applications whereby harsh environmental conditions prevail, including certain HVAC equipment, outdoor security cameras, telecom instruments, control equipment, emergency vehicles, field and ground support equipment, medical and wind power devices and remote antenna installation.



Figure 4: Axial DC Fans Specially Designed to Protect Against Dust, Moisture and Direct Water Exposure. [4]

The series are in 80 x 80 x 38 mm, 120 x 120 x 38 mm, and 172 x 150 x 51 mm frame sizes, all of which are available in 12V, 24V, and 48V versions. Speed options from 2000 to 10,200 RPM provide airflow capacity varying from 42.10 to 321.70 CFM, ensuring that the fan most suited to the application can be selected.

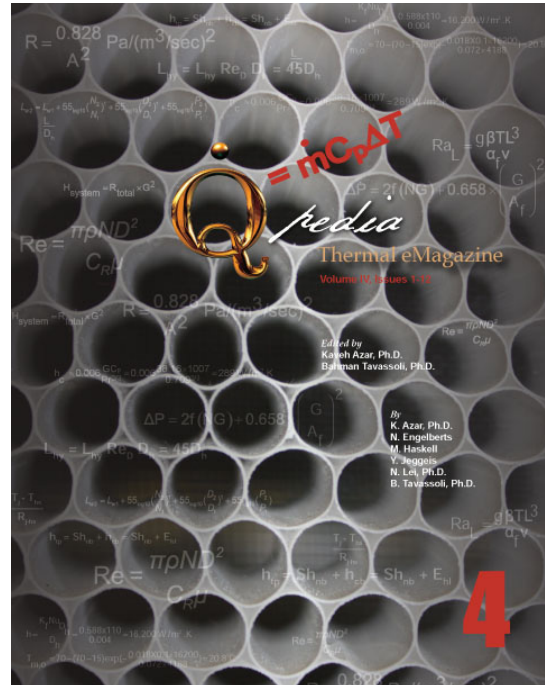
Summary

Because air cooling remains the most cost-effective thermal management approach, fans continue to play a major role within today's cooling solutions. Therefore, innovations and performance enhancements in fan design are continuous pursuits.

At the basic level when considering an axial fan, for most applications the main concerns should be noise, air flow (CFM), static pressure, physical size, bearing type, motor type, motor protection and life expectancy. There are models of axial fans that will meet particular needs in any of these areas. A thorough supplier search or discussion with a thermal management expert will usually result in the choice of a better suited axial fan.

References:

1. Omron (Ia.omron.com)
2. Rosenberg, USA (Rosenbergusa.com)
3. EMB Papst (Ebmpapst.com)
4. Cooltron (Cooltron.com)



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