

## Fans Aren't Just for Cooling Anymore

By Bob Knight, President, Knight Electronics/Orion Fans

Fans have traditionally been used for cooling through increased or improved airflow. However in today's demanding applications, fans are being considered for things beyond just cooling. While selling a fan to cool such things as industrial controls, server farms, telecommunications and networking equipment, motor drives and cabinets, and electronic enclosures, to name a few, may seem simple, staying competitive and delivering exactly what customers need in a myriad of applications requires fan manufacturers to do much more.

While some may claim that fans are too noisy, too large or not a suitable solution for some applications, low noise fans, fans as small as 1" x 0.39", and even fans used to cool aquariums are just a few of the solutions available today. Beyond cooling, the fan component or fan tray are capable of providing intelligent control and feedback options that maximize energy conservation and improve performance; reducing bill of materials and streamlining supply chain costs; and simplifying logistics issues.

### **Maximizing Energy Conservation and Performance**

Manufacturers of enclosures and electrical/electronic control cabinets are challenged by increasing demands to reduce enclosure size and reduce energy consumption, while also somehow managing the thermal management issues within the enclosure. As such, the functionality of fans has increased dramatically, to the point where product manufacturers are now utilizing fans with "smart" controls. Such controls include tachometer output, locked rotor alarm, pulse width modulation (PWM) input, and thermal and constant speed controls. These special functions provide end users with intelligent control options and feedback that increase functionality and optimize fan performance, while also maximizing energy conservation. With controls like these, manufacturers are able to better monitor airflow and operating temperature, ensuring the fans are operating properly and at optimal conditions.

Tachometer output, for example, provides design engineers with an accurate means of monitoring and reporting a fan's rotational speed, as well as indicating if the fan's speed falls below a certain RPM. This can be used as a lower cost alarm or indicator by monitoring the fan speed to determine relative temperature. Typically, the tachometer output option is available as either a 5V TTL signal, or as an "open collector" signal.

Fans and fan trays equipped with locked-rotor alarms indicate whether a fan has stopped operating by transmitting a high or low output signal, minimizing fan downtime and averting an overheating situation. PWM input varies the width of the electrical pulse in order to control the average voltage delivered to the fan, allowing for a higher efficiency than linear control provides. A PWM option also allows users to digitally control the speed of the fan through an existing bus system or PLC.

Fans or fan trays with thermal speed control employ a thermistor-controlled circuit that increases fan speed only when the temperature rises above a determined set point. This

“green” option reduces overall energy consumption by lowering fan speed when temperatures within the enclosure are below the set point, thus only cooling what needs to be cooled. In server farms, for example, a thermistor-controlled fan will only turn on or rev up if the temperature warrants it, conserving energy and preventing the fan from continually operating.



*Image: Cooling devices such as the DC fan shown above employ smart controls for optimal performance and maximum energy conservation.*

Thermistor control circuits can be mounted directly in the fan hub or remotely mounted via a lead wire, and can be positioned anywhere, giving design engineers the flexibility to regulate fan speed based on ambient temperature in a specific area. Finally, the constant speed function senses variable input voltage, which causes variations in power output and maintains the fan’s constant speed regardless of input voltage fluctuations.

### **Simplifying Bill of Materials and Streamlining Supply Chain**

In addition to increased functionality, other methods of cooling may not be capable of simplifying BOM (bill of materials) as easily as fans. For example, a simple fan assembly typically includes a prescribed length of wires, insulation, metal, and connector. By providing an assembly of daisy-chaining several fans together, the MRP process is simplified, eliminating multiple part numbers from the BOM, as well as reducing labor for each device. By the same token, dual voltage cooling fans simplify BOMs and procurement and inventory challenges allowing manufacturers to stock one fan part number, and one fan carton and label, regardless of the location for intended use.



*Image: Daisy-chained dual voltage fans contribute to simplified bill of materials through worldwide compatibility*

Along with standard fans, fully assembled and tested fan trays provide manufacturers with additional benefits by lowering supply chain costs, reducing lead times on materials,

reducing the number of SKUs, reducing parts inventory, improving quality and lowering overall production costs. Not only does the tray provide a complete solution, it reduces multiple part numbers and stocked inventory of cooling parts down to one.

In addition to a reduced number of parts, supply chain logistics can be further streamlined via drop shipping. While many component manufacturers have a “no drop ship” policy, in actuality, working with a distributor and OEM can help reduce the OEMs carrying inventory if the fan supplier is willing to drop ship for JIT requirements. By drop shipping and getting the fan directly from the manufacturer, the complete assembly, including any value added features, can be built in by the fan manufacturer for enhanced performance and a more streamlined process.

### **Reducing Logistics Costs**

The majority of AC and DC fans, like many component products, are being manufactured off shore. This is forcing companies to purchase product in larger quantities (container loads) in order to take advantage of lower per unit costs, thus resulting in additional inventory costs from bringing in a higher volume of products at once. Such logistical steps and procedures in addition to international currency exchange challenges, customs documentation and inspection, letter of credit procedures, and bank fees just to receive the shipment, can only be compounded if there is a quality issue with the shipment.

Partnering with a fan manufacturer who can a) provide value add functions, features or assemblies, and b) deliver FOB U.S. or any other point worldwide, removes all logistical burdens placed on the customer, and solves the challenges of direct offshore sourcing. In addition, procuring higher level fan trays or fan assemblies from a fan supplier will reduce the number of parts on the BOM, resulting in less inventory and reduced assembly cost.

Unlike other methods of cooling, fans are capable of enhanced controls, require less maintenance, and are more energy efficient, all while costing less. Engaging with a fan supplier just for the fan significantly limits design options, and leaves a considerable amount of money on the table.