

SELECTING COOLING FAN SOLUTIONS FOR KIOSKS IN ANY ENVIRONMENT



Interactive electronic kiosks offer a wide range of services and functionality that simplify our daily lives, from beverage self-service to ordering fast food, from vending snacks to purchasing tickets, from bank withdrawals to airport check-ins. Currently, they serve the banking, entertainment, food and hospitality, industrial and retail industries and increasingly are gaining popularity with consumers, because they streamline processes, offer faster turnaround, limit paper usage, improve efficiency, and enhance the overall user experience.



But while the customer-facing interaction appears simplified and seamless, the electronics powering these human-to-machine interfaces (HMI) are complex and sensitive, especially when subjected to harsh outdoor environments or indoor dust, grease, and airborne contaminants. Featuring CPUs, touchscreens, LCDs, power supplies, motors and more, kiosk electronics often are tasked with operating in ambient temperatures that can reach as low as -10°C to as high as +40°C with heat loads up to 200W.

The more sophisticated a kiosk's functionality, the greater the demand on system uptime and the components' performance. The increasing need for IoT capability, high-speed connectivity, and high computing power demands more from kiosk electronic systems than ever before.

Further, the addition of advanced HMI features like touchscreen displays requires additional power consumption, generates more heat, poses additional airflow challenges, and demands a bigger footprint to incorporate a cooling solution. The expectation that most kiosks be "always on" results in a constant heat load that could reach extreme internal temperatures depending on the environment; if not moderated, such conditions could slow or obstruct performance when they exceed the operating limits of the internal electronics.

To ensure proper performance and longer lifespan while reducing maintenance and operating costs, equipment designers pay particular attention to the enclosures' internal temperature regulation, achieved through a variety of cooling technologies.

OUTDOOR KIOSKS

Outdoor kiosks can be subjected to harsh environmental conditions that may affect the performance of sensitive electronics. From extreme temperatures and humidity to dust and dirt, as well as exposure to rough treatment by animals and humans, the electronics inside interactive kiosks must be rugged in design. Additionally, they must be equipped to maintain internal temperatures regardless of the weather: Imagine a Milky Way bar purchased from a vending machine at a rest stop in mid-July in Florida. The expectation is a cool, intact bite of chocolate, not a melted, spoiled mess. That's achieved by maintaining a specified temperature within the enclosure, come August or January, no matter what the weather outside.



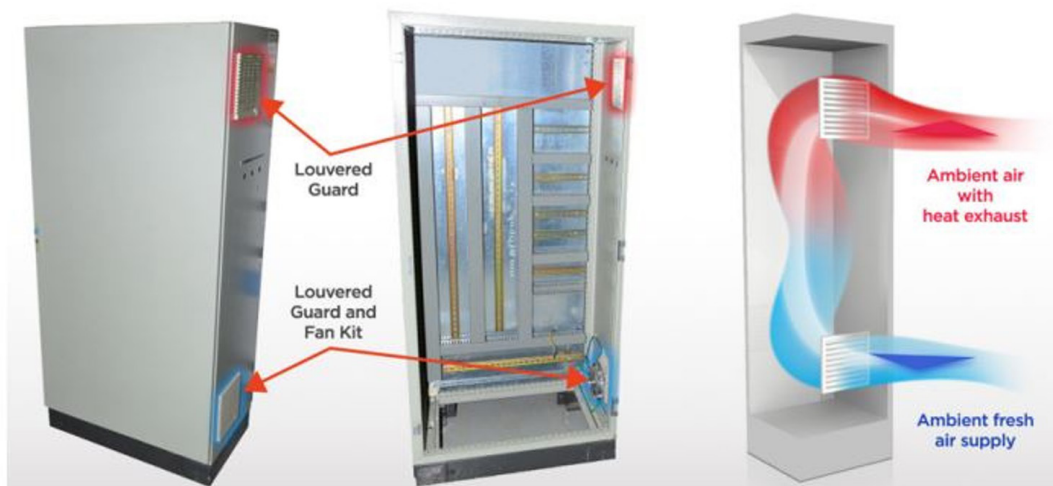
Kiosks utilize a variety of technologies to make this possible. Heat sinks and thermoelectric assemblies can address high temperatures and humidity while keeping electronics cool, but they can introduce additional space and mounting challenges. But even when these components are used as part of the thermal management solution, fans are vital in both types of cooling systems, as they continuously move air around the enclosure and move heat away from electronics and out through external vents.

It's essential to choose a fan that combines rugged operation with high air flow and low noise to ensure the long-term operation of interactive, outdoor electronic kiosks. Depending on the location, additional guards and filtering may be required in order to minimize the amount of dust, pollen, and other airborne particles from entering the enclosure.

Cooling systems for outdoor kiosks must meet rigorous requirements to withstand environmental conditions. These may require fans with IP55, IP56, or IP68 ratings or higher, as well as humidity and salt spray testing. Seals, gaskets, connectors, and fans within the cooling system also must meet specified environmental ratings. Depending on the size and design of the kiosk, high-static pressure fans may also be considered to provide the necessary airflow in restricted enclosure space.

INDOOR KIOSKS & ENCLOSURES

For indoor kiosks, extreme temperatures are less of a risk, so ambient temperature rarely drops below its norm. Often, such kiosks maintain their temperature through convection ventilation, but if there is concern that the enclosure could become a bit overheated (think a beverage dispenser or a server) due to continuous use or heat generated by other equipment around it, a fan can be used to dissipate the heat away from the electronics and out a top vent of the kiosk.



While a fan can be an incredibly affordable method of cooling the indoor kiosk, the electronics' lifetime can be further preserved by employing specialty items like a louver-filtered fan kit with specialty filters designed to meet the unique needs of particular indoor environments (such as food preparation, manufacturing sites, and similar messy locales rife with particulates). By accessorizing a fan with a louvered fan guard, specialty filter, and metal guard, you can meet specified NEMA and IP ratings that will boost uptime, extend equipment lifetimes, and minimize field maintenance costs. Further, some fan manufacturers like Orion Fans offer specialty filters designed to guard against low pressure drop, water and condensation, fire, and airborne dust. These filters are cleanable and reusable, ensuring that electronics will continually perform to the specified airflow.

ENCLOSURES WITH TEMPERATURE RANGES

Using heat sinks in addition to fans may move heat away from sensitive electronics, but they can only cool to the ambient temperature. For kiosks where electronics and other components must be cooled below ambient (such as coffee machines that dispense milk with coffee), thermoelectric assemblies with fans are often employed. The most common type of thermoelectric assembly is an air-to-air configuration, in which fans are used to increase the air exchange between the hot and cold side to maximize heat transfer.

In a coffee dispenser, for example, you may use thermoelectric cooling technology to keep the milk portion cool; an AC or DC fan will circulate the cooler air at a specified temperature in the milk chamber. But other parts of the machine, moving hot water and brewing the coffee, will need to maintain a higher temperature. Thermoelectric coolers are a good choice if you are looking for longevity, but you will still need an AC, DC, or possibly an EC fan to circulate air within the kiosk or enclosure.

Thermoelectric assemblies can be used to control the temperature of the entire kiosk or just one compartment within the kiosk where sensitive electronics are located. However, proper ventilation is required to ensure the hot air is being removed from the ambient environment. High efficiency, lownoise fans are commonly specified for such indoor applications. EC fans are becoming a popular alternative to AC fans, however, as they can reduce the fan power consumption by up to 50% depending on the size of the fan. Temperature and fan speed controllers can also be implemented to turn fans on and off once the set temperature point is reached, lowering energy consumption and noise.

SELECTING THE RIGHT FAN FOR THE APPLICATION

Faced with the variety of kiosk applications, environments, functionality, and enclosure size and location, choosing the proper cooling fan may not depend entirely on price. An out-of-order kiosk is inconvenient, negatively impacts revenue, and normally results in a high maintenance and repair cost. Specifying the right fan and the accessories can contribute greatly to the overall system performance as well as maximize kiosk uptime.

Kiosk applications utilizing AC fans can utilize electronically commutated (EC) fans to significantly lower energy consumption and simultaneously increase fan RPM. EC fans can offer power savings up to 50%, enabling manufacturers to meet energy-consumption requirements from agencies like ENERGY STAR. The AC input fans utilize a brushless DC motor and incorporate voltage transformation within the motor that delivers the significant power savings. Orion Fans, for example, offers EC fans from 60mm to 254mm that are direct drop-in replacements for corresponding AC fans. These EC fans also are available with additional IP68 and IP68-ATEX ratings for applications requiring those levels of protection.



Selecting a DC fan, however, provides a unique set of advantages including lower noise, additional functionality like thermistor control, locked rotor control, PWM and tachometer speed control to monitor fan performance to ensure system optimization. DC fans designed for highstatic pressure can provide increased airflow for heat removal in tightly packed spaces.

Harsh environment fans for kiosk or enclosure cooling can include IP55-69K ratings, salt-fog and IP55 ratings, all-metal fans, and louvered filter fan kits with reusable specialty filters for protection from particles and moisture.

CONCLUSION

Cooling kiosk electronics ensures peak performance and offers longer operating life with lower maintenance time and costs. This increases uptime of kiosks and lowers total cost of ownership. Fans— whether AC, DC, or EC— are an essential component to the cooling solution because they move heat quickly and efficiently away from temperature-sensitive equipment; indeed, fans play a crucial role, even when other cooling technology, like heat sinks and thermoelectric cooling, are deployed. Additionally, fans may also prevent water, dust, and wind-driven rain from entering the kiosk or enclosure.

While fans are available in a variety of package sizes and types, airflows, performance options, power designations, and other specifications, design engineers don't need to choose between shoe-horning in an off-the-shelf fan or designing and manufacturing their own. Orion Fans has the engineering expertise to specify parts and design a fan solution for your unique kiosk application that will save time and money.