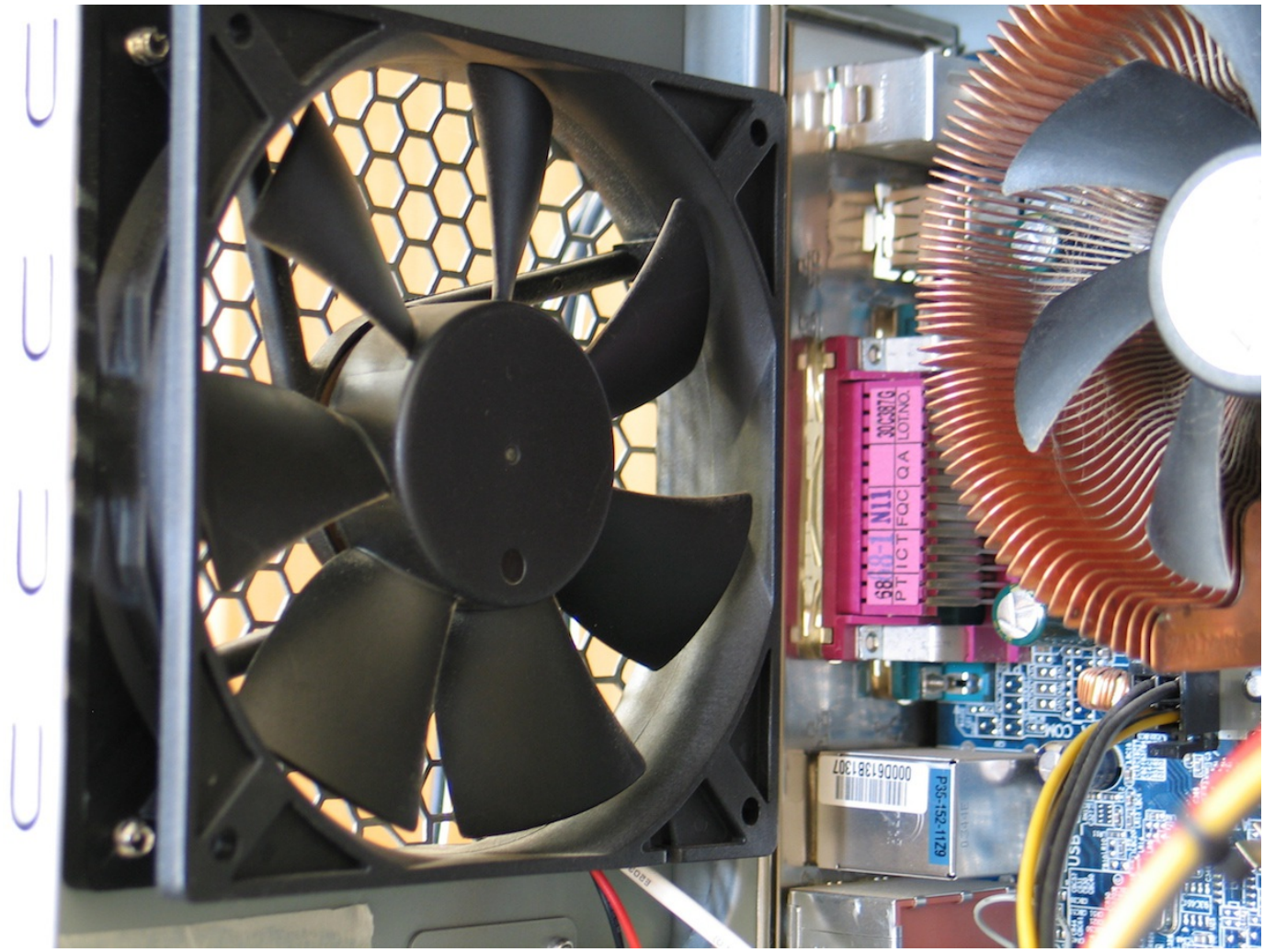

Why Enclosure Cooling Systems Fail and How to Prevent It: Part 1

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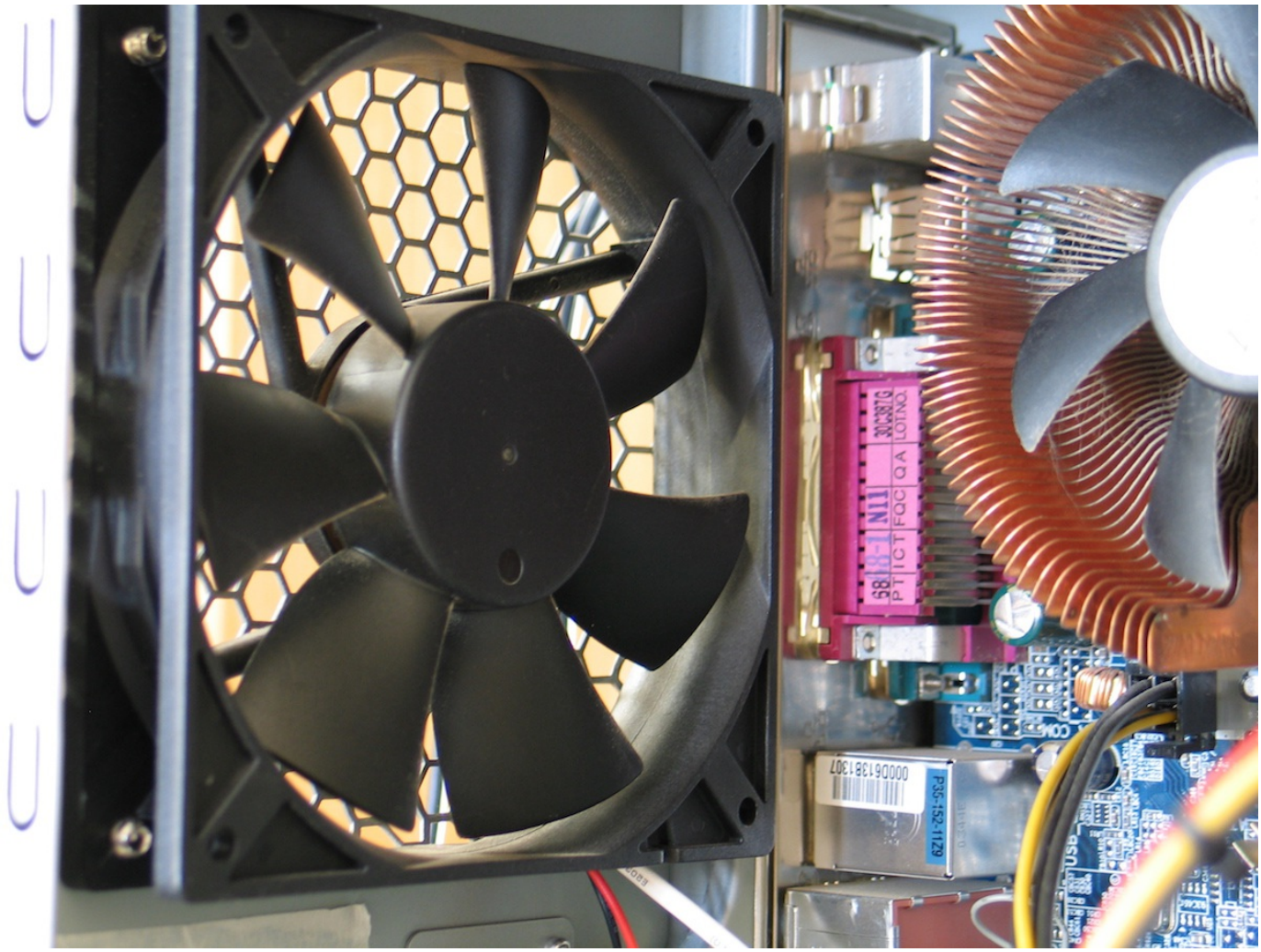
For designers of electrical and component enclosures, there's no element more important to the success of your device than its cooling mechanism. The primary method of controlling internal temperatures, cooling systems are relied heavily upon to ensure safe, effective operation through various external environments. But especially with cooling systems that incorporate moving parts (i.e. fans and other forced-air systems), the mechanical element of the device is often among the first parts of the enclosure to

fail.



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Enclosure fans can remove a tremendous amount of heat from a cabinet, but in order to achieve high performance and long-term reliability for end users, further, more robust cooling systems may be required.

How to Properly Assess Temperature and Heat Gain

Ambient temperature is one of the greatest variables to determining internal system temperatures within enclosures. Because enclosure fans operate by passing cooler air over the electrical components contained within, there must exist a temperature differential between the outside air and the air within the enclosure.

Measurement is simple and standard equipment thermometers will suffice, but if the intended environment for usage experiences seasonal changes in outside air temperature, it may be wise to record average temperatures year-round if the data is available. Knowing the degree to which external temperatures shift through the calendar year will help you determine the necessary size of the cooling fans required.

Air Volume and Resistance

Planning your enclosure's internal air volume and flow resistance during the design process alleviates several stages of revisions once the quality control process comes around. Understanding that equipment placement within an enclosure can restrict airflow and reduce cooling capabilities. Placing electrical components away from intake and outlet fans as well as designing for natural ventilation through air

convection and vertical air flow is an easy way to alleviate heat issues.

Furthermore, designing internal component placement around airflow resistance at the outset will provide a more even heat distribution throughout the enclosure and prevent hotspots from developing. This will also reduce stress on your cooling fans and improve their cooling efficiency over time.

We'll revisit and expand on this topic next week, but in the meantime, you can get started on your own enclosure design by downloading Front Panel Designer free today. Visit this page for more information on how to get started.

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