Giving dirt and heat no chance!

Rittal makes enclosure cooling systems virtually maintenance-free

By Tim Rourke, business development manager, Rittal Systems Ltd., Mississauga, ON

Heavy manufacturing environments like foundries, rolling mills or casting plants can be a brutal place to work. Hot, grimy, dusty. If it's hard for humans to function in 40C heat, it's even harder for sensitive electronics and process control systems.

These systems, the nerve centre of the modern factory, must be protected in sealed, temperature-controlled enclosures. Yet, they still have a degree of vulnerability when the powerful cooling units attached to these enclosures or operator control panels are not properly maintained.

The dust filters on these cooling units need regular attention, often weekly and sometimes more frequently. If not, a cooling unit's efficiency will be progressively reduced and the systems they are supposed to cool will overheat and crash, causing the shutdown of entire production lines. Rittal, a leading enclosure maker, has reduced that risk by making new nano-coated condensers standard on all of its TopTherm cooling units. Nano-coating the condensers eliminates dust buildup and reduces the need for regular maintenance.

A row of TS8 industrial cabinets with Rittal's TopTherm units used at the Audi plant.

Rittal works with leading industrial manufacturers around the world as their supplier of enclosure cabinets and enclosure cooling systems. In that capacity, it has seen just about every way a cabinet can be compromised by the ambient conditions in hot and dirty environments. Invariably, these problems begin when required maintenance – including frequent filter changes on the cooling units – isn't done often enough as required, or at all. Often companies leave it to the production workers on the floor to perform regular maintenance, including filter changes. For these workers, changing filters is a small part of their weekly duties, so it tends to be a task easily forgotten or performed on an irregular basis.

Heat is the number-one enemy of sensitive electronics and controls: It's a rule of thumb that every sustained 10K rise in temperature reduces the lifespan of semiconductors by 50%.

• Nano-coated condensers

After extensive field testing with some of its German automaker customers, Rittal is incorporating nano-coated condensers as a standard feature on its entire line of roof- and side-wall mounted TopTherm cooling units (available from 225 to 4,000W) sold worldwide. The ultra-thin coating seals the surface so there is no grip for contaminants like water, dirt and oil. TopTherm units with its proprietary RiNano coating require little or no maintenance.

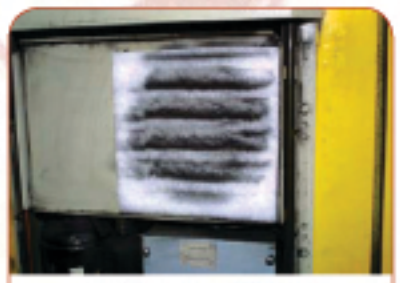
With nano-coating, the dust in the ambient air doesn't stick to the condensers and is exhausted from the cooling unit back into the workplace. In dry dust applications, there is no longer a need for filters, so there are none to change. Where oil-bearing contaminants are prevalent in the ambient air, metal filters are still used, but their service life is greatly extended by the RiNano coating of the condensers and maintenance intervals are much longer. (The RiNano-treated condensers don't clog up, but an oily/greasy residue can still build up on other parts if not for continued filtering, hence the need for occasional, if much less frequent intervention.)

• Passing the test at Audi

After initially field-testing RiNano cooling units at a major Volkswagen gear-box plant in Kassel, Germany, Rittal picked the disc brake manufacturing site of Audi in Ingolstadt, Germany, as the final proving ground for its RiNano coated TopTherm line. At the Audi plant, dozens of powerful 1500W TopTherm units are used to cool down a large number of Rittal TS8 industrial cabinets containing power supply components and process controls. At Ingolstadt, the TopTherm units ingest air laden with dust from metal casting processes. The cooling units operate nonstop, around the clock, and never go on standby. Summer temperatures in the plant reach as high as 40C.

The RiNano coated TopTherm units were put through a nine-month trial that ended in April 2006. They came through it with flying colors. "Given the dusty environment here, changing filters used to be a weekly chore for the production workers, while the RiNano units did not require any service during the entire test period," says Dietmar Vielwerth, maintenance manager at the Audi plant. By virtually eliminating cooler failures due to maintenance issues, Audi avoided another problem. "Among the most dangerous consequences of cooler failures is the necessity to open up an overheated enclosure and expose the electronics to the ambient air," says Audi/Ingolstadt process engineer Konrad Mayer. "The subsequent penetration of dust particles can compromise the system's reliability and create unpredictability and the threat of further failures in the near future."

• Cost savings



Filter mat used on Audi's conventional TopTherm cooling units – dirty after five days.

The field-test project concluded that it costs more than $5 per unit per week in new filters and labor to properly maintain TopTherm units that don't have RiNano coating. Multiply that by dozens or even hundreds of cooling units in a plant, and significant savings are achieved over time, without even accounting for savings realized by avoiding production downtime and repairs that occur when enclosures overheat. The RiNano-coated units deliver consistent cooling performance with much longer intervals between routine maintenance. When the units are cleaned, there is much less labor involved.

The benefits of Rittal's new RiNano-coated TopTherm cooling units are not exclusively for industrial cabinets. They also help extend the performance and durability of smaller control panels. Another German automaker, also a Rittal customer, operates a casting plant where temperatures routinely reach as high as 50C in the summer. At this plant, Rittal's VIP control panels with touch screens on the plant floor used to be equipped with conventional TopTherm cooling units. According to the maintenance protocols, these units needed a filter replacement every other day – a routine that frequently was skipped. With such high temperatures, employees are pretty much focused on two things: doing their primary manufacturing task and getting the heck out of there at quitting time to replenish their fluids.

Since the cooling unit filters weren't changed as often as needed, the filters would clog up on a regular basis and the cooling efficiency would plunge, causing the demise of multiple PCs enclosed in the VIP panel. After installing the new RiNano-coated units, the problem was solved – the heat sensitive PCs at this particular plant enjoyed much longer service lives.

"You can urge all you want, but you can't guarantee employees will perform routine maintenance on secondary systems like enclosure cooling units, so the best thing is to eliminate the need for maintenance in the first place, which is what we're doing using a new application of nano-technology," says Oliver Obermeier, president for Mississauga-based Rittal Systems Ltd.

Nanotechnology, derived from the Greek word nano, or dwarf, is a term covering a broad variety of material analysis and processing technologies that all work in dimensions below 100 nanometres. A nanometer is one millionth of a metre — 50,000 times smaller than the diameter of a human hair. There are significant potential applications – from greater storage to ultra-efficient wastewater treatment filters to artificial joints whose organic nanosurfaces are less prone to rejection by the host body. In treating industrial surfaces, special nanocoatings act like the leaf of the lotus plant. Water pools and rolls off the leaf because it actually sits on tiny papillae extending from the surface. "The water never touches the leaf," emphasizes Obermeier.

• No more dripping

New integrated condensate evaporation system for TopTherm cooling unit.

Another important issue with cooling units operating under extremely hot working conditions is that external condensate collectors often overflow. "Allow a little water to drip on a grimy factory floor and you create an opportunity for employees to slip and injure themselves badly," says Obermeier. "North American automakers won't even accept cooling systems with condensate management systems that can overflow."

Again, Rittal solved this issue by eliminating it. By installing integrated and heated condensate evaporators inside the TopTherm cooling units, there is no chance of water escaping.

"In essence, this automatic condensate evaporation concept is another way to make the units work more harmoniously with their challenging environment by isolating them from it as much as possible," adds Obermeier. "We're happy to make this new feature also standard on all our TopTherm units this fall."

For more information on industrial cabinets from Rittal Systems Ltd., Circle 245 or http://ept.ims.ca/9940-245.

Epoxy adhesive cures ultra-fast

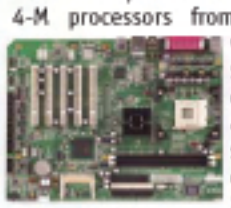
EP65HT-1 temperature resistant epoxy adhesive sets up in 3-5 minutes at room temperature with full cure to exceptionally high shear strength (approaching 3,000psi) normally occurring within a few hours. It meets NASA outgassing specifications and bonds well to a wide variety of substrates, including metals, glass, ceramics, woods, vulcanized rubbers and most plastics. Service operating temperature range is -60 to +400F. Product is supplied in pint, quart, gallon and five gallon kits.

MASTER BOND

Circle 246 or http://ept.ims.ca/9940-246

Industrial ATX motherboard furnishes rich connectivity

AIMB-740-6CB1 industrial ATX motherboard based on Intel 845GV chipset with HT (hyper-threading) technology supports Pentium 4/Celeron D/Mobile Pentium 4-M processors from 2.6 to 3.06GHz with L2 cache to 512K, wide memory bandwidth on 400/533MHz front side bus and memory up to 2GB DDR 266/333 SDRAM. It provides six serial ports, six USB connections, five PCI slots, VGA graphics controller, programmable 8-bit GPIO headers, Ethernet port and space for optional Type I/II Compact Flash socket.



ADVANTECH

Circle 247 or http://ept.ims.ca/9940-247

Digital microhmmeter stores, uploads data

DO7010 portable digital microhmmeter for low resistance and bond resistance measurement covers range from 600microhm to 60ohm with 0.1 to 10ohm resolution and switchable current levels of 1 or 10A on all but highest range. Four-terminal measurement eliminates lead resistance errors. LCD panel displays configuration information. Data logging function downloads test sequences from a spreadsheet and uploads test results from 1000 reading memory. Options include remote terminal that controls unit at 15m distance.

CROPICO

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