ALLIED CONTROL
IMMERSION COOLING

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Immersion-2 Rack Platform for 3M™ Novec™ Engineered Fluid brings Ultra High Density to HPC Supercomputing and Cuts Cooling Energy by 95%

Open system design allows unprecedented power densities of over 150kW per rack, speeds up deployment time by eliminating cooling parts, and cuts more than 95% of cooling electricity.

HONG KONG – November 18, 2013 – Allied Control, a professional consulting and engineering company specializing in two-phase immersion cooling, just completed its first large-scale installation of their Immersion-2 Rack Platform for 3M™ Novec™ Engineered Fluids. The firm is offering their design and consulting services to clients worldwide. Allied Control claims the open technology is truly universal and works with any hardware, including CPU based systems such as servers or blades, NVIDIA Tesla® GPUs, or Intel® Xeon Phi™ coprocessor clusters.

The first installation, a 500kW system in a high-rise building in hot and humid Hong Kong, was built in less than 6 months and runs on a PUE of <1.02 with no strings attached. The cluster fits into the size of a standard shipping container. With theoretical rack densities in the hundreds of kilowatts, the major benefits are energy savings, increased density and the elimination of all cooling parts such as fans, heatsinks or cold plates. System designers can finally stop worrying about getting the heat out.

By relying on Allied Control's expertise, organizations can avoid vendor lock-in and build a truly open system that can be reused for many hardware generations to come. "Our enclosures are essentially tanks with dielectric liquid from 3M™. In contrast to mineral oil, we don't need to keep heatsinks or large spaces between the heat generating components, only little fluid is required and we can pack more hardware in smaller spaces. ", said Kar-Wing Lau, vice president of operations at Allied Control. "What makes our systems work is the passive two-phase immersion cooling cycle."

The company places hardware in an open bath and surrounds it with a liquid that has a very low boiling point, such as 3M's Novec™ 7000 that boils at 34°C (93°F). The liquid then starts to boil on heat generating components and takes the heat away. When it rises and condenses on the lid, it falls back into the tank passively without the use of any pumps, and the cycle continues. "Systems are designed to avoid fluid losses. Novec is environmentally sustainable, non-toxic and non-flammable. They are odorless and not oily (hardware comes out dry), and we are looking at a shelf life of 30 years", Lau continued.

"It is this simplicity that makes passive-two-phase immersion cooling such an elegant solution for supercomputer deployments. While being one of the most efficient methods for heat transfer not only in computers, the system really shines if it is combined with high density hardware with a short lifespan, were deployment time and costs are big factors. Chips will be happy too, with junction temperatures usually much lower than with air, water or oil cooling."

The only requirement for passive two-phase immersion cooling is access to facility water. There is no need for traditional data center equipment such as air handlers, CRACs, chillers or raised floors. By using fluids with higher boiling points or employing free cooling, it is possible to reduce cooling energy even further, while still keeping core temperatures below manufacturer recommendations or traditional cooling.

While passive two-phase immersion cooling cuts down on facility and cooling hardware overhead, it also presents a unique opportunity for other industries to solve completely new challenges, such as high density power distribution at the facility and also at the hardware level.

“Immersion cooling designs are a bit like reusable barebone systems - assembled only once and then put to work exactly the way the customer sees fit, over a span of many hardware generations”, explained Lau. “We are also strong believers in modular data center infrastructure. Building an immersion cooling system into a container will prove to be an extremely worthwhile investment, further reducing capital expenditure while actually providing more benefits to the user. It can move where it is needed most, without wasting money or time on building fixed infrastructure. Best of all, there is no need for access to facility water, it’s all built into the container. “

Allied Control will be hosted at 3M’s booth #3728 at SC13 in Denver.

About Allied Control
Allied Control is a consulting and engineering company that made open bath immersion cooling its top priority. The company is looking for partnerships and clients worldwide. Allied Control is official 3M Technology Partner and offers services such as modular enclosure and facility design, remote or on-site project management, training, material and feasibility studies and access to in-house development and test platforms. Allied Control is a privately held company staffed by an international team with its headquarters in Hong Kong.
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