

Case | Asperitas

Asperitas and Grundfos advance immersion cooling efficiency and reliability

Asperitas partnered with Grundfos to co-develop its immersion cooling system for data centers and edge environments. What started as a desire for more robust pump seals grew into a greater development with Grundfos E-pumps, sensors and advanced control, bringing better efficiency, reliability and uptime. Read the story and see the film.

Oil-based dielectric fluid circulates around fully immersed IT servers in an Asperitas immersion cooling tank. Liquids can transfer heat more efficiently than air, helping to address the challenges of air-cooling systems as computing densities increase.

GRUNDFOS 

Possibility in every drop

The situation

Asperitas was one of the first companies in the world to introduce immersion cooling to data centers – an application in which IT servers are completely immersed and operating in a liquid.

The company, founded in 2014 in Amsterdam, the Netherlands, wanted to optimize its liquid cooling solutions for the growing demands of high-density computing.

Immersion cooling uses a dielectric cooling fluid, an electrically non-conductive liquid that can come into direct contact with electronic components. The fluid absorbs heat from the immersed IT equipment and transfers it through the cooling system to the facility water loop. Liquids can transfer heat more efficiently than air, helping to address the challenges of air-cooling systems, especially as computing densities increase.

Material compatibility is an important consideration when using dielectric cooling fluids, explains Stephan de Vries, Head of Production at Asperitas. Certain fluids can interact with seal



Luke Gardener (left), Grundfos Sales Manager OEM, with Grundfos Benelux Sales Engineer Wesley Nieraeth (centre) in discussion with Asperitas CEO Rutger de Haij.

materials such as EPDM, causing them to absorb fluid, increase in volume and lose elasticity. This can compromise the integrity of the seal, while the interaction may also affect the properties of the dielectric fluid and potentially put the immersed IT equipment at risk.

“Our main challenge was that some seals were not compatible with our fluid, so we needed a different sealing material,” says Stephan de Vries. “For example, EPDM seals expand – which means basically that they come out of the pump.”

In addition, he says, Asperitas sought a pumping solution that could provide maximum operational reliability, reduce system complexity and deliver deeper insight into system performance. “So, with Grundfos, who were initially talking to us

about what is possible, we got excited in like, ‘Hey, let’s do this development together.’”

Beyond testing alternative elastomer seals, Asperitas worked closely with Grundfos to integrate intelligent E-pumps into its immersion cooling system.



Reflections of a conversation above a cooling tank with Asperitas's Stephan de Vries and Grundfos's Wesley Nieraeth

The solution

“Through the product development process, we partnered with Grundfos from the very beginning,” says Andy Young, Chief Technology Officer at Asperitas. “And while we were aware that there’s a wide range of pumps from Grundfos, what we weren’t that aware of was the extent to which they embed control into the products.”

Control is vital for core data centres, he says. “Because for them it’s all about energy efficiency and reliability, as well as preventative maintenance. And how we got to know about that was through the conversations that we were having with Grundfos engineers throughout our development cycles. And what was also a distinguishing factor was the amount of support

that we got and the level of interaction that we received.”

The Asperitas-Grundfos co-development simplified the hydronic system by utilizing the E-pumps’ full functionality – and even adding new features to the pumps, says Stephan de Vries. “Grundfos designed a sensor that can actually fit inside the pump

with our requirements, because we had a tight space.”

Additionally, the pumps also provided operational data like flow estimation, pressure and temperature measurements throughout the cooling circuit.

“The data that Grundfos pumps can provide allow us to find the

optimum point for running our systems to be as efficient as possible,” says Asperitas CEO Rutger de Haij. “Another thing is reliability. We can detect anomalies that will allow us to act before something goes wrong. And that will also help the customer in terms of precious computing uptime.”



Phillip Hjelmeborn Kaae, Lead Application Manager for Grundfos (left) and Robert Guilford validate flow estimation algorithm. The enhancement compensates for differences in fluid properties between water and dielectric fluids, ensuring accurate flow estimation across cooling applications.

In the Grundfos labs

The co-development resulted in features for the Asperitas system that had not yet been imagined at the beginning of the cooperation.

“Over like several iterations, we found solutions together,” says Phillip Hjelmeborn Kaae, Lead Application Manager for Grundfos. One of those new features will allow operators to install the system without external flow meters. “By measuring the differential pressure across the pump and utilizing the pump's

performance curve, the E-pumps can accurately estimate flow, eliminating the need for costly external flow meters.”

In addition, he adds, “We want to make sure that our pumps are reliable in dielectric thermal fluid used for immersion cooling. So, Asperitas has been supplying samples of the fluids, and we’re testing our pumps and elastomers in the fluid in our very extensive laboratory facilities.”



Anders Pelle Mørup, Senior Materials Engineer in Grundfos, tests elastomer materials used in pump seals with dielectric fluids in the Asperitas co-development.



Jonas Svaneborg Kildedal, Lead Product Specialist in Grundfos, registers data in the differential pressure tests.

The outcome

The collaboration delivered more than a solution to seal compatibility. By making fuller use of the pumps' integrated features, Asperitas gained a more integrated pumping setup, greater operational insight and ongoing technical support to optimise system performance.

“Because immersion cooling is still an emerging technology, we initially expected it would be challenging to meet our specific requirements,” says Stephan de Vries. “The result is a reliable partner that can help us optimise the system using the pumps’ capabilities, while also supporting us with seal selection and pump requirements.”

The results are also being explored at the Modular Integrated Sustainable Data Centre (MISD) lab operated by Asperitas partner Eurofiber. There, Asperitas systems equipped with Grundfos pumps are being used to examine how immersion cooling can improve data centre efficiency. “We’re looking at how we can create the most efficient data centre in the world,” says Jan Bonke, Business Innovation Officer at Eurofiber.



Asperitas Head of Production Stephan de Vries checks data on immersion cooling units being tested with Eurofiber's Business Innovation Officer Jan Bonke at the Eurofiber lab.

Efficiency is measured by Power Usage Effectiveness (PUE), which compares the amount of power needed for cooling and non-computing energy to the amount of power needed for computing. With a PUE of 1.5, for example (typical for air-cooled data centers), for every 1 kilowatt of IT load,

500 watts of additional power is needed for cooling. From his lab in Arnhem, Netherlands, filled with Asperitas systems and Grundfos pumps, Jan Bonke says, “What we're doing here with immersion cooling is 1.018. So that's a whole different ball game than it is with air cooling.”

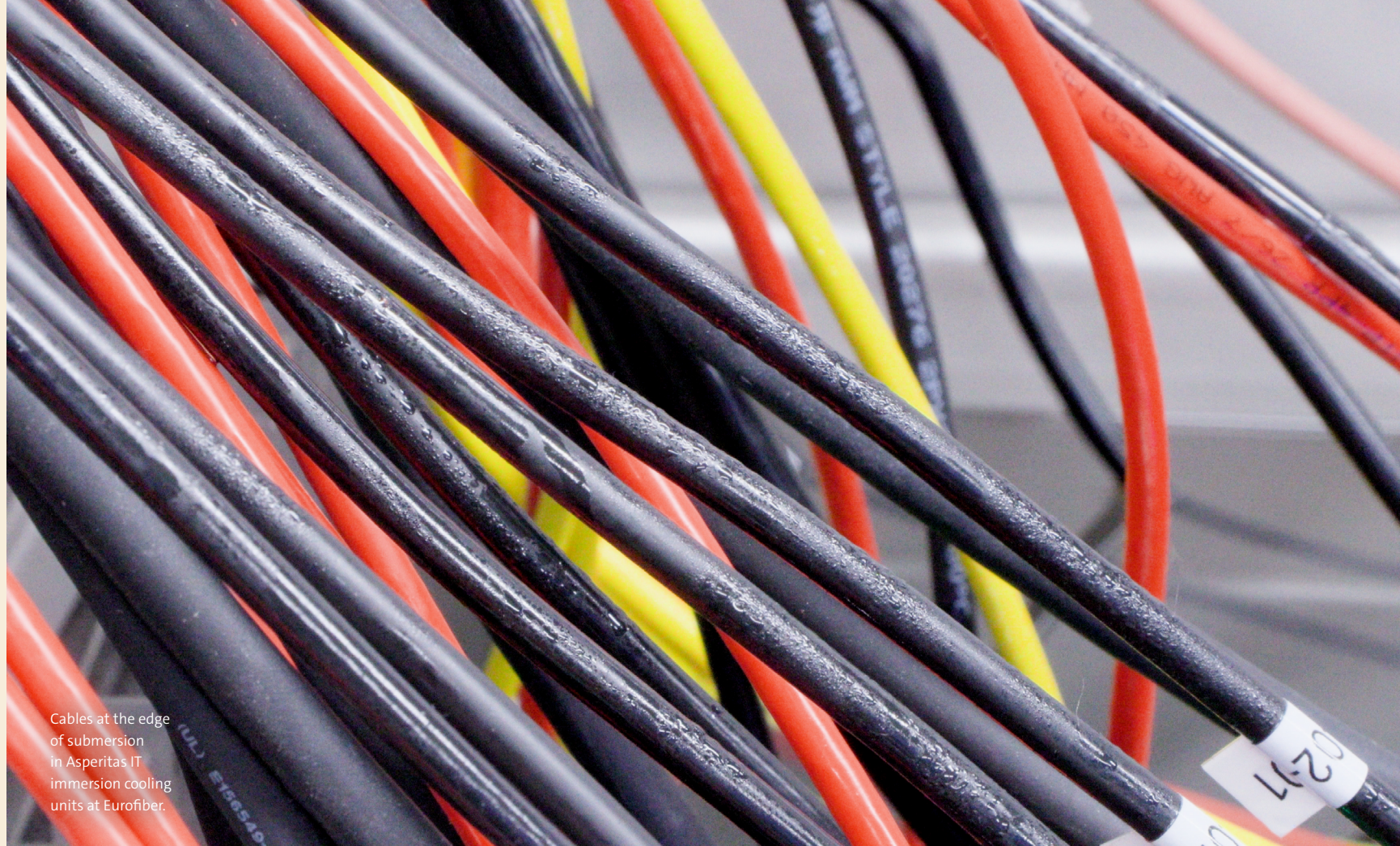
“The result is a reliable partner that can help us optimise the system using the pumps’ capabilities”

Stephan de Vries, Head of Production,
Asperitas

“Sustainability is one of the core pillars of what Asperitas offers,” says Rutger de Haij. “What we try to do is to make the most efficient and effective use of resources wherever possible. If you look at today's major challenges for building new infrastructure, it's really the limitation in terms of power. And what we enable our customers to do is to use that power for the things that deliver them money – basically to optimise their power connection, and use the electrons to really generate value, rather than to just blow them in the air, so to speak.”

Andy Young says, “I'm really proud to be associated with Grundfos. There's a great synergy between our companies. I'm proud of the way that we can work directly with their technical and commercial teams to find the right fit of our technologies, coming up with innovations – particularly around control, efficiency and reliability.”

He says, “We take an approach where really every drop of the cooling liquid counts. So, the liquid is really the blood in the veins of the cooling solution, and the pump is the beating heart.”



Cables at the edge of submersion in Asperitas IT immersion cooling units at Eurofiber.

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Evangelos Karakostas, Mechanical Design Engineer, and Alireza Beheshti, System Integration & Test Engineer, prepare a Grundfos pump for installation in an immersion cooling unit at the Asperitas headquarter in Amsterdam.

Grundfos supplied

In the co-development of a next-generation immersion cooling system with Asperitas, Grundfos supplied its multistage CRNE E-pumps with integrated inlet, outlet pressure and flow measurements. Also integrated were Combined Pressure Sensors (CPSs) and Relative Pressure Sensors (RPSs), as well as the CIM 200 Modbus RTU communication interface.

[Learn more about IT Cooling and Grundfos.](#)



Andy Young and Stephan de Vries of Asperitas

Sources

The facts in this story come from interviews on site at Asperitas and Eurofiber in Amsterdam and Arnhem, the Netherlands, respectively on 16-17 June 2026.

Topic:	IT immersion cooling
Location:	Amsterdam, the Netherlands
Customer:	Asperitas



Two Grundfos vertical, multi-stage CRNE E-Pumps can be seen in the backside of a new Asperitas DFCX1 immersion cooling unit bound for its customer Unicom in the United States.

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