



Case study

Advanced liquid cooling enables future-ready HPC expansion at the Zuse Institute Berlin



Background

The Zuse Institute Berlin (ZIB) is a leading interdisciplinary research institute specializing in applied mathematics and high-performance computing (HPC). As part of the National High-Performance Computing Alliance (NHR), ZIB supports complex simulations, modeling, and data-intensive applications for research institutions.

pro-com DATENSYSYSTEME supports the institute as an IT service provider, with a focus on efficient warm water cooling solutions for HPC infrastructure.

Project milestones

From foundation to future-ready: A phased liquid cooling journey

- Phase 1 — Operational baseline with the implementation of Vertiv™ Liebert® XDU 450, delivering reliable direct-to-chip liquid cooling performance for initial workloads.
- Phase 2 — Capacity growth driven by increasing AI and HPC workload demands, leading to the strategic decision to expand GPU and CPU cluster capacities.
- Phase 3 — Infrastructure upgrade following the selection of the Vertiv™ CoolChip CDU 1350 to scale cooling capacity while preserving system compatibility and operational efficiency.
- Phase 4 — Custom engineering involving the development of a mobile distribution unit by pro-com DATENSYSYSTEME, enabling flexible coolant delivery and rapid deployment.
- Phase 5 — Seamless deployment as installation was completed with minimal downtime, supporting business continuity throughout the infrastructure upgrade.
- Phase 6 — Future-ready architecture now fully operational and designed for future expansion, ready to scale with next-generation compute demands.



Company profile:

Leading research institute for applied mathematics and high-performance computing.

Industry: Research / High-Performance Computing (HPC)

Region: Berlin, Germany

Challenge

With the rapid increase in GPU-based workloads, ZIB needed to expand its supercomputing capacity by deploying next-generation technologies. This resulted in significantly higher thermal loads, requiring an upgrade to the cooling infrastructure.

The existing solution was no longer sufficient to support the increased power density and new performance requirements. At the same time, available space in the data center was limited, making it difficult to scale infrastructure without disrupting ongoing operations.

“The main objective of our project was to incorporate new technologies to meet the evolving requirements of high-performance computing, while maintaining optimal operational flexibility. The requirements were perfectly met by Vertiv, which also enabled us to keep the increase in energy costs under control and ensure efficient management of our new data center.”

— **Christian Schimmel,**
Head of Supercomputer Systems at ZIB.





Solution

To address the increasing cooling demands of high-density GPU clusters, Vertiv implemented the Vertiv™ CoolChip CDU (Coolant Distribution Unit) 1350 — a high-performance liquid cooling solution specifically designed for HPC and AI applications. The system enables precise and efficient heat removal directly at the chip level, making it ideal for managing the extreme thermal loads generated by modern GPU workloads.

In close collaboration with pro-com DATENSYSYSTEME, the solution was complemented by a custom-designed, mobile fluid distribution manifold, enabling flexible and scalable coolant delivery without the need for fixed piping. A key advantage is the integration of the new cooling system into the existing data center infrastructure. This was achieved through a well-designed installation approach, allowing optimal use of the limited space available.

The Vertiv CoolChip CDU not only meets current requirements but also provides additional capacity for future GPU generations and increasing power densities. Thanks to its modular and scalable design, ZIB can expand its infrastructure step by step without requiring extensive modifications or downtime.



Results

The implemented solution delivers immediate operational improvements while simultaneously establishing the foundation for long-term growth in the field of high-performance computing.

Key benefits and added value:

- Future-ready infrastructure delivers scalable cooling capacity for upcoming GPU generations and increasing rack densities.
- Smooth integration enables seamless deployment into the existing data center, allowing streamlined commissioning with minimally interrupted research operations.
- Optimized space utilization through the mobile fluid distribution manifold developed by pro-com DATENSYSYSTEME within the raised floor maximizes the use of limited data center space.
- High scalability via modular design enables expansion without fundamental infrastructure changes.
- Improved thermal efficiency through liquid cooling enables stable performance even under extreme loads.
- High operational reliability combines proven Vertiv technology with customized integration to reduce risks.
- Maximum flexibility from the mobile fluid distribution manifold allows dynamic adaptation to evolving requirements.
- Energy-efficient cooling supports reduced energy costs and lower CO₂ emissions.

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