

Excellence
in Flow⁺

+GF+

Polymer flow solutions

Driving AI data center efficiency

LG U+ and GF collaborate on testing of next-generation cooling

Performance validation of
polymer manifolds in direct-to-chip
cooling testbed

Delivering efficient direct-to-chip liquid cooling with polymer solutions

As demand for AI and cloud computing continues to grow, the pressure on data center infrastructure intensifies. South Korea's LG U+ is addressing this challenge by developing AI-ready data centers that integrate next-generation liquid cooling solutions. At its Pyeongchon 2 Center, LG U+ has launched a live AI DC Testbed to showcase and evaluate technologies that promise operational performance and environmental sustainability. In this pursuit, the company selected GF to implement a high-performance polymer manifold tailored for direct-to-chip liquid cooling, laying the foundation for future-ready thermal management.

Project background

LG U+ set out to improve cooling efficiency, enhance reliability, and reduce energy consumption and maintenance costs to future-proof its infrastructure and meet the demands of high-density AI workloads. The Pyeongchon 2 Center, one of the largest data centers in the metropolitan area, is a real-world testing ground for evaluating advanced technologies, including direct-to-chip and immersion cooling. The goal is to optimize internal operations and promote more sustainable practices across the industry by reducing carbon emissions and supporting knowledge-sharing through AI data center tours.

Selected technical solution

GF provided a custom-engineered in-rack manifold made from high-performance PVDF (polyvinylidene fluoride) to meet these requirements. This pipe-shaped polymer manifold offers significant advantages over metal alternatives: it is corrosion-free, lightweight, and ensures fluid purity, all essential for mission-critical cooling applications. In LG U+'s application, the manifold supports a direct-to-chip cooling loop using the propylene glycol-based coolant Dowfrost™ LC 25 Heat Transfer Fluid (PG25), ensuring even coolant distribution across all chips of the 100kW rack. The flexible design integrates seamlessly into the rack architecture, making installation quick and minimizing system complexity.

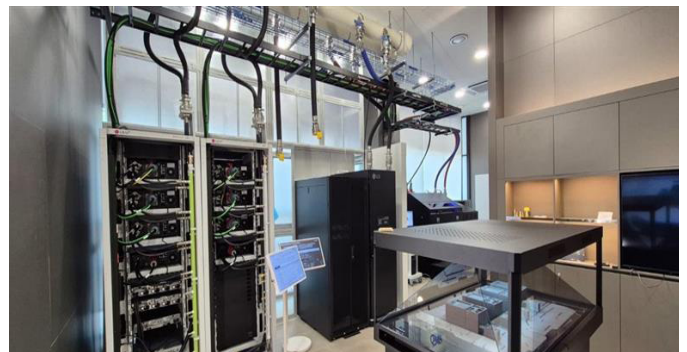
Towards scalable implementation

The result is a fully operational D2C cooling system at LG U+'s AI DC Testbed, enabling real-time demonstration of sustainable thermal management. Thanks to the manifold's lightweight and modular structure, installation was fast and efficient. The system strives to deliver reliable, uniform cooling without the risk of corrosion or fluid contamination, minimizing downtime and supporting the continuous operation of high-performance computing equipment. Beyond the expected operational gains, using polymers significantly lowers the environmental impact of the cooling infrastructure. With significantly lower embodied carbon than metal components, GF's solution contributes directly to LG U+'s goal of reducing the carbon footprint of its data center operations while simplifying maintenance and lowering the total cost of ownership.

Where next?



Polymer manifolds are custom-engineered based on the project requirement and rack densities.



LG U+'s AI DC Testbed at the Pyeongchon 2 Center is testing advanced solutions for next-gen cooling.

Customer benefits

- **Lightweight, easy-to-install system with design flexibility**
- **Corrosion-free polymer material ensures long-term reliability**
- **Low energy consumption through reduced pumping effort**
- **Clean, sustainable operation aligned with LG U+'s green IT strategy**



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