

Verification Facility “Data Center Trial Field” Established to Promote the Utilization of Liquid Cooling Technology in Data Centers

TOKYO – November 21, 2024 – NTT DATA, a global digital business and IT services leader, today announces the establishment of “Data Center Trial Field”, a verification facility in Noda City, Chiba Prefecture, in November 2024, to promote the utilization of liquid cooling technology in data centers. Recently, the rapid increase in server heat generation due to advancements in AI and other technologies has raised awareness of the need for highly efficient cooling methods like direct liquid cooling and immersion cooling. However, current liquid cooling technologies have different specifications depending on the manufacturer, making it difficult to fully meet customer requirements, and there is a lack of mutual understanding among related companies regarding safe construction and operation. To solve these issues, field trials are needed for joint verification where various stakeholders involved in data centers can participate, covering each phase of IT service from planning to operation. Data Center Trial Field, in cooperation with Hibiya Engineering, Ltd. and Kuwana Metals, Ltd., will reproduce the heat source equipment of data centers, and provide an environment where multiple liquid cooling devices and servers can operate simultaneously. Various business operators will work together at this facility to conduct joint verification to find solutions to outstanding issues. NTT DATA will support the development of liquid cooling technologies through the expansion of community and promotion of collaboration among business operators, and provide more sustainable IT services to customers.

1. Background

Demand for data centers has increased rapidly due to the development of information technologies and services such as AI and cloud services. Additionally, the technology to process large amounts of data efficiently has led to a significant rise in power consumption and heat generation from high-density server racks, making it difficult to rely solely on traditional air cooling systems. Therefore, there is a growing need for liquid cooling technologies, such as direct liquid cooling and immersion cooling, which are highly efficient and conserve energy. However, current liquid cooling technologies have different specifications set by each manufacturer, lacking flexibility in terms of the initial configurations concerning load capacity and the number of servers, as well as adapting to changes to the configuration, such as an increase or decrease in the number of servers after the start of operations. This creates challenges in fully meeting customer requirements. Furthermore, constructing server rooms requires not only servers and server racks but also ensuring safety in managing the pipes and pipe connections that link heat source equipment and heat exchangers. It is also necessary to establish system integration and operational flows for central monitoring networks and the maintenance of each piece of equipment. This requires mutual understanding and collaboration among data center operators, pipe construction companies, equipment manufacturers, and design companies. Solving these challenges and accelerating the practical application of liquid cooling technologies requires a verification facility that can reproduce the data center equipment, and provide a communication space for collaboration among business operators involved in data centers.

2. Overview

NTT DATA, in cooperation with Hibiya Engineering and Kuwana Metals, opened a data center cooling technology verification facility, known as Data Center Trial Field, in Noda City, Chiba Prefecture, in November 2024. NTT DATA will provide direct liquid cooling devices and immersion cooling devices, while Hibiya Engineering will build the verification facility, and Kuwana Metals will provide its chilled tower cooling system Chilled Tower™ (Note 1). The new facility allows for actual operation of liquid cooling technologies in an environment identical to that of data centers. It also enables the verification of optimal cooling water

temperatures and flow rates to improve data center efficiency, feasibility checks for monitoring systems, construction, and operations for existing data centers, as well as training of maintenance staff to support the actual implementation of liquid cooling systems. The facility will operate as a place where various stakeholders involved in data centers, including data center operators, equipment manufacturers, IT vendors, and research institutions, can come together to jointly conduct verifications aimed at finding solutions to the challenges involved in using liquid cooling technologies.

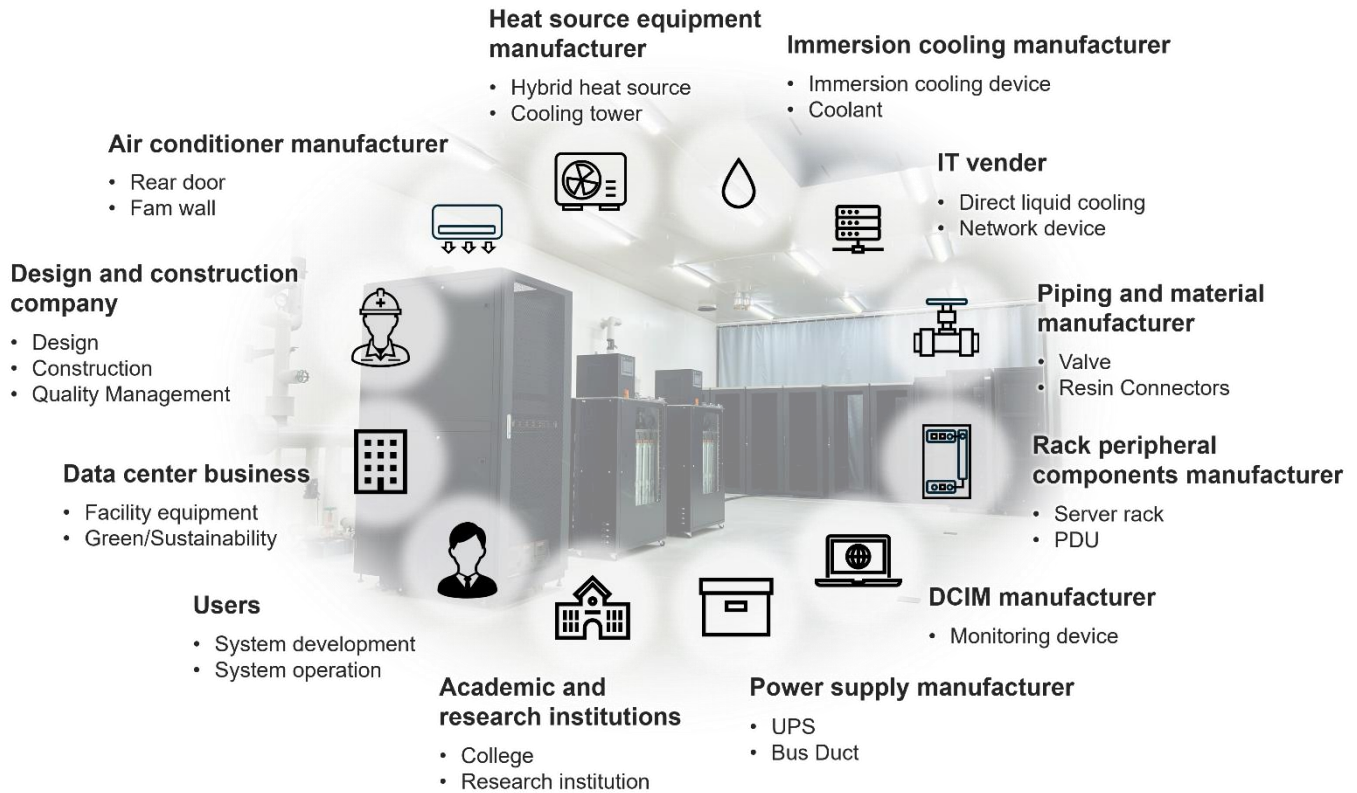


Fig.1: Assumed stakeholders in “Data Center Trial Field”

Advantages of utilizing Data Center Trial Field to address the issues surrounding liquid cooling technologies:

Challenges in utilizing liquid cooling technology		Advantages of using this facility
We lack sufficient test and demonstration environments.	The equipment configuration of existing data centers limits the verification environment.	We can reproduce a free operational environment, allowing verification for multiple buildings and harsh conditions.
	Sharing parts of buildings or equipment in commercial use restricts on running services.	By separating from the commercial environment, we can conduct verification without reducing commercial resources.
	The investment required for building the environment becomes a burden	We can reduce costs through sharing the environment.
There are differences in specifications of pipes, wiring, and protocols among related devices.	The risk of troubles during construction and operation increases.	By resolving specification differences and conducting construction tests in advance, we can reduce the risk of service delays and failures.
	There is a reluctance to introduce water into the server room.	We can confirm safety through actual operation and verification, eliminating reluctance.
	The hardware areas of facility and system become closer, making the responsibility boundary unclear.	Understanding device characteristics allows us to develop service designs not bound by traditional responsibility boundaries.
There are limited opportunities for stakeholders in data centers.	Communication between stakeholders is lacking	We can use the facility as a hub for mutual interaction among all stakeholders from upstream to downstream in the data center business, promoting communication.

Fig.2: Challenges in utilizing liquid cooling technology and advantages of using this facility

■ Features of Data Center Trial Field

1. Flexible operational conditions utilizing Chilled Tower, which integrates a dry cooler (Note 2) and a chiller (Note 3)

The features of Chilled Tower include the utilization of outside air to achieve high energy-saving performance, and the ability to supply a wide range of cooling water temperatures. This will allow for flexible installation of devices with different cooling water temperature requirements, and verifications considering temperature conditions suitable for the applied environment.

2. Simultaneous operation and exchange of multiple devices

Multiple secondary-side connection outlets allow the simultaneous operation of devices, enabling the verification of different devices in the same environment and comparative evaluation. This also enables parallel implementation of various verification plans, as well as the conducting of operational and application tests or evaluations for switching devices without stopping the cooling system.

3. Detailed verification through facility collaboration

The facility is located at Hibiya Engineering's Technology Research Laboratory, which handles numerous data center equipment installations. Therefore, the facility allows for collaborative verification related to cooling technology peripheries, such as connecting liquid cooling pipes to building pipes and product development.

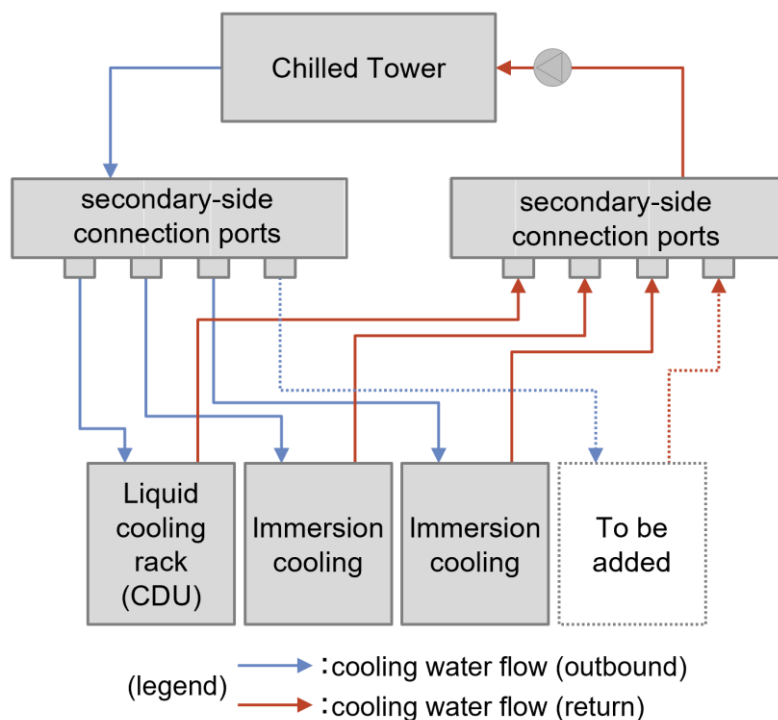


Fig.3: Configuration of Data Center Trial Field



Fig.4 : The verification environment

Information	
Name	Data Center Trial Field
Place	Hibiya Engineering, Ltd. Technology Research Laboratory
Opening	November, 2024
Space	105 m ²
Cooling capacity	75 kW (Opening)
Power capacity	6 kVA×4, 3 kVA×2 Total 30 kVA (Opening)

■ Future Plans

Going forward, NTT DATA will conduct performance, operation, and peripheral technology verifications related to direct liquid cooling and immersion cooling at this facility, and provide services that flexibly meet customer requests. Additionally, to eliminate construction challenges caused by differences in specifications for domestic and international equipment piping, NTT DATA will collaborate with Hibiya Engineering in developing dedicated parts, aiming for the introduction of liquid cooling technology in various operating environments. NTT DATA will also connect IT vendors and data center operators, promote the utilization and practical application of liquid cooling technology through cross-industry community expansion and collaboration, and contribute to the realization of a sustainable world.

Notes

1. Chilled Tower is a registered trademark of Kuwana Metals, Ltd.
2. A dry cooler is equipment that lowers the cooling water temperature using air as a medium.
3. A chiller is equipment that mechanically lowers the cooling water temperature using compressors, etc.

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