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PRODUCTS

## Revolutionizing Research Cooling: How a Midwest University Achieved 37% Energy Savings with Waterless Direct-to-Chip Liquid Cooling from CPI and ZutaCore®



At Chatsworth Products (CPI), we believe groundbreaking research deserves equally innovative infrastructure. A Midwest university's journey into waterless direct-to-chip liquid cooling is a powerful example of how cutting-edge technology, collaborative engineering, and integrated design can redefine data center performance. This case study showcases how CPI and ZutaCore® partnered with the university to tackle the challenges of high-performance computing, delivering transformative results in energy efficiency, cooling, and scalability.

## A Pioneering Proof of Concept to Meet a Growing Need

The university's research data center, originally designed in 2015, supported 2.1 MW of IT load and relied on passive rear-door heat exchangers (RDHx) for cooling. As research demands and computing density grew—driven by AI, big data, and modeling-intensive applications—the limitations of traditional air cooling became apparent. Hot spots, fan noise, and rising power usage presented persistent challenges. To meet the needs of high-performance workloads and prepare for next-gen deployments, the university's IT Services team launched a direct-to-chip liquid cooling (DLC) proof of concept (POC) in 2024.

This was more than just a test; it was the university's first venture into a liquid-based technology cooling loop system. With no previous deployments on campus and limited internal experience with liquid-based systems, the team needed a trusted partner. CPI worked closely with the university to deliver a complete cabinet-level solution centered on CPI's ZetaFrame® Cabinet System and the ZutaCore® HyperCool® technology. The goal: to compare system performance side-by-side with legacy cooling and prove the real-world benefits of DLC in a live research environment without disrupting ongoing work.

## Built to Compare—and Built to Perform

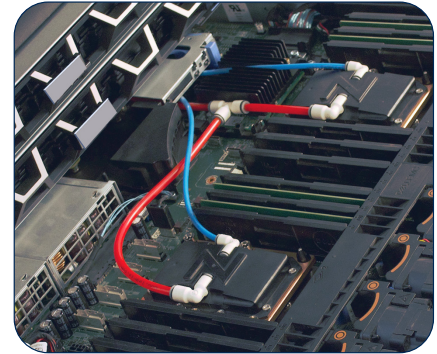
The POC deployed ten Dell PowerEdge R6525 servers in two configurations: one cabinet cooled via RDHx, the other using waterless direct-to-chip liquid cooling with ZutaCore HyperCool. Each cabinet mirrored the other in server load and layout to ensure a valid, apples-to-apples comparison. CPI supplied the ZetaFrame Cabinet (800mm x 1075mm x 42U), monitored eConnect® PDUs (17kW), and integration support to ensure a streamlined, scalable setup.

This wasn't just a hardware installation—it was a highly instrumented evaluation. Environmental and performance data was continuously monitored using Sunbird DCIM and Grafana dashboards. The test environment captured side-by-side metrics including CPU temperatures, inlet and exhaust temps, power consumption, and system load. Audio sensors were even deployed to compare noise levels, giving the university a complete picture of thermal, electrical, and acoustic performance.

With the right data in hand, the university could make informed decisions not just about the feasibility of waterless liquid cooling, but also about future scaling strategies, energy efficiency opportunities, and long-term ROI.

CPI STRATEGIC PARTNER

**ZUTACORE**








*Direct-to-chip cooling in a ZetaFrame Cabinet System shown*



*ZetaFrame® Cabinet with ZutaCore® HyperCool® technology installed*

## Exceptional Results Across Key Metrics

The DLC-equipped cabinet outperformed the RDHx-based system in nearly every category. The results of the side-by-side comparison were clear:

	DLC (ZutaCore)	RDHx	% Delta
 <b>Inlet Temp</b>	74.2°F	81.4°F	9%
 <b>CPU Temp</b>	135°F	124°F	8%
 <b>Power Consumption (avg)</b>	326W	516W	37%
 <b>Annual Power Cost/Node</b>	\$1,714	\$2,714	37%
 <b>Noise Level (dB)</b> (server front/rear)	84/85	97/96	15% / 13%

Perhaps the most significant observation was that power consumption fell by 37%, with annual savings of over \$5,000 for five nodes. The test also confirmed consistent performance without CPU throttling, even under heavy loads—a key requirement for high-compute research environments.

Noise levels decreased significantly, contributing to a quieter and more comfortable data center. In addition to performance improvements, the team observed smoother operations, lower system fan usage, and reduced cabinet ambient temperatures (from ~130°F to ~80°F).

While RDHx systems delivered slightly lower CPU and exhaust temperatures, the DLC-equipped cabinet outperformed in energy efficiency, noise levels, and operational cost.

**"Once the system was in place, the excitement grew. We're seeing better efficiency, lower noise, and real results on power savings. This has helped us validate DLC as a viable, long-term strategy for research computing."**

*Director of Data Center Strategy  
at a Large Midwest University*

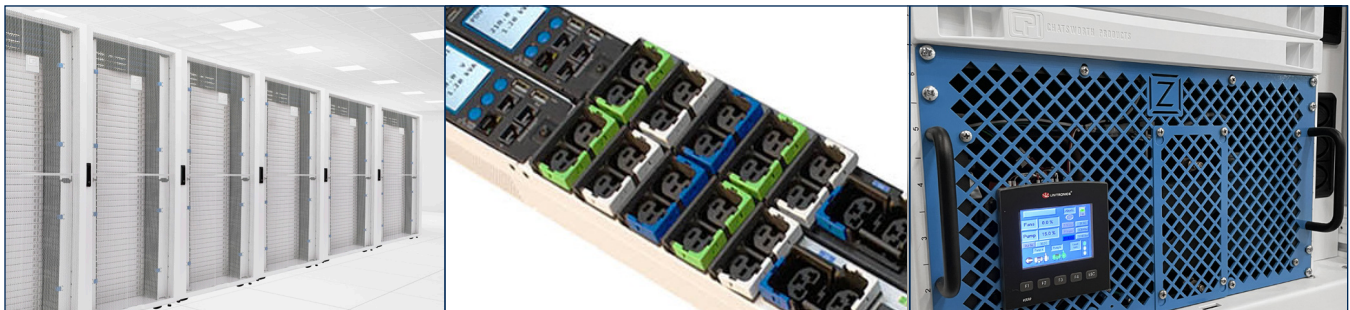
The success of the POC has generated interest across faculty research groups and laid the groundwork for future DLC expansion.

## Proving the Case for Integrated, Scalable Waterless Liquid Cooling

By partnering with CPI, the university validated the cooling technology and the value of an integrated infrastructure approach. CPI's cabinet system, PDUs, and design support simplified deployment and ensured system components worked seamlessly together.

**"The university's results demonstrate how a fully integrated cabinet solution—including CPI's ZetaFrame<sup>®</sup>, eConnect<sup>®</sup> PDUs, and ZutaCore<sup>®</sup> HyperCool<sup>®</sup>—can simplify deployment, reduce power consumption, and elevate performance. It's a scalable, future-ready model for high-density environments."**

*Sam Rodriguez  
Senior Product Manager, Cabinets, Containment & Industrial Solutions,  
Chatsworth Products (CPI)*



ZetaFrame<sup>®</sup> Cabinet Systems

eConnect<sup>®</sup> PDU with QuadLock Outlets

ZutaCore<sup>®</sup> HyperCool<sup>®</sup> Heat Rejection Unit

This collaboration underscores CPI's commitment to helping research institutions unlock the full potential of their infrastructure through smarter design, practical innovation, and partnership built on performance.

### About Chatsworth Products

At Chatsworth Products (CPI), it is our mission to address today's critical IT infrastructure needs with products and services that protect your ever-growing investment in information and communication technology. We act as your business partner and are uniquely prepared to respond to your specific requirements with global availability and rapid product customization that will give you a competitive advantage. At CPI, our passion works for you. With over two decades of engineering innovative IT physical layer solutions for the Fortune 500 and multinational corporations, CPI can respond to your business requirements with unequalled application expertise, customer service and technical support, as well as a global network of industry-leading distributors. Headquartered in the United States, CPI operates from multiple sites worldwide, including offices in Mexico, Canada, China, the United Arab Emirates and the United Kingdom. CPI's manufacturing facilities are located in the United States, Asia and Europe.

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