SPECTRUM CONTROLS
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Case Study

Strategic Application in Data Centers

The Need for Legacy HVAC and Power System Integration

Empowering Innovation for over 40 years

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The Challenge

Many legacy data centers reflect a “best-of-breed” design philosophy that no longer scales. Consider a 15-year-old facility running a mix of disconnected systems: a VRF cooling plant controlled by a Siemens S7-300 PLC, power distribution monitored via Modbus RTU PDUs, and a newly deployed DCIM platform built for today’s high-density racks.

The problem? **None of these systems speak the same language.**

Without native integration between legacy control infrastructure and modern DCIM software, operators are forced to jump between siloed interfaces to monitor temperature, power, and alarms. The result is fragmented visibility, delayed response times, and an operational model that’s reactive by design—introducing unnecessary risk in an environment where uptime is critical.

Phase 1

Assessment of Legacy Systems and Data Silos

Modernization begins with a focused audit of the existing infrastructure to establish a clear integration baseline. All critical legacy assets and their communication protocols are identified, confirming the Siemens S7-300 PLC as the cooling system controller and Eaton PDUs as the primary source of power data. The DCIM platform is defined as the single system of record for operational visibility.

From this assessment, a prioritized tag list is created to capture only the data that matters. For cooling, this includes real-time water temperatures, aisle-level ambient temperatures, and fan speeds. For power, key metrics include per-PDU kW consumption, breaker status, and voltage levels. Integrating these critical data points enables the DCIM platform to deliver a unified, actionable view of facility health and performance.

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Phase 2

Deployment and Configuration of Universal Industrial Gateway

A Universal Industrial Gateway is selected to bridge legacy systems and modern software through native multi-protocol support and rapid configuration. The gateway is installed on a DIN rail in the main electrical room, positioned near the cooling and power control infrastructure. It is powered via a 24 VDC supply and connected to the facility network using one of its dual Ethernet ports.

Configuration is completed through the gateway's web-based interface. Two devices are defined: Siemens_Chiller_PLC using the S7comm protocol, and Eaton_PDUs using Modbus RTU. Network and serial parameters—such as baud rate and parity—are matched to the field equipment, enabling reliable, bi-directional communication without custom code or significant system downtime.

Phase 3

Data Mapping and Integration with a Centralized DCIM/BMS

This is the most critical phase of the project, where the gateway's data bridging capability is leveraged to link the data silos. The configuration engineer creates a series of "Tag Maps" to define the data flow.

Example 1: HVAC System Integration

A tag map is configured to deliver real-time thermal data from the Siemens PLC to the DCIM platform. The chiller water temperature register is mapped from S7comm to a Modbus TCP destination the DCIM can read, with execution set to On Change to ensure immediate updates when thresholds are exceeded. In parallel, a second tag map captures chiller energy consumption on a periodic interval (e.g., every five minutes) to support historical trending and performance analysis. Together, these mappings provide both instant visibility and long-term operational insight without modifying existing control systems.

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Phase 3 Cont.

Data Mapping and Integration with a Centralized DCIM/BMS

Example 2: Power System Integration

To align power consumption with IT workload, a second set of tag maps is configured for the legacy PDUs. The source tag pulls kilowatt (kW) data from the PDUs over Modbus RTU and maps it to an EtherNet/IP destination register already supported by the DCIM platform.

This enables the DCIM to poll real-time power data from existing infrastructure, delivering granular, rack-level visibility without replacing hardware. The Live Tag Map Viewer is used to validate accurate data transfer from source to destination, ensuring reliable, end-to-end data flow.

Proposed Impact and ROI Analysis

By integrating IT and OT systems through the Universal Industrial Gateway, data translation becomes a direct driver of financial value. Unified, real-time visibility enables the DCIM platform to move from passive monitoring to active optimization. With correlated workload, thermal, and power data, operators can implement dynamic cooling strategies—reducing chiller output for underutilized racks and eliminating overcooling.

The result is continuous efficiency gains, lower PUE, and measurable energy cost savings. Centralized data also unlocks predictive maintenance. Subtle indicators—such as rising vibration levels or increased current draw—are detected early and flagged by DCIM analytics, allowing maintenance to be scheduled before failures occur. Avoiding unplanned outages protects uptime, revenue, and SLAs.

Together, energy optimization and downtime prevention deliver a clear, quantifiable return on investment—transforming integration infrastructure into a strategic asset rather than a cost center.

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The Spectrum Controls Solution

Universal Industrial Gateway is a highly versatile and cost-effective solution designed to overcome these integration hurdles. Its core value proposition is the elimination of complex programming, as it requires no special programming or configuration of the attached automation equipment. It handles all communications needs, freeing up PLC processing power and valuable Engineering time. For configuration, it uses an intuitive, browser-based interface accessible from any web browser, eliminating the need to install proprietary software.

Comprehensive protocol support including key standards like Modbus TCP/RTU, EtherNet/IP, and S7comm, allows connection to a broad range of legacy and modern industrial devices from different vendors. Multi-port design (two Ethernet and two or four RS-232/RS-485 serial ports) provides the physical flexibility to connect to a wide array of equipment simultaneously.

Key Benefits and ROI

Power Usage Effectiveness (PUE)
Dynamic cooling adjustments based on real-time IT load allows for higher efficiency and lower cost

Annual Energy Cost Savings
Reduced cost by eliminating overcooling and optimizing power usage.

Mean Time to Resolution (MTTR)
Automated real time alerts and predictive maintenance enabled by unified data.

Cooling System Efficiency
Real time data and a higher level of accuracy provides for Precise, data-driven thermal management.

Uptime/Reliability
Higher level of Predictive failure analysis and rapid, data-informed responses.

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For over 40 years, Spectrum Controls has been a trusted manufacturer of cutting edge industrial I/O, and is the first company to build licensed, core-technology I/O modules for Rockwell Automation® as a proud Technology Partner.

Focusing on expanding the capabilities of control systems, we offer a myriad of solutions to tackle the unique projects you face including high-density I/O, universal analog input, and specialized modules to harness the full capability of any system. All of our licensed hardware includes full TechConnect™ Support through Rockwell Automation support channels.

Our Universal Industrial Gateway combines the capabilities of multiple typical gateways into a single module that allows for seamless communication between multiple devices with a choice of 12 different protocols.

For visual communications in critical production environments, InView industrial LED displays offer robust hardware and class-leading ease of use thanks to our EasyTag technology.

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