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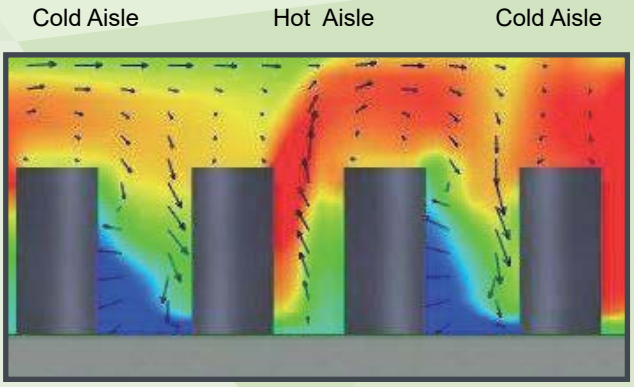
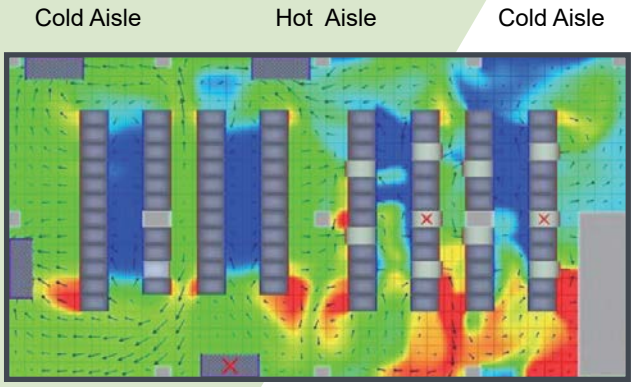
CFD Analysis: Traditional Data Center vs. Cold Aisle Containment

Traditional Data Center without Cold Aisle Containment



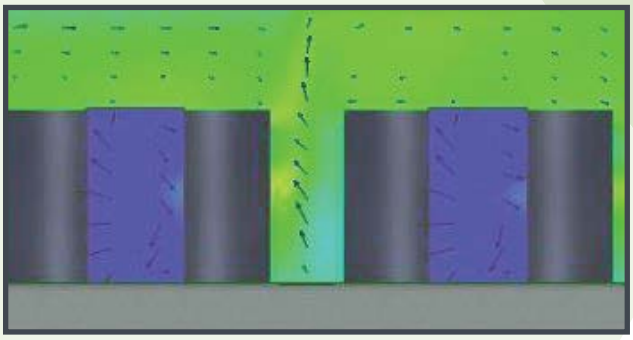
Rack Side View



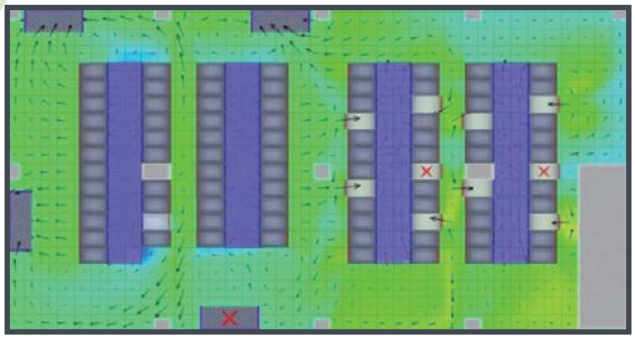
Data Center Top View

Problem: Temperature billboard for a traditional data center without cold aisle containment reveals numerous thermal inefficiencies: hot spots, significant hot-cold air mixing, inconsistent rack inlet temperatures, elevated inlet temperatures for equipment at the top of racks, and higher overall exhaust temperatures. These issues lead to poor utilization of cold air, reduced return-air temperatures at CRAC units, and increased equipment inlet temperatures—driving up exhaust heat and forcing server fans to work harder. The result is higher power consumption, reduced cooling efficiency, and overall degraded performance of CRAC systems.

Data Center with Cold Aisle Containment



Rack Side View



Data Center Top View

Solution: In a data center equipped with cold aisle containment, the temperature billboard shows a dramatic reduction in hot exhaust air and consistently lower temperatures within the cold aisle. By virtually eliminating hot-cold air mixing, the system maintains stable, controlled temperatures where equipment needs it most. This optimized airflow not only improves cooling performance but also reduces overall energy consumption.