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THE IMPACT OF CABLE
MANAGEMENT ON
CONTAINMENT SOLUTIONS



Something in the air

Tom Cabral of Chatsworth Products (CPI) takes a look at the impact of cable management on containment solutions

▶ In the intricate ecosystem of data centres, the effective management of airflow is paramount to ensure optimal performance, energy efficiency and reliability. With the increasing demand for higher densities and capacities within cabinets, it becomes imperative to explore containment options that can efficiently channel airflows while mitigating hotspots and improving overall cooling effectiveness.

GO WITH THE FLOW

Data centre infrastructure is designed to support specific power and airflow requirements. While the average cabinet density hovers around 8-10kW, the cooling capacity of typical airflow supplied to the cabinet remains adequate. However, to enhance airflow management, various solutions are employed to block and redirect airflow, thus optimising cooling efficiency.

Solutions such as cabinet blanking panels, air dams, sealing and grommets play a crucial role in blocking airflow around equipment, and through open rack units and cable openings. By preventing exhaust air from recirculating around the equipment,

these measures contribute significantly to maintaining optimal operating conditions within the data centre environment. Moreover, proper cable management within cabinets is essential to prevent

cables from obstructing airflow pathways.

CLIMATE CONTROL

Ideal for raised floor environments or data centres without overhead hot air return

space, cold aisle containment solutions direct cold air into the contained intake space between two cabinet rows. By designating the area outside the contained space as the hot aisle, cold aisle containment effectively elevates the room temperature, thereby improving overall cooling efficiency.

In contrast, hot aisle containment solutions channel hot exhaust air out of the contained hot aisle to overhead return air systems. By transforming the area outside the contained space into the cold aisle, hot aisle containment facilitates a cooler and more comfortable room temperature, enhancing the operational environment of the data centre.

Functioning akin to hot aisle containment, vertical exhaust duct solutions, or chimneys, are employed at the individual cabinet level to direct hot exhaust air to the overhead return air system. By effectively isolating hot air from the aisles and working space, vertical exhaust duct solutions contribute to maintaining a cooler and more comfortable room temperature without necessitating a complete hot aisle containment system.

LIQUID ASSET

Passive cooling solutions play a pivotal



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role in supporting increased rack power density and improving cooling efficiency by isolating cold intake air from hot exhaust air. This allows for higher air supply temperatures and prevents costly computer room air conditioning (CRAC) overprovisioning.

However, as average power densities surge beyond 25-30kW per rack passive cooling may no longer suffice in preventing hotspots without additional cooling capacity and lowered supply temperatures. Additionally, not every data centre space can adequately accommodate containment solutions and vertical exhaust ducts that require a raised floor or overhead return air systems.

Liquid cooling emerges as a promising alternative, with superior heat conduction

capabilities compared to air. It enables higher rack power densities, particularly as the demand for processing power continues to escalate. Standard 1U and 2U servers

face increasing challenges in cooling via air, especially as central processing unit (CPU) power surpasses 400W. Liquid cooling stands as the optimal solution for cooling equipment with higher CPU power requirements, ensuring optimal performance and reliability within data centre environments.

DEEP IMPACT

Effectively managing cables that are inside a cabinet is a crucial aspect of containment strategies in data centres, impacting overall efficiency, safety and system performance. By optimising airflow, preventing air recirculation, enhancing cooling capacity, facilitating maintenance and ensuring compliance with safety standards, well managed cables inside of cabinets contribute significantly to the overall efficiency and reliability of data centre containment systems.

Proper cable management facilitates improved airflow and cooling efficiency, which is central to both hot aisle and cold aisle containment strategies. It also ensures that cables are neatly organised and routed away from airflow pathways. If left unmanaged, cables can obstruct the flow of cool air to IT equipment or impede the exhaust of hot air from the servers. By keeping cables organised and secured, airflow remains unobstructed, optimising the

efficiency of containment solutions.

Cables can create gaps or openings within cabinets or rack units, allowing cold air to mix with hot exhaust air, leading to air recirculation. This phenomenon reduces the effectiveness of solutions such as cold aisle containment or hot aisle containment. Proper cable management including the use of grommets and cable trays seals these gaps, preventing air recirculation and maintaining the desired temperature differentials between the cold and hot aisles.

EFFICIENCY DRIVE

By organising cables neatly and out of the main airflow paths, data centres can minimise airflow obstruction and hotspots, ensuring that cooling systems work more efficiently. This not only helps maintain optimal temperatures for hardware but also reduces the energy consumption of cooling systems, leading to significant cost savings and a lower environmental impact.

Moreover, well implemented cable management enhances overall safety and accessibility within a data centre. It reduces the risk of accidental disconnections, tripping hazards and potential fire risks due to overheated cables or equipment.

For maintenance and scalability, a well organised cable infrastructure allows for easier access to cables and equipment, streamlining the process of upgrading, troubleshooting and expanding the data centre infrastructure. This level of organisation supports effective containment strategies by ensuring that physical infrastructure changes do not compromise the integrity of cooling zones or airflow patterns, thus maintaining the data centre’s operational efficiency and reliability.

CHALLENGE ACCEPTED

In the ever-evolving landscape of data centre management, containment options play a pivotal role in optimising airflow management and enhancing cooling efficiency. By embracing innovative solutions such as hot and cold aisle containment, vertical exhaust ducts and liquid cooling, data centre operators can effectively address the challenges associated with rising power densities and cooling requirements. As data centre infrastructures continue to evolve, the adoption of containment strategies remains instrumental in ensuring resilience and efficiency. ■



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Tom Cabral has worked in the telecoms industry for 27 years and has been employed with CPI for 22 years, serving as a regional sales manager, field applications engineer and now product application specialist. He provides technical advice and design specifications on complex product applications and acts as a technical liaison, with a high level of knowledge on product operation and performance.

