CASE STUDY



Flexibility by Design

CAF AisleFrame® Delivers a Custom Data Center Solution

Summary

SUBZERO ENGINEERING

Subzero Engineering, a global leader in turnkey engineering solutions for data centers and mission-critical environments, has completed the first commercial deployment of its Composite AisleFrame® (CAF) system for one of the leading colocation data center providers based in the northeastern United States.

The project involved a strategic deployment within a constrained, active colocation data center facility. The customer required a containment framework that could accommodate the existing site conditions, whilst also providing structural support for overhead infrastructure, including cable trays and power distribution equipment.

Subzero Engineering used its new adaptable CAF AisleFrame® system and in-house design-build expertise to create a customized containment and infrastructure-support solution to support the customer's needs.

CAF was selected for its lightweight construction, design flexibility and ability to

provide an integrated alternative to conventional steel framing and ceiling-suspended infrastructure.

The project also provided valuable engineering and installation experience for future CAF deployments, with regard to the assessment of raised-floor capacity, supplemental structural support and infrastructure loads.

Customer Background

The customer is a leading colocation data center provider in the northeastern United States, and an existing Subzero Engineering customer.

Having already installed Subzero containment equipment at the facility, the customer's relationship and confidence with Subzero contributed to their willingness to explore a new solution.

This design-build capability was an important factor in the project.

Challenges

The customer required a structural containment framework that could function within an existing raised-floor data center. This presented the project's most significant engineering challenge.

The initial concept considered supporting the CAF structure within the existing raised-floor environment. During engineering review, however, Subzero determined that the anticipated combined loads, including the CAF structure, containment, and infrastructure that could be supported from it, would require additional structural support.

The concern was not simply the static weight of the frame. The total anticipated loading and the need to provide appropriate structural protection over the life of the installation had to be considered, including that of potential seismic loading or other environmental concerns.

The customer also wanted to avoid relying on traditional ceiling suspension for its overhead infrastructure. Therefore, the system needed to accommodate the customer's existing conditions to support infrastructure such as cable trays, electrical busways and power infrastructure, containment components and other site-specific infrastructure.

Avoiding direct penetration of the concrete slab was another important consideration. Drilling into the slab would have required additional engineering approvals and introduced further complexity into an operating data center.

The design therefore needed to achieve several objectives at once:

- Provide a complete containment framework.
- Work within an existing raised-floor environment.
- Provide support for overhead cable trays and potentially power infrastructure.
- Minimize reliance on ceiling suspension.
- Avoid unnecessary concrete drilling.
- Remain sufficiently lightweight and modular to allow for future changes.

Results

The CAF structure demonstrated the rapid assembly that the system was designed to provide. The main CAF AisleFrame® was substantially assembled within a single day. Compared with a conventional steel structure, the CAF system was easier to transport, handle and assemble on site.

To enable viable structural protection of the construction, supplemental steel stanchion supports were installed beneath the raised-floor tiles to transfer the load more securely. The result was a hybrid installation: primarily CAF AisleFrame®, supported by supplemental steel beneath the raised floor.

Importantly, this experience reinforced a key engineering principle for future projects. Floor construction, load capacity, anticipated infrastructure loads and site-specific engineering requirements must be evaluated before the final configuration is established.

Benefits Demonstrated by the Project

Eco-friendly construction – The lower weight reduces the transportation carbon footprint. It's also a 100% recyclable material.

Durability

It resists corrosion, moisture damage, and temperature cycling.

Cost effectiveness

The lighter structure simplifies shipping, unloading, transport, and field assembly, reducing transportation and labor costs.

Fast deployment

Two-person teams can install it in half a day. In this case, the CAF structure itself was built in approximately one day once the site and materials were ready.

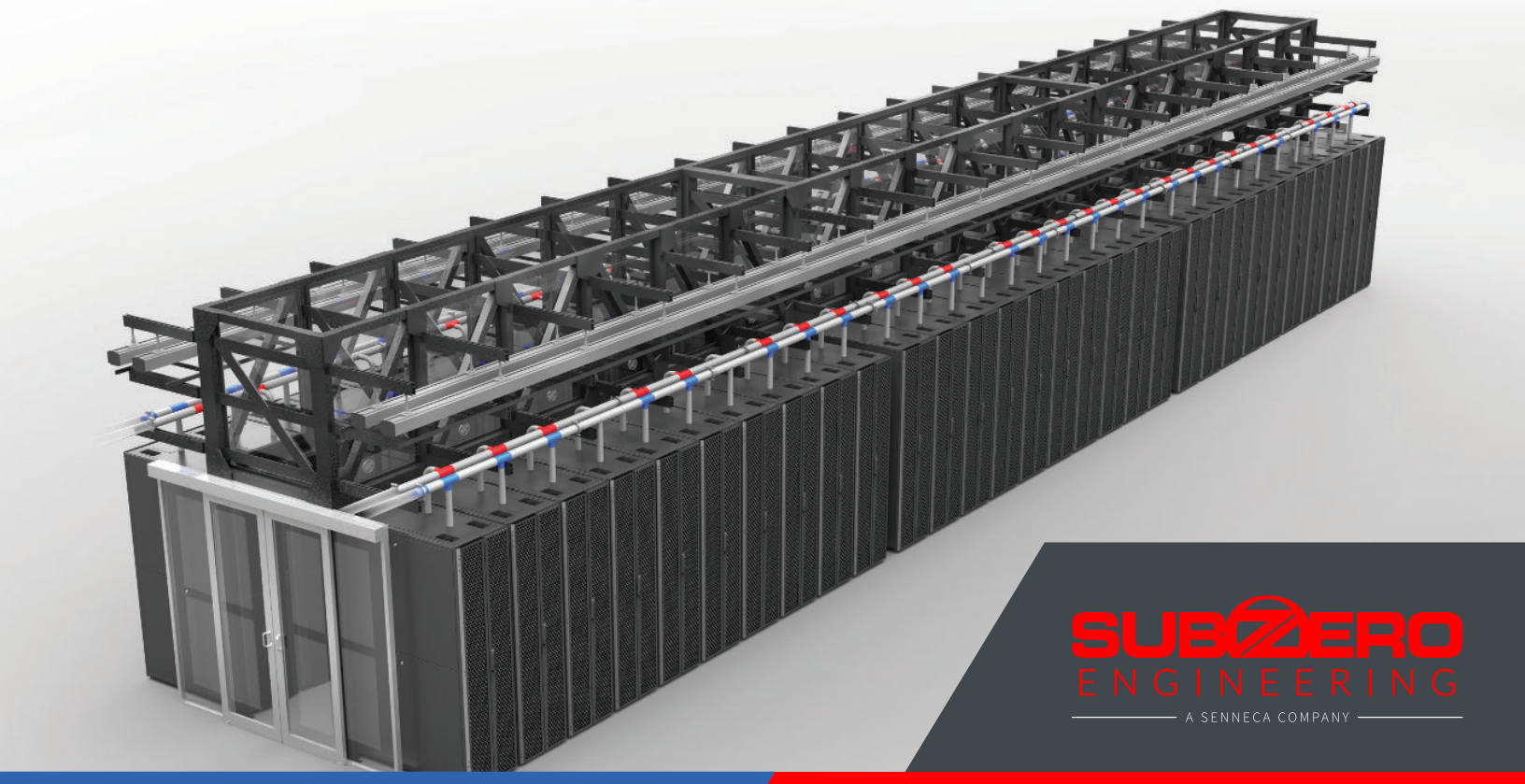
Flexible design

Reconfigurable as deployment scales. This was the clearest and most importantly demonstrated advantage. The structure was customized around existing conditions and configured to support the customer's overhead infrastructure. The completed frame could also be potentially relocated should the customer change the layout of the data hall or reallocate space.

Readiness for AI and high-density computing environments

CAF can also be configured for next-generation high-density and AI deployments, including facilities built on concrete slab floors. It is worth noting that piping and liquid-cooling infrastructure may introduce significant weight. Therefore, load requirements must be carefully evaluated before presenting the system as capable of supporting every AI or liquid-cooling configuration.

Subzero provided the complete design-build service, and the CAF components were manufactured at Subzero's Salt Lake City facility and transported by truck to the customer's facility in Connecticut. Subzero's installation team then completed the field assembly.



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The additional engineering requirement subsequently affected the project schedule. This delay was not representative of the assembly speed of the CAF structure itself, but from the weight concerns identified during the project.

For Subzero, this was an important outcome of the first commercial deployment. The company gained practical experience in identifying structural requirements earlier in the design process.

Beyond Conventional Containment

One of the most significant benefits demonstrated by the project was CAF's ability to perform more than a conventional containment role.

This system provided a structural framework around which the customer could organize containment and infrastructure. Rather than using threaded rod and ceiling-mounted supports to carry cable trays and associated infrastructure, Subzero was able to configure the frame and incorporate structural arms for the customer's overhead infrastructure.

The arms provided a means of supporting overhead infrastructure directly from the frame, reducing the need for traditional ceiling-suspended supports.

This infrastructure-support capability emerged as one of the most important selling points of the system.

Lightweight Flexibility

The lightweight nature of CAF was central to the design. CAF offered a significantly lighter alternative to a traditional steel frame, making it better suited to the existing raised-floor environment. CAF's lower weight also makes transportation, unloading, handling and field assembly easier.

CAF's flexibility is particularly relevant in colocation environments, where data center configurations can change as customer requirements evolve. As the completed CAF structure is lightweight and not permanently anchored directly into the concrete slab, it offers potential for future relocation. Subject to engineering requirements, the frame could potentially be lifted and repositioned by a small installation team. This could allow a colocation operator to move the structure to another part of a data hall or adapt the layout as customer requirements change.

This modularity was an unexpected but valuable takeaway from the installation.

Complete Design-Build Delivery

Subzero delivered the project as an integrated solution rather than simply supplying a manufactured frame. Engineering, design, manufacturing, freight and installation were coordinated by Subzero.

The project also demonstrated that CAF's sustainability credentials, such as its recyclable material and reduced transportation weight, are legitimate additional benefits, even though sustainability was not a primary purchasing driver for this customer.

Conclusion

The first installation demonstrated that CAF can be adapted to challenging site conditions, and that Subzero's engineering capability can bridge the gap when those conditions require a hybrid approach.

The result is a more informed CAF AisleFrame® design-build process. It becomes a deployment that combines lightweight construction and modular flexibility with the engineering expertise required to adapt the system to real-world data center environments.