



Case Study

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Zinc-Plated Steel vs. Zinc Die Cast Fittings Why it Matters in Data Center Applications

Bridgeport Provides Product Solutions to Mitigate the Destructive Potential of Zinc Whiskers in Highly Sensitive Electronic Infrastructure Component Systems for a New Southfield, Mich. Data Center Facility

Background

The United States has thousands of operational data centers, and that number is expected to grow substantially in the years ahead, with thousands more new data centers currently in various stages of development nationwide.

As a result, both retrofitting current operations for demand growth as well as the creation of entirely new facilities require an enormous amount of cable and conduit fittings as they play a substantial role in datacenter infrastructure execution.

Traditional electrical fittings are made of steel with a zinc electro-galvanized protective coating to prevent rust and corrosion as zinc acts as a physical barrier against moisture and oxygen. For this reason and others, zinc has become a mainstay for such use.

However, there is a downside, which can be catastrophic. When steel is zinc plated, such as for fittings, they are susceptible to the formation of zinc whiskers. These



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microscopic, electrically conductive metallic filaments grow on galvanized metal surfaces, and ultimately pose a severe threat to data centers.

Why? Zinc-plated steel relies on a thin zinc coating applied to a steel substrate for corrosion protection. This electroplated zinc layer is a recognized source of zinc whisker growth, especially under long-term, temperature-stable indoor conditions typical of data center white space. While mitigation techniques such as passivation or organic topcoats may reduce risk, they do not fully eliminate the potential for whisker formation over the service life of the product.

Due to this risk profile, zinc-plated steel components are commonly restricted or conditionally approved within data center facilities, particularly in proximity to active electronics, airflow paths, raised floors, and overhead cable systems.

However, utilizing die cast zinc fittings drastically reduces this potential hazard as zinc die cast does not produce the problematic zinc whiskers that can cause short circuits in data centers.

How? Zinc die cast components are manufactured from a homogeneous zinc alloy and do not rely on an applied zinc coating. Because zinc whisker formation is associated with residual stress in thin electroplated zinc layers, zinc die cast materials do not present the same failure mechanism and are not considered a zinc whisker risk.

As a result, zinc die cast components offer:

- Significantly reduced particulate and contamination risk
- Stable microstructure over long service life
- Proven suitability for IT-adjacent and white-space installations
- Corrosion Resistance: The zinc alloy material is highly resistant to corrosion

For data center applications where long-term reliability, electronic safety, and contamination control are critical, zinc die cast components represent a lower-risk and a premium material choice compared to zinc-plated steel. This selection aligns with recognized industry guidance and best practices aimed at mitigating zinc whisker-related failures.

Challenge

Located in Saline Township, Michigan, The Barn is a gigawatt-scale data center campus under development by Related Digital exclusively for Oracle and its customer OpenAI.

Southfield, Mich.-based Shaw Electric Co. and Long Island City, N.Y.- based E-J Electric were contracted for the job, and they realized the severe potential risk while developing The Barn. For such data center applications where long-term reliability, electronic safety, and contamination control are critical, zinc die cast components represent a lower-risk and a premium material choice compared to zinc-plated steel.

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The amount of such fittings required for such a project is immense, and so it required a low-risk alternative for such critical installations. As such, Shaw Electric needed to work with both a distributor and manufacturer that could provide high quality die cast zinc fittings in quantity as well as on time.

Oracle is at the forefront of today's data center operations, and it is also planning for the future. Shaw, and ultimately the project operators at The Barn, needed a supplier that not only manufactures top-tier product that meets every required specification in addition to necessary mass quantities, but reliability in deliverables is also key...there is no time to waste on shipping.

Solution

After Shaw Electric discussed the complexities and required deliverables for The Barn project, they created a plan in which the full quantity of fittings required from a manufacturer had to not only be met, but also had to surpass expectations for quality and customer service.

"Strong relationships often lead to the best solutions," explained Rani Salloum, NSI VP of Sales. "Because of zinc whisker concerns in data center applications, I turned to our Bridgeport product team. They explained how our solid zinc alloy die cast fittings eliminate the issue because they're not zinc-plated. Bryson Allen, NSI Director Product Management and Engineering, developed a technical white paper that helped educate the customer and ultimately led to Bridgeport being specified for The Barn project. That's what makes this industry rewarding—combining trusted relationships, technical expertise, and innovative products to solve our customers' toughest challenges."

Bridgeport develops and manufactures its zinc alloy fittings to the most rigorous industry standards, and its Premium Choice Zinc die cast components are manufactured from a highly engineered zinc alloy and do not rely on an applied zinc coating. As a result, Bridgeport's zinc die cast materials do not present the same failure mechanism and are not considered a zinc whisker risk.

"Once we connected with Bridgeport and learned they were celebrating their 100th anniversary, and with their headquarters, manufacturing, and warehouse facilities located in Connecticut, we determined they were an ideal partner for the project," said A.O. Wood, Executive Vice President at Shaw Electric Co. "Controlling the manufacturing and delivery process from a U.S.-based facility was very important and provided significant value to us on this project."

Bridgeport was able to meet The Barn project's stringent requirements, and supplied the components on time.

Customer Feedback

“For a project of this size, the potential consequences of using antiquated or substandard fittings in a data center were significant, and we knew Bridgeport could provide the die-cast zinc fittings we required,” Wood concluded. “Bridgeport delivered the right product, in the quantity we needed, and on time. Like Shaw (since 1930) and E-J (since 1899), Bridgeport’s history and longevity mean something—trust and reliability in service, products, and customer relationships are vital.”

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For more information on Bridgeport products, please visit nsiindustries.com/bridgeport/.

About Bridgeport

Bridgeport celebrated its 100th anniversary in 2025 as the trusted brand for electricians, contractors, and distributors, delivering innovative fittings and connectors that ensure professional reliability from line to load. With multiple manufacturing locations across the U.S., Bridgeport has delivered high-quality, precision engineered solutions with expert technical support. Our manufacturing capability and supply chain expertise continues to ensure a reliable supply, faster delivery, and consistent performance while offering versatile, high-performance solutions for any application.

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