

Load Application Unit for the Wind Turbine Drivetrain Test Facility at Clemson University

North Charleston, South Carolina



The “load application unit” is located inside an unconditioned building 300 yards from the harbor. The only conditioning will be large fans to ventilate the space to remove excess heat when operating. When not operating, the facility will be subject to ambient coastal conditions. This is an area in a high humidity region with rapid shifts in temperature leading to active condensation on large steel structures.

Hot-dip galvanizing was chosen because if a paint system had been used, scrapes and scratches would have had to be repaired immediately, and on a consistent basis to keep any corrosion of the structure from taking place. Galvanizing’s metallurgical bond and four intermetallic layers of coating protection allow the product to take the wear and tear and extreme conditions required by testing. The sacrificial properties of zinc also allow small scrapes and scratches to be healed over time providing continuous protection. The hot-dip galvanized structure surpassed all performance goals maintaining structural integrity.

This is a one of a kind facility and will be the world’s most capable wind turbine drivetrain testing facility. There will be almost 1,000,000 lbs. of steel components cantilevered off the embedded ring and its surrounding concrete structure. The final mounting surface was accurate to plane within 0.028” over the entire face.

Once the ring was assembled, metrologists came in to take measurements of the entire structure to verify the 192 pipe openings were in the correct locations on all X, Y and Z axes. This proved to be the most difficult part. Typically the distortion caused by welding and galvanizing make it very difficult to ensure the tighter tolerances. In the structural world, a commercial shop generally gets + 1/8”. This particular job had some tolerances in the 1/1000ths of an inch.

The galvanizer took extra steps to reduce the possibility of warping caused by the hot-dip process. As each section was brought back to the fabrication shop from the galvanizer it was placed together to start the formation of the ring. After many days of modifying and measuring over and over, it was finally ready to be locked in place. The splice plates were match drilled to ensure that after shipping the ring would fit back in the correct location. The ring was broken into four sections for shipping from Charlotte, NC to Charleston, NC. There the construction team reassembled the ring and hung it in place.

“If it were not for the galvanizer’s attention to detail, we would not have been able to fabricate and galvanize the structure to be within the customer’s

tolerances. One of the most difficult parts was the schedule. The fabrication had a very tight deadline and completed fabrication of the ring in four weeks. The galvanizer was able to turn around each section very quickly and still maintain high quality. Each section was 7’4” wide so we needed a larger tank or we would have been forced to perform post galvanizing welding. The galvanizer was able to provide the fabricator with excellent service, quick turnaround and top tier quality,” said Brian Schlenker of SteelFab, Inc. ■

Galvanizer

Valmont Coatings - Columbia Galvanizing

Architect

Jerry Walter, Davis & Floyd, Inc.

Engineer

Thomas E. Lorentz, AEC Engineering, Inc.

Fabricator

Glenn Sherrill, SteelFab, Inc.

Owner

Jim Tuten, Clemson University - Restoration Institute

Other

Chris Palmer, Choate Construction

Electrical, Utility, and Communication