

Reaching new heights on One World Trade Center

Metco 16E spray system



The spire superstructure, fabricated by ADF Group Inc. in Terrebonne, Quebec, is comprised of seventeen individual sections that support a lighted beacon that can be seen over great distances, three communication rings and television broadcasting antennae. The total weight of the spire exceeds 680 metric tonnes (750 US tons).

When Drytec Trans-Canada, one of the most modern paint and grit blasting shops in Quebec and an Oerlikon Metco customer for years, was assigned as the contractor for the corrosion protection of the spire by the building's primary owner, the Port Authority of New York and New Jersey, it soon became evident that the sheer size of the construction presented major challenges. The original plan to galvanize the high-strength steel was dismissed as the immense size of the spire pieces, the varying thicknesses, and required double-dipping eliminated it as an option. Neither was painting a choice, as the binders in the paint systems would have compromised satellite communications. The Port Authority required pure zinc for conductivity and a final coating thickness of 10 to 20 mil (254 to 508 μm), which could not be achieved with paint. Nor could electric arc wire spray meet such a tightly controlled coating thickness requirement on the spire's very complex geometry.



139.6 meters, 680 metric tonnes:
The spire of One World Trade Center

Drytec finally demonstrated flame spray technology to the Port Authority, and spent about a year testing flame spray equipment. Eventually, Drytec contacted Jacques Paradis, Key Account Manager at Oerlikon Metco, as they were facing major challenges — amongst them was the required coating specification bond strength of 700 psi (4.8 MPa). Furthermore, Drytec had to qualify each operator to this spec before each shift, write a procedure and show the New York City inspector how they would mask the parts to prevent any overspray.

“After I met the New York City Inspector at the Drytec facility to demonstrate the Metco 16E wire combustion spray gun, and showed how to do the masking and spraying, he was absolutely convinced by the system”, recalls Jacques Paradis. As a result, the inspector recommended the Metco 16E system to Drytec to apply the zinc coating. With this equipment, Drytec was able to achieve a bond strength of 1200 psi (8.3 MPa) on all parts of the antenna, thus meeting the required blast and thermal spray specifications, SSPC SP10 and SSPC-CS23, as well as the Port Authority's adhesion test requirements, ISO 2063, and coating thickness of 10 to 20 mils (254 to 508 μm).

Factbox

All the important information about this interesting project at a glimpse:



Company

Drytec Trans-Canada
www.drytec.ca

Challenge

Corrosion protection of the 139.6 meters (458 ft), 680 metric tonnes (750 US tons) spire of One World Trade Center

Objectives

- Pure zinc; no galvanization, metallization or painting
- ISO 2063
- DFT of 10 to 20 mils

Solution

Metco 16E arc wire combustion spray gun

Location

New York City, USA

Date of Project

2013

The inspector summarized his recommendation in very convincing words: ‘After a few years, I don’t want to go up there with a can of paint to do touch up! If any of your customers have doubt about the coating quality of the combustion wire spray gun, you can tell them the World Trade Center spire has been sprayed with a Metco 16E spray gun!’”, remembers Jacques Paradis smiling.

Each of the 17 sections of the spire arc comprised of 12 interlaced pipes, creating pockets that were hard to reach with the standard configuration of the Metco 16E spray gun. For those areas, Oerlikon Metco’s XT6-18T 45-degree Angular Spray Cap gun extension module was used. For pockets that were impossible to reach, special epoxy putties were applied and sprayed over with cold galvanizing. There was also a very short window between the time of blasting and the application of the zinc coating. High-strength steel corrodes very quickly, so the coating had to be applied within four hours, before the onset of corrosion.

KTA-Tator, a U.S. inspection firm, conducted tests and inspections before the start of each shift; testing took about two hours before application could begin. Approximately 11 ft (3.35 m) of the antenna could be blasted and thermal spray coated within an eight-hour shift.

The first six sections were too big and heavy to be transported, so Drytec rented a hangar near the port to do the final metallizing. ADF Group built each of these sections in three parts in its fabrication shop in Terrebonne, Canada, and then shipped them to the port, where they were welded together. The application of the zinc corrosion coating required the use of three of the wire combustion spray guns at the same time. Drytec kept six on hand at all times to allow for gun maintenance. Each gun was certified and qualified before each shift. The company used 11,500 kg (25,000 lbs) of zinc wire to complete the application.

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With its technology brands – Oerlikon Balzers, Oerlikon Metco and Oerlikon AM – the Oerlikon Surface Solutions division focuses on technologies and services that improve and maximize performance, function, design, reliability and sustainability, which are innovative, game-changing advantages for customers in the automotive, aviation, tooling and general industries and in the luxury, medical, semiconductors, power generation and oil & gas markets.

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