

F148-14 Mabey Bridge Wind Turbine Towers and ARC140

Metallisation Equipment Protecting Wind Turbine Towers

Metallisation's customer, Mabey Bridge, recently metal sprayed a number of Endurance Windpower X-Series wind towers, using the ARC140/S350-CL system, to protect them from corrosion.



Mabey Bridge is a specialist supplier of high quality steel bridges, infrastructures, wind turbine towers and heavy plated structural steel work. Based in Chepstow, Mabey Bridge has extensive experience in the production of wind turbine towers, with a specialist factory designed to produce up to 150 towers per year. The company manufactures wind towers from flat sheet to final fit out at its Chepstow factory. The whole process from rolling, welding, coating and fitting out a tower takes around seven to ten days.

Wind turbine towers are exposed to harsh external environments, particularly those in an offshore location. Mabey Bridge is well-established in the wind energy market, serving several major manufacturers and increasing the number of UK-made components in wind energy installations.

In this project, the 30 metre high X-Series wind towers have been metal sprayed on behalf of Endurance Wind Power. The metal spraying process used is a typical specification for this type of structure. The surface of the wind towers is prepared by blasting with a mix of GH25 and GH40 steel grit using a 12.5mm nozzle at nine bar pressure. The areas to be metal



sprayed are grit blasted to standard SA3, while the areas that are painted, and not metal sprayed, are prepared to standard SA2.5. Mabey Bridge has a dedicated blast booth with programmable rotators, which provides a safe, clean and efficient area for the blasting process.

During the QA/QC process, the profile and cleanliness of the blasted surfaces are checked and approved before metal spraying and painting can begin.



The blasted sections are then transferred on the blast rotators to the metal spray booth. The metal sprayed coating cures instantly so the tower sections can be rotated directly on the outside diameter. For a land based turbine, various areas are zinc coated with typically 60-120 microns of Zn, using the Metallisation ARC140/S350-CL twin wire arc system. The metal sprayed zinc coating is applied to areas more susceptible to corrosion due to assembly damage and normal usage. Specifically, these areas include the studs, brackets, internal fixing areas, the connection flanges located at both ends, plus 300mm internally and externally from the flanged ends. The base section of the tower has an access door, where the internal and external surfaces of the tower are zinc metal sprayed to the top of the access hatch plus 300mm.

The Metallisation ARC140 system uses a synchronised push/pull wire feed arrangement to feed the zinc wire from the two, 250kg dispensing drums to the spray pistol. The synchronised feed system allows extremely reliable wire feed up to 20 metres from the pusher unit to the pistol. This enables Mabey Bridge to efficiently spray the inside and outside of their longest tower sections without having to move the heavy wire drums or power supply. They simply take the pistol and supplies package right up through the inside of the tower and can reach all areas from the ends of even their



longest 36m tower section. The ability to have the power supply outside the dusty spraying area also improves reliability, efficiency and makes preventative maintenance a simpler and cleaner process.

After metal spraying is complete, the tower sections are transferred to dedicated paint spray booths. A typical paint specification would now see all areas of the tower section, except the flanges, being sprayed with around 50 microns dry film thickness (DFT) of a 2-component zinc rich epoxy primer coat. The flanges are left unpainted, as the profile of the metal sprayed zinc aids the strength and friction of the bolted joints. There is an approximate curing time of two hours at 40 to 50°C. The mid-coat, commonly a 2-component high build epoxy, is then sprayed at around 120 microns DFT for the internal surfaces of the tower and 150 microns on the external surfaces.



There is a further two hours curing time required at 40 to 50 °C. The final top coat to be applied is around 50 microns DFT of 2-component gloss acrylic polyurethane to the external surfaces of the tower. There is approximately four hours curing time required at this stage, again at 40 to 50 °C.

This specification of zinc metal spray and paint is quite typical for land based wind towers. Some other specifications call for more or all areas of the tower to be metal sprayed. Some tower users also specify zinc/aluminium alloy as a metal coating. Aluminium is also considered for off-shore towers, following the lead from the oil and gas industry. Other areas of the complete wind turbine are also metal sprayed including support steelwork, jackets, boat docks, nacelles and rotor hubs.

Metallisation is the only UK developer, manufacturer and worldwide supplier of metal spraying equipment and consumables. With extensive experience, knowledge and expertise, Metallisation provides a wide range of engineering coatings, as well as anti-corrosion solutions, to diverse industries on a global scale.

Metallisation Arcspray equipment is the ultimate solution to today's demands for high performance coatings. The Metallisation ARC140/S350-CL, used in this project, is a unique blend of ability and innovation. The recently updated system enables the operator to set the spray current independent of wire



type before starting the job, enabling easier setup and protection of the system from over-current. The control function is controlled by a simple PLC, which ensures improved reliability as less component parts are required. The efficiency and effectiveness of the ARC140, as well as the whole process from blasting through to metal spraying, can be seen in a video, simply visit Metallisation's website www.metallisation.com

Alex Wilson, Production Engineer, at Mabey Bridge, says: "I am so pleased with the Metallisation equipment. We purchased two of the ARC 140 systems with the powered drum trolleys and 20 metre supplies packages, which allowed us to gain access to the longest tower sections we can produce. This saved so much time and made the spray operators tasks much easier. Metallisation's after sales service and customer support is second to none and is aligned with our own service commitments. I would not hesitate to recommend Metallisation."

Due to the success of the new wind turbine facilities, Mabey Bridge has developed its services and is now a recognised tubular products supplier. With the new facilities, which opened in May 2011, they can produce and coat tubular sections from 500mm up to 4.8



metres in diameter and up to 36 metres long, with a wall thickness of up to 70mm. They now produce tubular products for the civil engineering industry, such as dock monopiles, and the oil and gas industry, including monopiles, meteorological masts and drill conductors.

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