The company

A manufacturer of high performance polyurethane coatings for the protection of wind turbine towers and blades.

The problem

Traditional polyurethane based coatings require tin based catalysts to help speed up the cure as the coating film takes a long time to set and can lead to water spotting during storage. Faster curing polyaspartic topcoat technology has a propensity to dry spray in high humidity and shop conditions have to be adjusted accordingly.

The company was aiming to develop a polyurethane top coat with fast cure and suitable working time across a spectrum of application conditions. The polyurethane top coat had to conform to the current VOC regulations (420g/l) and provide the specified chemical, UV and weathering resistance. The final coating was to be applied to glass fibre plastic on the blades of wind turbines.

The solution

The company approved Incozol 2 (mono-oxazolidine) and Incozol 4 (bis-oxazolidine) in a two component solvent based aliphatic polyurethane coating based on HDI in combination with a polyester/acrylic soft segment. The oxazolidines can be added into both the polyol and isocyanate side of the formulation at an addition level of 3-6%. The adoption of oxazolidine technology allowed for the production of a sprayable coating that could be applied at thickness levels between 75 - 150 microns.

The benefits

Polyurethane coatings are widely used as top coats for the protection of wind turbine towers and blades. The polyurethane chemistry can be manipulated to provide low temperature application and curing characteristics. These processing characteristics enable tower sections to be shipped in a few hours, whilst at the same time providing the long term coating performance requirements (>15 years) and meeting global standards.

The versatility of the polyurethane chemistry enables the development of low VOC coatings with the desired performance properties for such a challenging application.

By incorporating both the Incozol 2 and Incozol 4 into their formulation, the company was able to produce a moisture free polyurethane top coat with the combined advantage of fast cure and long pot life. Formulation latitude was provided by the oxazolidines with the Incozol 4 bis-oxazolidine able to increase cross linking where improved film toughness and performance is required. The final aliphatic polyurethane coating conformed to the VOC regulations whilst providing low temperature and fast cure characteristics.