Applied Polymer Developments (APD) is an independent consultancy working in the field of composite materials. Many of its customers work in the wind energy sector, which uses fibre-reinforced resins to construct turbine blades.

The Isle of Wight-based company helps with the testing, design and troubleshooting of blade manufacture. Wind energy currently accounts for up to 50% of the UK’s energy production and there are plans to extend this with new developments in the North Sea (Dogger Bank), which will double the current capacity. It’s therefore no surprise that APD’s wind energy customer base continues to grow.

**Building better turbines**

The heart of the issue is that wind turbines are simply getting bigger. In 2015, the first generation of large offshore turbines were 7MW with 80m long blades. The latest designs being prototyped are 15MW with blades that are 115m long. The 35m increase in length means each of these blades can now weigh up to 80 tonnes.

**Monitoring blade manufacture**

The Agilent 4300 handheld FTIR spectrometer is extremely useful to check that the resin is properly mixed during the infusion process of a blade’s composition, ensuring that they last for an extended period of time.

Fourier-transform infrared spectroscopy also enables the polymerisation process to be monitored. Having such a fast and portable analysis technique optimises the production cycle while maximising the blade quality and production capacity. The handheld unit can also be used to check the critical adhesive bonds in the blades and to assure that these surfaces are clean and ready for bonding on the success of the UK’s wind energy production, believes Ness.

“As these wind turbines get bigger, the risk of technical problems and failures increases, and this is where wind customers need our support in collaboration with Agilent Technologies,” says Derek Ness, APD’s Managing Director. “Agilent’s analytical tools can be used to optimise the blade manufacturing process, as well as identifying contamination and investigating blade failures.”
Identify the causes of blade failure

Despite everyone’s best efforts, blades sometimes fail; what’s important is identifying why it’s happened. APD uses Agilent’s gas chromatography mass spectrometry (GC-MS) tools to carrying out failure analysis on blades, often using multiple Agilent platforms.

“At APD we have an Agilent single quadrupole instrument that is ideal for the detection and identification of trace contaminants that may be present on failed surfaces,”

“The use of the GC-MS, in tandem with the FTIR, is ideal as the two techniques complement each other and can handle demanding analytical tasks.”

Derek Ness

The close cooperation between APD and Agilent continues to help the development of analytical procedures that support the growing wind energy market. This will undoubtedly have a long-term impact on the success of the UK’s wind energy production, believes Ness.