AW-LAKE
PROCESS FLOW MEASUREMENT

APPLICATION SPOTLIGHT

Monitoring Adhesive Flow in Windmill Blade Manufacturing

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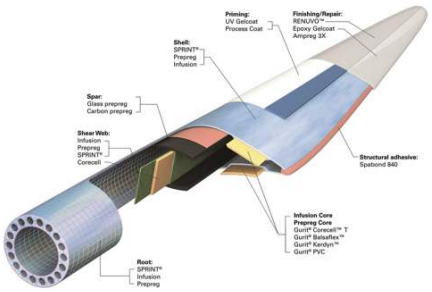

APPLICATION:

Windmills, often called wind turbines are a clean source of generating energy without adding to the carbon footprint. Rotor blades of the wind turbines are constructed of glass and carbon fiber composites to maintain high strength, low weight, and long service life. Structural adhesives bond components of the blade together. Windmill blade epoxy potting is conducted in a vacuum machine.

Once molded, the top and sides of rotor blades are cast separately, then joined to form a unit by a bonding process. Adhesives in this bonding process are composed of glass fiber, carbon fiber, silicone, and other highly viscous and abrasive composite materials. Flow meters offer real-time flow measurement of resin output for both the epoxy potting of individuals blades and molding them together to create one unit.

PRODUCT SUPPLIED:

- **Helical Gear Positive Displacement Flow Meters (SRZ Series)**

CHALLENGE:

A fast and sustainable bond is required for both applications – a challenge for measurement technology. Even the smallest errors can lead to serious additional cost. The flow meters also needed to withstand very high pressure drops.

Operating parameters of the individual blade potting application include:

- Media: Resin
- Temperature: 40°C
- Pressure: 50bar
- Measuring range: 20L/min
- Density: 1.15kg/L
- Viscosity: 50 – 5000 cp

Operating parameters for the bonding blades together:

- Media: Adhesive
- Temperature Range: 68°F to 104°F (20°C up to 40°C)
- Pressure Range: 1,740 to 2,900 psi (120 to 200 bar)
- Measuring Range: 8 up to 12 l/min
- Density: 20 °C: 1,150 kg/m3
- Viscosity: 50,000 to 300,000 cSt

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SOLUTION:

In the blade potting application, a SRZ40ST Helical Positive Displacement Flow Meter regulated by a PLC (programmable logic controller) maintained a resin flow rate of 20 – 40 kg/min for a two-component mixture with an accuracy of 0.5% resolution.

A SRZ40ST Helical Positive Displacement Flow Meter also was specified for the molding application. The meters withstand extensive abrasion forces and provide accurate measurement data even at high viscosities. The meters also were regulated by a PLC, providing an accuracy of 0.5% resolution

The flow meters addressed the manufacturer's requirements for the following certifications:

- CSA/UL – Certification
- Accreditation according to ISO 17025
- Pressure Equipment Directive 97/23/EC, 2014/68/EU
- HP0 – Certification
- Explosion protection according to 2014/34/EU

RESULTS:

The Helical Flow Meters offer:

- Very fast response time
- High measuring accuracy, high resolution
- High-quality materials
- Suitability for highly viscous and highly abrasive media
- Suitability for the toughest applications (special bearing concept)
- Compact design for simple system integration

The customer is very satisfied with the SRZ40ST Helical Positive Displacement Flow Meter in both the epoxy potting of blades and molding them together to create one unit. Over 2000 helical positive displacement flow meters have been used for more than three years without any failure. The extraordinary performance of the SRZ40ST Flow Meters in the wind turbine blade application shows their remarkable technical stability and extremely suitability for this high viscosity application.

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