BUILDING TRUST

RELIABLE REPAIR INJECTION

Introduction

The trend within the wind industry is towards higher capacity turbines. As blades get longer and more complex to manufacture, the number of minor defects such as voids or dis-bonds within the composite structure invariably increases. Over its typical lifetime, a blade may see over 60 million rotational cycles, and any defect left untreated during its manufacture may give rise to stress concentrations leading to cracking and premature failure.

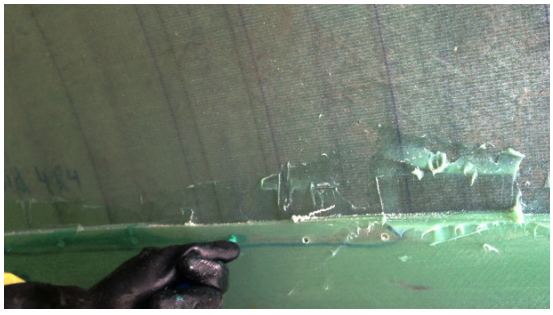
Having a robust and reliable solution to repair these is vital to ensure the longevity of the blades in operation and to reduce the number of field service repairs.developed SikaPower®-800, a low-shrinkage epoxy repair injection adhesive that is chemically identical to current blade bonding adhesives. It offers very similar mechanical properties, a higher toughness to resist cracking and can also fully cure without the need for external heating.

Material selection

In an ideal world, the solution selected to repair voids or disbonds would have final properties that are the same as the original blade. However, the properties that make bonding pastes suitable for manufacturing large composite structures, such as long open time, high sag resistance and relatively long thermal curing profiles, are not suited for repair injection where low viscosity and full room temperature curing capability are beneficial or preferred.

The material used should have little or no shrinkage as this will require further remedial work to fully fill the voids. Shrinkage voids within an existing repair cause localized stress concentrations which can also initiate detrimental cracking. This is a well-known disadvantage of existing fast-curing solutions on the market.

It is therefore inevitable that an alternative to the blade bonding adhesive is required for injection bonding and ideally, it should have as similar properties as possible in the other areas. Sika has developed SikaPower®-800, a low-shrinkage epoxy repair injection adhesive that is chemically identical to current blade bonding adhesives. It offers very similar mechanical properties, a higher toughness to resist cracking and can also fully cure without the need for external heating.



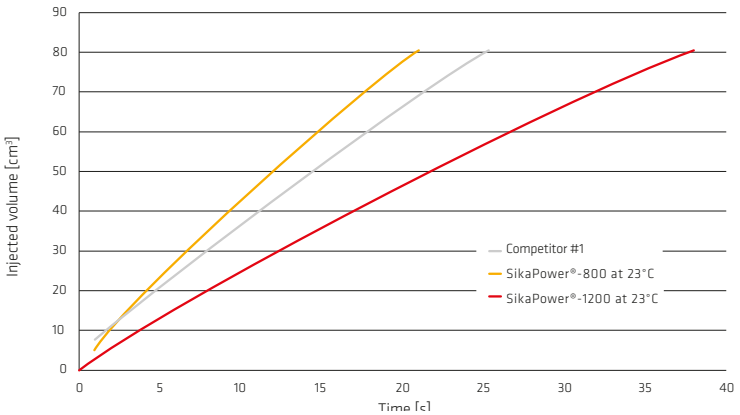
KEY FEATURES AND BENEFITS

- Excellent injection properties
- Chemically identical to original blade materials
- Similar mechanical properties
- Low shrinkage
- Improved toughness
- Ambient temperature curing
- No post curing required

Application and curing

INJECTABILITY

SikaPower®-800 has been formulated to offer improved injectability properties compared to current commercially available solutions. This saves time during injection repairs and thus increases customers' production efficiency.



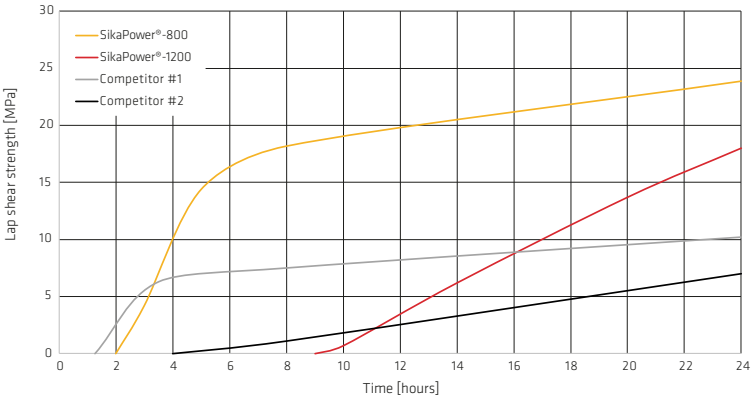
Injection volume vs. time

CURING

It can be very time consuming and expensive to reach the required post-cure temperature during the repair process. The physical mass of the blade acts as a large heat sink drawing heat away from the repair area, increasing the time it takes to reach a minimum level. Field repairs also have the added issue of the prevailing ambient temperature adding to this effect, especially in the colder months.

The optimal solution is to therefore have a material that can fully cure without the need for subsequent post curing. SikaPower®-800 has been developed to reach a handling strength of 1-2 MPa after 3hrs and reaches 95% of final strength after 24hrs.

Subsequent post curing has a limited effect on increasing the mechanical properties and is therefore not necessary.



Strength vs. time

For more details contact us or visit our website:
www.sika.com/wind