Gurit

RENUVO™

UV Curing Composite Technology

RENUVO™ BLADE REPAIR

RENUVO™ offers a novel approach to the manufacture, maintenance and repair of today's wind turbine blades. RENUVO™ uses UV light from readily available lamp equipment to achieve full cure in just a few minutes.

RENUVO™ blade repair materials are designed to be handled at temperatures as low as +5ºC. This greatly widens the operating window for carrying out repairs and dramatically reduces the turbine downtime. RENUVO™ materials are easy to handle, requiring no mixing or awkward hand-impregnation of heavy glass fabrics. The RENUVO™ product range consists of two main types of material:

RENUVO™ MPS: RENUVO™ MPS is a multi-purpose, single-component resin system supplied in a cartridge. For small 'maintenance' repairs such as leading-edge erosion, small holes and other surface defects, RENUVO™ MPS can be used on its own. With its grease-like consistency it can be easily applied with small spreading tools and can be cured in just 90 seconds with the small, battery operated hand-held, LED lamps.

RENUVO™ PP: For larger repairs, where the blade laminate itself needs to be replaced or reinforced, RENUVO™ prepreg (PP) is used. This consists of a biaxial or unidirectional fabric which is already impregnated with the RENUVO™ resin system. The material, which has a slight 'tack' to it, can be easily cut to the desired patch size and can be used in single or multiple layers. Excellent bonding to the existing blade laminate is achieved through the use of the MPS resin acting as an interface. Full cure is obtained in as little as 180 seconds for repairs up to 3mm thick, using the larger, more powerful 2000mW/cm^2 UV lamps. For large repairs, this lamp is 'indexed' over the repair area using a specially designed lamp mounting system that ensures that each part of the patch receives the correct UV dose.

For the worldwide distribution of the RENUVO™ UV curing lamination system, Gurit has signed a distribution agreement with AeroNordic ApS. Additionally, AeroNordic provides related ancillaries such as UV lamps, training and validation services.

AeroNordic ApS is a Danish composite engineering firm with extensive composite knowledge and testing capabilities, primarily focussed in material and process qualification projects for wind turbine blades with in-house manufacturing, processing and testing facilities. Because of this unique combination of engineering and testing capabilities, AeroNordic has worked intensively with the UV curing range of RENUVO™ materials.

AeroNordic is well established to handle small volumes at short notice, a typical requirement for the blade maintenance and repair market. This market is generally characterised by agility and small volumes and will be met by centralising the global distribution with AeroNordic ApS.

The product range

	PRODUCT	DESCRIPTION	TYPICAL APPLICATION	PAGE
MULTI-PURPOSE SYSTEM	RENUVO™ MPS (+5°C to +30°C)	Multi-Purpose System - single component resin for working conditions from +5°C up to +30°C.	Small surface 'maintenance' repairs. Cure with lamp.	3
PREPREG	RENUVO™ PP BIAX (+5°C to +30°C)	600g BIAX Glass Prepreg for working conditions from +5°C up to +30°C.	Structural repair of turbine blades, where new laminate needs to be added. Use in combination with RENUVO™ MPS and cure with a suitable UV lamp.	4
	RENUVO™ PP UD (+5°C to +30°C)	600g Uni-directional Glass Prepreg for working conditions from +5°C up to +30°C.		
RENUVO™ CONSUMABLES	UV Lamps	Portable, battery operated UV Lamps compatible with RENUVO™.	Quick curing, high penetration up to 8 layers of RENUVO™ Prepreg.	5
	Consumable kitting	Peel-ply, UV protective eyewear, gloves, vacuum bags, rollers, tapes.	All ancillary materials are proven for the UV based cure process.	6
	Training	AeroNordic training ensures that knowledge of the product is transferred to make projects a success from day one.		

RENUVO™

Multi-purpose system (MPS)

- Mono-component resin system
- Thixotropic paste consistency for ease of application
- Excellent handling through a wide temperature range
- Suitable for use on polyester or epoxy substrates
- Compatible with current topcoat technology
- Cured with battery operated lamp in just 90 seconds

+5°C - +30°C
+41°F - +86°F

RENUVO™ MPS is a multi-purpose UV curing resin system designed for use in wind turbine blade repair.

Typical Applications

The RENUVO™ MPS can be used on its own for repairs where laminate does not need to be replaced or added. This includes surface pitting and erosion, as well as small holes.

RENUVO™ MPS is also used in combination with RENUVO™ prepregs as part of a structural repair. In this application it can provide a smooth, easily sandable top surface to the final repair patch.

Application Process

RENUVO™ MPS is a single component resin so requires no pre-mixing. The product should be dispensed using a standard cartridge gun and applied out of direct sunlight if possible, as this will extend the working time. Plastic spatulas can then be used to apply and spread the material and adding a layer of dry peel-ply over the repaired area helps to ensure that the material is evenly spread. Curing is achieved by using the battery operated hand-held lamp and after 90 seconds of cure the material can be sanded and painted.

RENUVO™

Biaxial & uni-directional prepreg (PP)

- Biaxial and UD material formats to enable close matching of the blade laminate
- Excellent drape and tack through a wide temperature range
- Suitable for use on polyester or epoxy substrates
- Compatible with current topcoat technology
- Cured with 640mW/sq.cm lamp in just 180 seconds

+5°C - +30°C
+41°F - +86°F

RENUVO™ PP is a range of UV curing prepregs designed for use in wind turbine blade repair. The prepreg format removes the need for manual weighing and mixing of wet resins and avoids the difficulty of hand-impregnation of heavy glass fabrics. The prepreg is clean to handle and eliminates the waste associated with mixing pots, spatulas, brushes and loose glass fibres.

Typical Applications

RENUVO™ prepregs can be used to both replace damaged laminate, or to add extra reinforcing layers on top of existing laminate. The conformability of the RENUVO™ prepregs makes them especially suitable for patches that need to wrap around and reinforce the leading and trailing edges of the blade.

The RENUVO™ prepregs can be combined to make patches with multiple fibre orientations and with different thicknesses. This enables many different blade laminates to be replicated with just a few RENUVO™ prepreg types.

RENUVO™ PP is supplied in 400mm wide, 20lm rolls in both biaxial and unidirectional formats. A 600g/sqm version of each is maintained as a standard product, although other fabric configurations may be possible in certain circumstances.

Application Process

The prepreg materials are cut to the shape of the required patch out of direct sunlight. If the patch consists of more than one layer of prepreg these are pre-consolidated using the portable RENUVO™ HVC equipment, or other heated vacuum table. This consolidates the individual prepreg layers into one, low-void patch that is then easy to apply to the blade.

The blade surface should be lightly abraded and cleaned of dust and debris to ensure good adhesion. Special surface wipes are available to aid this process. Once the prepreg patch has been applied to the blade surface, an additional layer of MPS can be applied on top of the reinforcement patch to achieve a smooth, easily sanded upper surface. The patch is then cured using a suitable UV lamp.

RENUVO™ PP should be applied out of direct sunlight to extend its working time. When combined with RENUVO™ MPS, a complete laminate repair up to 3mm thick can be cured in minutes with a powerful lamp.

Portable, battery operated UV Lamps compatible with RENUVO™

MobileCure

- UV output, 2.5W/cm^2
- Beam spread, 115
- Battery life = 45 -70 minutes
- Light handheld lamp encased in a user-friendly design
- Quick curing, high penetration up to 8 layers of RENUVO™ Prepreg
- Includes Lithium ion batteries, charging station and heavy-duty travel case

UV lamps

The MobileCure provides ease of handling and excellent operation for a competitive price. The lamps with high energy output can be turned on and off with no cool down or warm up periods. These versatile units consist of one Li-Ion battery that enables up to 45 minutes of continuous curing in all relevant climate. The UV lamps are specially constructed to feel comfortable in your hand, even after hours of operation. The lamps have a built-in pistol-type handle.

Application

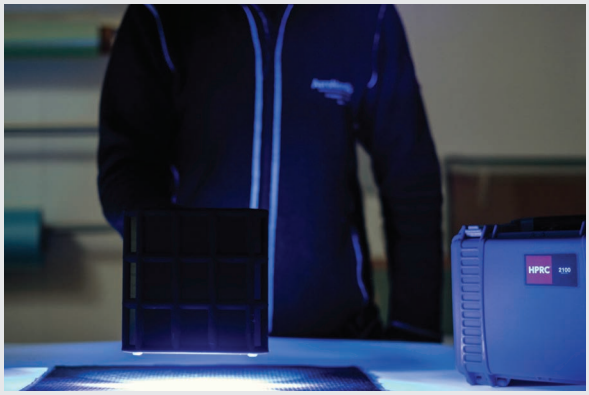
Repair of composite UV prepreg laminate up to 8 layers thickness. Suitable for both in-factory and outdoor curing as well as easy handling in rope access repair situations.

Consumable kitting

To ensure high quality repairs with RENUVO™ in the shortest possible time, AeroNordic provides customer specific support in terms of ancillary materials for blade repair. These support kits consist of peel-ply, UV protective eyewear, gloves, vacuum bags, rollers, tapes etc. Since they are custom made for the specific application, the ancillary materials are cut to the required repair lengths and volumes. AeroNordic can also provide standard support kits that contain the standard materials used for most wind turbine blade repairs. All ancillary materials are proven for the very specific UV based cure process.

Training

The purpose of AeroNordic providing training is to ensure that the knowledge of the product is transferred to the relevant audience and help make projects a success from day-one. It is to strengthen the training system and product/process knowledge transfer for engineers, technicians and material suppliers. We provide both lab scale test subjects along with onsite/ production support for the customer.



For the distribution of Gurit RENUVO™ and independent sale of related ancillaries and services contact our global distribution partner:

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