



Multi-Brand Services – GE Universal Fleet Solutions

Quality Engineered Solutions for Drive train and Blades

GE's Multi-Brand expertise

Universal Fleet Solutions (UFS) is our Global Multi-Brand Services platform. Our mission is to safely provide a broad spectrum of services supporting the wind industry, regardless of the Original Equipment Manufacturer (OEM). Our focus is to provide our customers with a single focal point to maintain and repair their fleets, improving availability, reliability and energy output. Coupling GE's field expertise with our strong technology development, GE can help to safely and strategically reduce costs and downtime.

Benefits

Reduce Lifecycle Cost

Whether catching a small issue early, or enhancing turbine performance, GE's suite of UFS offerings improve project economics.

Better Performance, More Production

GE's repair and replacement offerings minimize downtime and reduce performance losses, resulting in greater production, and enhanced asset value.

Exceptional Safety and Quality

Safety is an integral part of our services and repairs, built into each process. Our extensively trained field specialists deliver high quality service with integrity, transparency and compliance with applicable standards. Safety is especially paramount with crane selection, where GE's technical rigor ensures the right crane for the job with industry leading lift margin requirements.

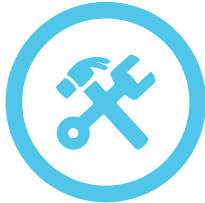
Our Services

GE's team of experienced professionals brings unsurpassed and proven industry expertise to bear on our Multi-Brand services. Our key differentiators are



Technician Skills

GE has established Multi-Brand training partnerships and curriculum. These trainings are provided to our engineering and field teams in order to execute with safety and coordinated speed.



GE Multi-Brand Engineering

- Aerospace and power generation criteria to guide development of our devices and services
- GE's dedicated Multi-Brand engineering execution teams are also involved with development of procedures, processes and tooling...they are familiar with all execution aspects
- GE's return to service times for exchanges and repairs meet or outperform industry averages by ~10-20%



Materials

Any materials provided with GE Multi-Brand services are sourced from qualified, reputable vendors using tested material and validated according to international industry standards and GE's internal requirements.



Safety

- Traceably compliant with OSHA standards
- GE transparently shares our certification documentation for all critical / overhead / crane-attached tooling and equipment
- GE's development processes for devices or equipment adhere to or exceed requirements such as OSHA 1926.251, ASME B30.20 and ASME

Our Multi-Brand mechanical and service expertise is ever-expanding, here's where we are today:

We strive to couple our dedication to safety, vast field expertise and technologies with each of our Multi-Brand Uptower drivetrain repair, Component exchange and Operations & Maintenance offerings. We tailor major component exchange and Uptower Repair events to minimize crane requirements. Our specialized technicians strive to safely minimize downtime with quality and standardized component exchanges. GE methodology and tooling technology enables reduced crane requirements and higher wind speed limits (including our expanding craneless options in many applications).

Repair Services – Drive Train

With over a decade of operating thousands of wind turbines, GE’s technology expertise has advanced on both new design and field service – with a keen focus on delivering lower lifecycle costs on one of the most expensive components. GE’s extensive service capabilities aim to perform as much up-tower as possible, reduce the need for cranes, and enable upgraded replacement options when possible. Contact us to see how GE’s technology and service offerings can solve your challenges.

Drive train UFS Capabilities

✓ Available

	Vestas				Gamesa	Siemens	Acciona		Senvion	Suzlon	Nordex	MHI	Negmicom	Fuhrlander
	V47	V82	V80	V90/100	G8X, G9X	SWT 2.3	1.5MW	3MW	MM92	S88	N90/100	2.4	2.4	2.4
Uptower Repairs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Gearbox Repairs			✓	✓	✓	✓			✓		✓		✓	✓
Component Exchange			✓	✓	✓	✓	✓	✓		✓		✓		

GE is open to develop any new capability to respond to your needs.

Blade Lifecycle Management

Blades are the cornerstone to efficient production of sustainable, clean wind energy. GE’s design knowledge and composite expertise shapes our engineered blade service solutions to ensure this vital component remains in peak condition. With extensive blade service capabilities across multiple platforms, GE has an array of solutions to ensure asset performance and lower lifecycle costs.

Inspections, Diagnosis and Prognosis

With a constant priority and focus on keeping owner’s blades in peak condition, GE offers a variety of blade inspection and monitoring solutions, to identify actionable emerging issues before they become a problem, to all turbine types.



Pinwheel Photography

- High-resolution ground-based camera capable of detecting external defects
- Performed with rotor idling for highest picture quality while minimizing downtime (20-30 mins/WTG)
- Detects broad range of defects: cracks, bonding issues, tip damage, lightning damage and leading-edge erosion
- Images processed via Artificial Intelligence + Human Engineering for maximum defect capture
- Suitable for most annual blade inspections or if requested more frequently by local authority / certifying body



Unmanned Aerial Vehicle (UAV) automated flight

- High-resolution camera on a UAV with automatic flight program. Full scan of Blade surface area without moving the rotor or pitching blades; results in faster field data acquisition
- Access to web platform to review and store images. Enables better asset management and planned repair campaigns
- Disposition performed by GE experts and supported by experts in engineering, manufacturing and fleet management
- Wind turbine is shut down for approximately 30 minutes; scans up to 15 turbines per day

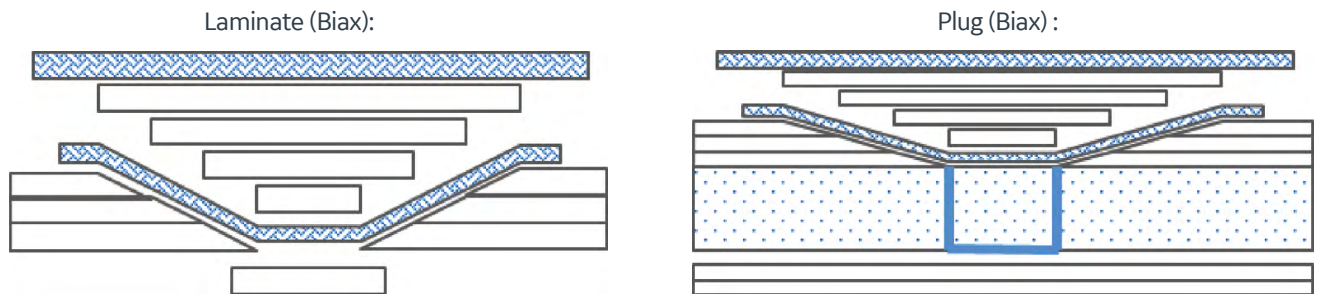


SABRE

- Thermal Imaging (IR): blade anomalies under cyclic load display a temperature change resulting from micro-friction of the fibers and the thermoelastic material properties
- Technology can detect those minute thermal variances and detect anomalies with a high degree of accuracy
- Ability to detect surface and sub-surface damages and pinpoint cracks, delamination and bonding flaws below the blade's surface

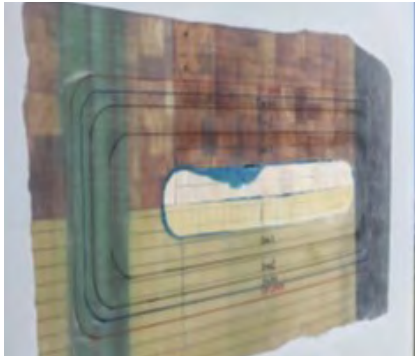
Repairs

GE's growing team of experienced professionals brings unsurpassed expertise in composite and fiberglass repair. GE's repair solutions are developed to meet even the most severe damage, on any blade type. GE can repair damage ranging from Level 1 (Cosmetic) to Level 5 (Major Structural).

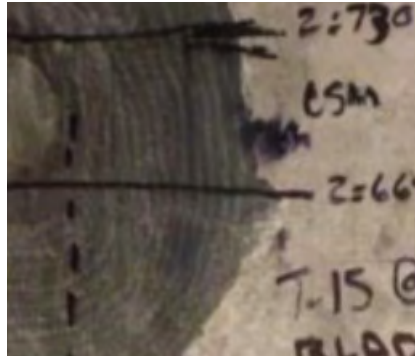


Our Multi-Brand Blade repairs are designed to ensure the lay-up matches the removed plies, and are performed per OEM drawing when provided:

- Aerospace criteria used to tailor repair schedule and process (GE patent)
- PC based model to generate laminate schedule for quick response
- In general blade repairs only achieve ~70-80% original strength properties, however GE repairs are designed to achieve ~100% of their original strength properties
- Repair is designed to provide environmental seal
- Detailed digital repair reports are field-generated, engineering approved and provided to you soon after each repair is approved by our engineering team



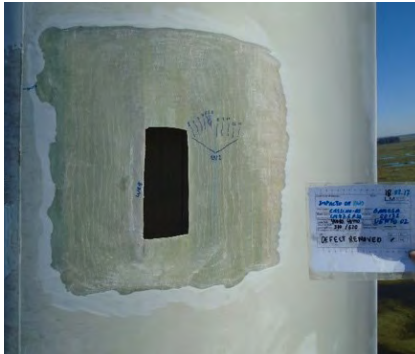
Fiberglass Repair



Carbon Repairs



External and Internal Lightning Repairs



External and Internal Lightning Repairs



Small to Large Sandwich Repairs

About GE Renewable Energy

GE Renewable Energy is a global leader in advanced technology focusing on wind, hydro, and solar power generation services for a cleaner, more productive world. Combining onshore and offshore wind, hydro and innovative technologies such as concentrated solar power, GE Renewable Energy has installed more than 400 GW capacity globally to make the world work better and cleaner. Our tailored solutions range from single component to full turnkey power plants.

**Contact your Digital Services Sales Leader
for more information on gaining more insights into your wind farm.**

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