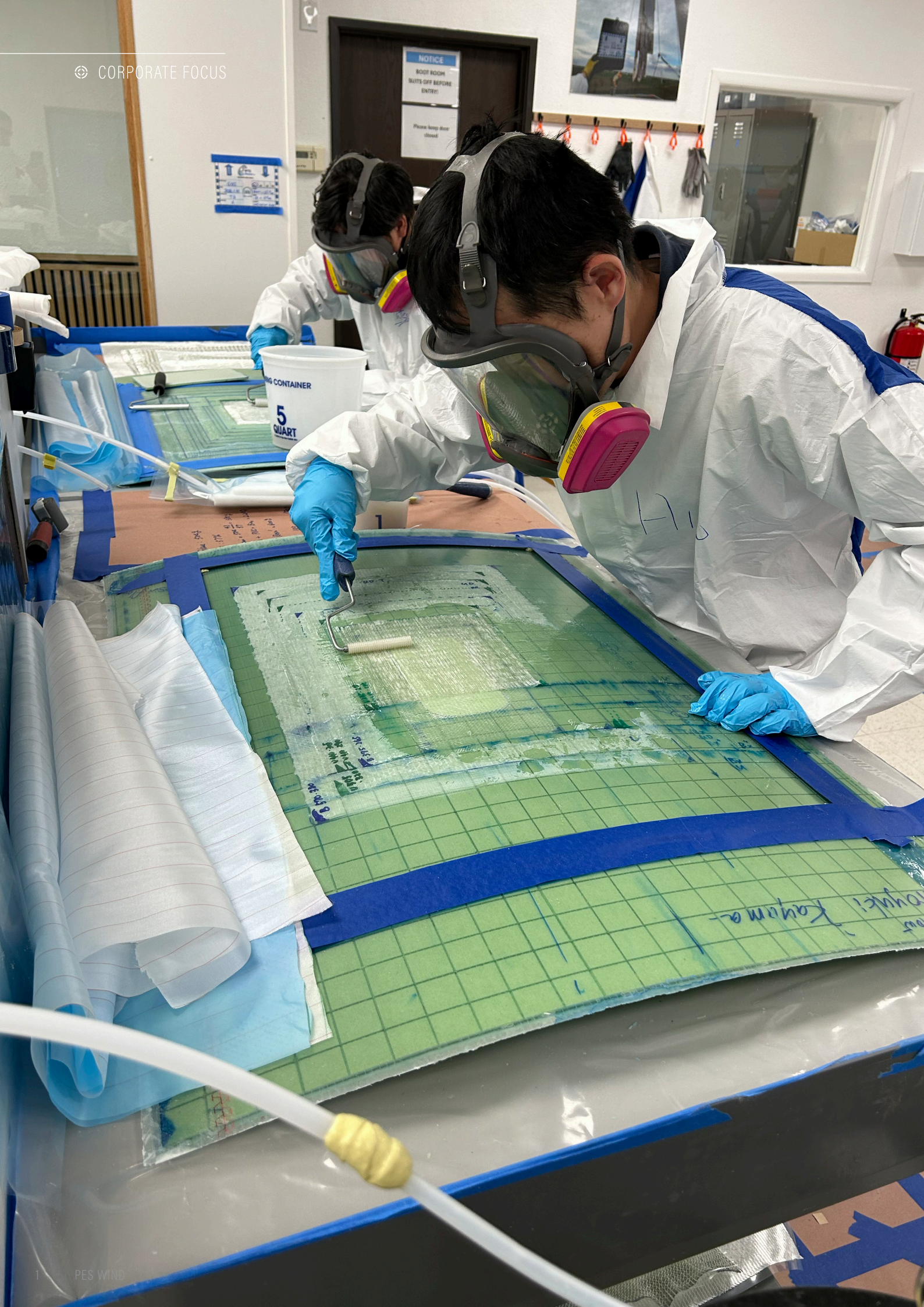
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Raising the standard in turbine blade repair and composite materials training

With the launch of its Colorado Springs Training Center, Global Blade Services is redefining wind turbine blade repair education in North America. The facility combines OEM aligned expertise, DNV certified standards, advanced carbon repair capability and competency driven training to meet the growing demands of next generation composite technologies.

In 2024, Global Blade Services (GBS) marked a defining milestone in the advancement of wind turbine blade repair and composite materials training in North America with the opening of its state-of-the-art USA Training Center in Colorado Springs, Colorado. Founded by Mike and Shirin, the facility was established with a clear and ambitious objective: to bring world-class blade repair expertise, structured competency based training and internationally aligned quality standards to the United States wind energy market.

At a time when turbine blades are growing longer, lighter and more structurally complex than ever before, the need for highly trained, competency verified composite repair technicians has never been greater. In just over a year, the GBS USA Training Center has evolved from a bold concept into a nationally recognized center of excellence, helping redefine how blade repair training is delivered, validated and aligned to global certification frameworks.

A vision built on technical authority and educational excellence

The expansion of the US wind fleet has accelerated rapidly, with turbine blades now exceeding more than 80 meters in length and incorporating increasingly advanced composite systems, particularly high stiffness carbon fiber reinforcements in spar caps and other load bearing structures. These technological advancements demand repair methodologies that are precise, structurally informed and aligned with engineering.

Mike and Shirin recognized early on that closing the technician skills gap in the United States would require more than traditional on the job mentoring. It required a formalized training ecosystem grounded in structured education, documented competencies and compliance driven delivery.

Shirin, a certified teacher with more than 30 years' experience in education, has been instrumental in embedding professional educational methodology into the DNA of the GBS USA Training Center. Her expertise in curriculum design, structured assessment, progressive learning pathways and measurable competency validation ensures that training is not simply delivered, it is retained, understood and demonstrably achieved.

Her integration of teaching science, combined with Mike's in-depth experience in composite engineering, creates a powerful learning environment where students build knowledge step by step, reinforcing theory with hands on application.

This fusion of educational rigor and engineering depth is a defining characteristic of the Colorado Springs facility. Every course is built around clearly defined learning objectives, documented skill assessments and progressive capability development.

Built on OEM foundations, supported by Orla Sørensen

From its inception, the GBS USA Training Center has been supported by Orla Sørensen, the original developer of Vestas' blade repair training programs. His involvement ensures that the curriculum remains aligned with OEM level structural repair philosophy and manufacturing standards.

This foundation guarantees that technicians trained at GBS USA understand not only repair execution techniques, but the structural logic behind them, how repairs integrate with blade design intent, load path restoration and long-term asset integrity.

Comprehensive technician development: levels 1, 2 & 3

The GBS USA Training Center delivers the full Global Blade Services certification pathway, structured to build technicians from foundational understanding through advanced structural authority.

In addition to its proprietary GBS framework, the Colorado Springs facility is GWO (Global Wind Organisation) approved, reinforcing its alignment with internationally recognized wind industry training standards.

Importantly, the GBS Level 2 Structural Repair course meets and exceeds the requirements of the GWO Blade Repair Training Standard, allowing the facility to offer dual certification. Candidates completing Level 2 receive both GBS Level 2 Structural Repair Certification, an GWO Blade Repair Certification.

This dual recognition provides internationally portable credentials while validating advanced structural repair capability.

Level 1 Foundation blade repair technician

Level 1 establishes essential competencies in composite materials, safe work practices, surface preparation, resin systems, and introductory structural repair methodology, instilling a disciplined, safety first mindset.

Level 2 Competent blade repair technician (Dual GBS & GWO Certification)

Level 2 introduces increasingly complex repair scenarios including core replacement, laminate reconstruction, bonding systems, vacuum assisted techniquesquality assurance/ quality control documentation and structural integrity awareness. Graduates receive both GBS and GWO certification, enhancing employability and compliance alignment.

Level 3 Advanced structural & major repair technician

Level 3 prepares technicians for safety critical structural work including spar cap restoration, shear web repair, major rebuilds, engineering aligned validation, advanced composite systems and carbon repair methodologies.

Advanced structural and carbon repair technician: leading the US market

GBS USA provides the only blade specific carbon repair course in the United States delivering formalized carbon structural repair training. Programs address carbon fiber mechanics, hybrid laminate transitions, high stiffness reconstruction, vacuum infusion systems and post repair validation, ensuring technicians remain aligned with next generation blade technology.

Carbon repair samples completed by candidates during the advanced structural and carbon repair courses are further validated by our third party non-destructive testing partner RCON NDT, rcon-ndt.com, industry leading specialists in composite materials inspection, utilizing the latest phased array ultrasonic inspection technologies.

This independent validation ensures that completed repair samples are assessed beyond surface level inspection, evaluating internal laminate consolidation, void content, bond integrity and structural continuity without destructive testing.

By incorporating third-party phased array inspection into the training process, GBS reinforces a culture of quality assurance and compliance while giving candidates valuable insight into the NDT processes used to verify composite structural integrity in real world shop and field environments. This additional layer of verification strengthens alignment with DNV standards and emerging IEC requirements, further elevating the credibility and technical depth of the training program.

In-house composites testing and materials validation laboratory

A defining feature of the GBS USA Training Center is its dedicated in-house composites testing and materials validation laboratory, a capability that elevates the facility beyond a training center into a technical authority environment.

As turbine blade materials continue to evolve, the importance of understanding composite behavior at a material level has become critical. Structural repair quality is directly influenced by fiber architecture, resin chemistry, curing conditions and environmental variables. Recognizing this, GBS USA has invested in laboratory capabilities that allow for comprehensive material testing, validation and inspection.

The in-house laboratory supports testing and analysis including:

- Tensile strength testing of composite laminates
- Fiber volume fraction and resin content analysis
- Resin viscosity measurement and control
- Cure profile evaluation and gel time testing
- Materials hardness testing
- Failure mode analysis
- Microscopic laminate inspection

Materials can be inspected under electron microscope magnification, allowing for

detailed evaluation of fiber wet out, void content, consolidation quality, interlaminar bonding and fracture characteristics.

This laboratory capability serves multiple critical functions:

Training enhancement: students gain deeper understanding of composite behavior, seeing firsthand how material preparation, vacuum consolidation and curing parameters influence structural performance.

Quality assurance alignment: Testing reinforces alignment with DNV standards and emerging IEC requirements by validating material properties and repair methodologies.

Research & continuous improvement: the lab provides a controlled environment to evaluate new materials, refine repair techniques and analyze repair outcomes.

Forensic insight: failure analysis and microscopic inspection allow for deeper understanding of structural degradation and repair effectiveness.

By integrating laboratory science into technician development, GBS ensures that repairs are not only performed correctly, but understood at a structural and material level.

This commitment to material validation reinforces the center's broader mission: to build technicians who are not simply repair operatives, but technically informed composite specialists capable of supporting the next generation of blade technologies.

Partnership and DNV standards: WTG Blades LLC Global Certification leadership

GBS USA is closely partnered with WTG Blades LLC. In fact, both companies are owned and operated by Mike and Shirin. WTG Blades LLC holds DNV shop approval and repair process certification under DNV-SE-0436:2022-09 Shop Approval in Renewable Energy. It also applies the standard DNV-SE-0441:2021-10 Type and Component Certification of Wind Turbines, based on CR-SADNV-SE-0436-12362-0.

This approval covers both shop and field repair of blades. WTG Blades LLC is currently the only company globally certified to this specific DNV shop approval standard for renewable energy blade repair. The GBS USA Training Center trains technicians to this DNV standard, aligning curriculum, documentation, competency validation and repair methodologies with internationally audited requirements.

Strengthened leadership and instructional depth

The strength of the GBS USA Training Center lies not only in its curriculum and certifications, but in the depth of experience and leadership guiding its delivery.

In 2025, the center's instructional leadership was further strengthened with the appointment of Chris Hannon as Training Manager. Chris previously served as a Vestas repair instructor at the Isle of Wight blade manufacturing facility in the UK, one of Vestas' most established composite production and repair training sites.

During his tenure with Vestas, Chris was responsible not only for delivering factory based blade repair instruction, but also for supporting the development and global rollout of standardized blade repair training programs. His work extended beyond the UK, contributing to technician upskilling initiatives across multiple international regions and ensuring alignment with OEM engineering standards and evolving turbine platforms.

His experience spans theoretical classroom delivery, advanced composite methodology training, hands-on structural repair supervision and competency validation at OEM level. Having trained technicians globally for Vestas, Chris brings a comprehensive understanding of platform-specific repair variations and field execution realities.

Supporting Chris is Adam Lund, Lead Instructor, who has more than 10 years of experience as a Siemens Blade D Technician. Adam's field based repair experience across Siemens platforms provides direct operational insight into structural repair execution, environmental challenges and composite reconstruction methodologies.

Between Chris's global OEM instructional expertise and Adam's Siemens field experience, the instructional team covers all major blade types and repair methodologies active in the US market.

Operational oversight of the Colorado Springs facility is led by Mike, Training Center Manager.

Mike previously served as the USA technical authority and Houston based Operations Manager for North Sea Lifting, an offshore company globally recognized for uncompromising safety and engineering discipline. He also played a critical role in developing subsea engineered rigging and lifting training programs for BP America and Subsea7, ensuring documented engineering competencies were supported by structured instructional frameworks and validated competency systems.

His background in compliance governance, competency development, and risk-managed operations directly informs the disciplined culture of the GBS USA Training Center.

Closing the skills gap: the military veterans training initiative

Recognizing the accelerating complexity of modern blade technologies and the growing gap between technician supply and industry demand, WTG Blades LLC partners with GBS USA to deliver a structured US military veterans training program designed to develop the next generation of highly competent blade repair technicians.

As turbine blades become larger, incorporate advanced carbon reinforcement systems, and operate under increasingly rigorous compliance frameworks such as DNV and emerging IEC standards, the industry requires technicians who possess not only technical skill, but discipline, procedural awareness and a safety driven mindset.

The military veterans training program is built on the understanding that US veterans represent a proven and highly capable workforce. Veterans bring discipline, accountability, safety awareness and experience operating within structured procedural environments, qualities that align naturally with the compliance driven nature of wind turbine blade repair.

Through this partnership, veterans enter the structured GBS Levels 1 to 3 training pathway, aligned to DNV standards and supported by GWO certification where applicable. Participants receive comprehensive theoretical instruction, hands on composite repair training, structured competency validation and documented certification upon completion.

The program is designed not simply as training, but as a career pathway, developing veterans into fully competent, certification backed repair technicians capable of supporting shop and field operations under internationally recognized standards.

At the same time, it provides a meaningful transition from military service into the renewable energy sector, offering long-term career stability in an industry supporting national energy resilience and sustainability goals.

By investing in this initiative, WTG Blades LLC and GBS USA are strengthening the renewable energy workforce while honoring the capability of those who have served.

Supporting the future and meeting IEC TS 61400-32

As the wind industry continues to evolve, international technical standards increasingly define expectations around blade inspection, repair methodology, documentation control and lifecycle asset integrity.

GBS USA is committed to supporting and meeting the requirements set out in the newly developing standard IEC TS 61400-32 General Requirements of Blade Operations and Maintenance.

By proactively aligning training methodologies, competency validation systems, documentation practices, and quality assurance processes with IEC TS 61400-32, GBS positions itself ahead of regulatory evolution.

This commitment ensures alignment with emerging global best practices and future ready compliance as IEC TS 61400-32 becomes an established benchmark.

Defining the future of blade repair in North America

Through structured education, DNV aligned training, GWO dual certification, advanced carbon expertise, veteran workforce development and proactive IEC alignment, the GBS USA Training Center has established itself as a benchmark facility for wind turbine blade repair training.

From Colorado Springs, a new standard is being set, where education, engineering authority, certification alignment and workforce development converge to support the continued expansion of renewable energy across the United States and beyond.

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