3D scanning wind turbines

A practical guide: How to harness 3d scanning for asset management and efficiency

DIS CREADIS

Wind energy's upward trajectory

In Europe, countries will need to install 30 GW of new wind farms every year between now and 2030 to meet the objectives established in the Fit for 55 designed to reduce the European Union's greenhouse gas emissions[1]. In the U.S., the Biden administration has stated it wants to achieve 30 gigawatts of offshore wind alone by 2030[2]. The aim is to finalize environmental reviews of 16 offshore wind projects by 2025, priming the industry for up an uptick in manufacturing, assembly, supply chain and installation optimizations[3]. Leading OEMs, with their longstanding heritage of reinvention, are primed to be the earliest leaders to benefit from the spread of renewable wind systems.

All of these political and regulatory goals entail a major acceleration in the expansion of wind energy and pressure on OEMs and Owner/Operators/ISPs. They will be forced to become as calibrated as possible to benefit from the extensiveness, speed, and importance of growing wind power demand.

[1]. European Council website; Fit for 55
[2]. The White House website; Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs
[3]. Reuters Events website; White House expands offshore wind approval team after hiking targets

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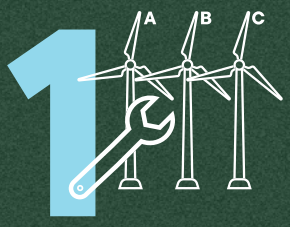
Addressing the wind sector's challenges

Maintaining wind turbines is an intricate task, encompassing supply chain enhancements, manufacturing finesse, operational efficiency initiatives, energy production boosts, and more. As the industry sets high standards, some pivotal trends emerge:



Multi-brand operation & maintenance (O&M)

Where an entity – OEM, self-servicing owner/operator, or Independent Service Provider (ISP) – services varied turbine models.

Repowering

Involves updating existing turbines with newer technology, replacing parts like the nacelle to enhance efficiency and extend the turbine's lifespan.

Upgrades & modification

Focus on implementing targeted improvements to existing turbines to boost their performance and reliability, (resulting in optimized efficiency and extended operational life).

Each of these trends come with a unique set of challenges, however. DIS / CREADIS' customers have benefited from our 3D Scanning services for a foundational phase in achieving success.

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The size and complexity of maintaining wind turbines is an integrative engineering effort ...

Wind industry painpoints

While these trends herald promise, they also pose challenges. With over 700 engineers and a quarter-century of experience, the DIS/CREADIS team collaborates with leading OEMs, developers, owners, and operators navigate these emerging trends. We've identified recurring wind turbines issues where the solution can be found in 3D Scanning:

Inaccessible turbine data

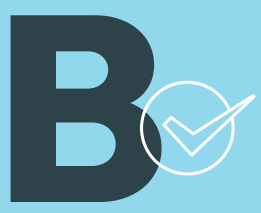
Lack of OEM turbine design data hinders effective service, maintenance, and upgrade strategies. This gap often leads to inefficiencies and increased operational risks.

Solution

Utilize 3D Scanning for reverse engineering, deriving measurements, and geometric models to inform service protocols. This approach provides detailed insights into turbine structure and functionality, enabling more informed decisions and streamlined maintenance processes.

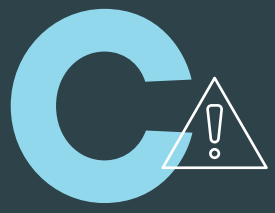
Subpar asset management

Deformations in turbine components necessitate advanced tech solutions for understanding their implications. These deformations can significantly impact turbine efficiency and longevity if not properly addressed.



Solution

Use 3D Scanning for detecting deformations and assessing quality, facilitating accurate prognosis. The technology helps in early identification of potential issues, allowing for timely intervention and maintenance to prolong turbine life and optimize performance.



Expensive, intrusive turbine repair travel

Diagnosing onshore and especially offshore turbine issues is costly and time-intensive. The logistical challenges often exacerbate the maintenance costs and extend turbine downtime.

Solution

Embrace 3D Scanning for digital walkthroughs, reducing unplanned downtime, and capturing spherical imagery for O&M documentation. This innovation not only minimizes the need for physical inspections but also provides comprehensive data for efficient remote diagnostics and planning.

Throughout the evolution of the wind industry, capturing and leveraging detailed data has generated gains in the asset maintenance, productivity, and profitability of turbines. Amid the great renewable transition happening in the U.S. and Europe, OEMs and Owner/Operators/ISPs must provide the underpinnings of the wind asset management tools, processes, and practices that are in line with its momentum and maximization.

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Clear advantages of 3D scanning

3D Scanning is pivotal for asset management, ensuring precision that saves time and money while enhancing wind turbine longevity. This technology captures assets with a precision that traditional methods can't match. Whether it's for Building Information Modeling (BIM), creating Piping & Instrumentation Diagrams (P&ID), or developing comprehensive documentation, 3D scanning is the foundation for data-rich, informed decisions in asset management benefitting the wind industry in numerous ways:

Enhanced cost-effectiveness and profits

Maximizing uptime

Greater turbine integrity

Efficient large surface inspections

Precise, quick results

Enhanced corporate reputation

[1] kilder

The future through experience

As the global wind turbine fleet grows, the role of 3D scanning in maintenance and repair is becoming increasingly vital. One major advancement is the integration of 3D scanning with digital twins, allowing for enhanced simulations and performance analyses. With turbine designs pushing boundaries, 3D scanning will be paramount in ensuring quality and precision in newly manufactured components. The process of repowering older turbines, replacing outdated parts with modern ones, will also rely heavily on the detailed insights provided by 3D scans.

Emerging integrations with Augmented Reality (AR) and Virtual Reality (VR) promise immersive training and maintenance experiences. Furthermore, the advent of drones equipped with 3D scanning technology will revolutionize turbine inspections, especially in remote areas. Finally, as 3D scanning melds with advanced data analytics and Artificial Intelligence, operators can expect richer insights, driving both operational efficiency and turbine longevity. In essence, 3D scanning is set to be a linchpin in the evolving wind energy landscape.

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Get in touch to discuss your opportunities within operation and maintenance strategies.

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