JFE Engineering Corporation
Remote Blade Damage Assessment and Wind Turbine Restart Decision System for Lightning Strikes

Akita Floating Offshore Wind Demonstration Project

Research & Development Overview

[O-6]: Remote Blade Damage Assessment and Wind Turbine Restart Decision System for Lightning Strikes

Background & Challenges

▸ Background

・Floating offshore wind turbines are located farther offshore, making on-site inspections more difficult than for bottom-fixed offshore wind turbines

・Main cause of wind turbine shutdowns: blade damage caused by lightning strikes

- Lightning strikes are the most common cause of failures and accidents (Fig. 1)
- Blades account for the largest proportion of failure and accident locations (Fig. 2)

⇒ According to NEDO data, lightning strikes are the primary cause of blade accidents

・Wind turbines must shut down when lightning is detected

⇒ Prompt condition assessment is critical for determining whether the turbine can be restarted

▸ Issues

・Offshore locations face extended delays in on-site inspections due to vessel scheduling, weather restrictions, and distance from base ports

・These prolonged inspection times reduce turbine availability due to lightning-related shutdowns

Developing a Remote Blade Damage Assessment and Wind Turbine Restart Decision System for Lightning Strikes can solve this issue

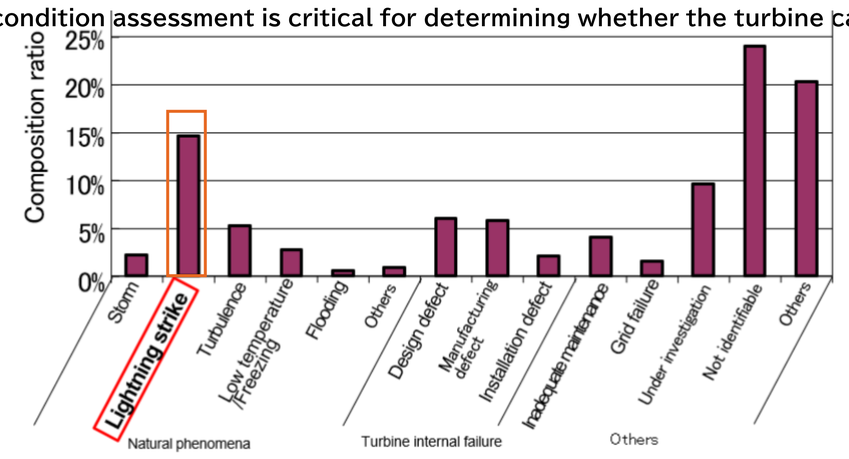


Fig. 1.Causes of Failures and Accidents (FY2004–2015)
Source: NEDO FY2016 Report on Wind Power Generation Failures and Accidents

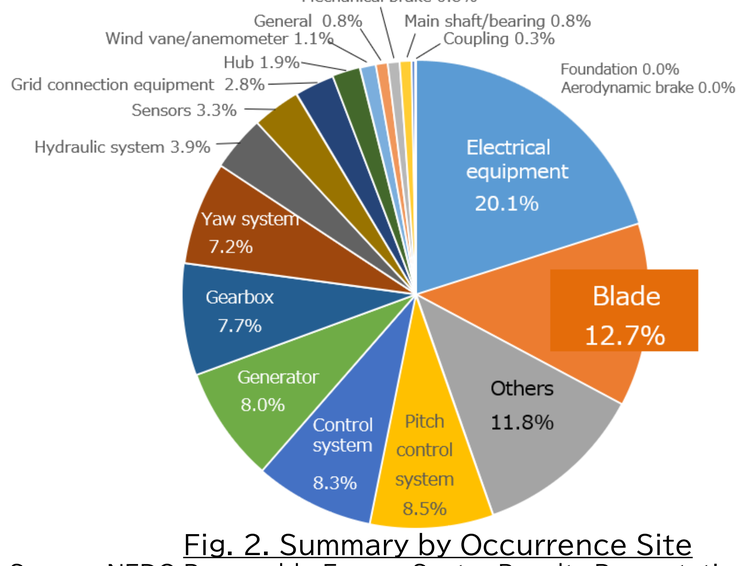


Fig. 2. Summary by Occurrence Site
Source: NEDO Renewable Energy Sector Results Presentation Materials
”Survey of Domestic and International Trends on Wind Turbine Failure and Accident Conditions, Cause Analysis, and Early Recovery (July 2025)”

Research & Development Overview and Future Prospects

Research & Development Details

Develop and demonstrate a system that assesses the extent of blade damage caused by lightning strikes and determines restart feasibility within a specified time frame

- ☐ Development of Blade Damage Assessment Technology
- ☐ Construction of Post-Lightning Restart Decision System ※5
- ☐ Demonstration at Floating Offshore Wind Sites

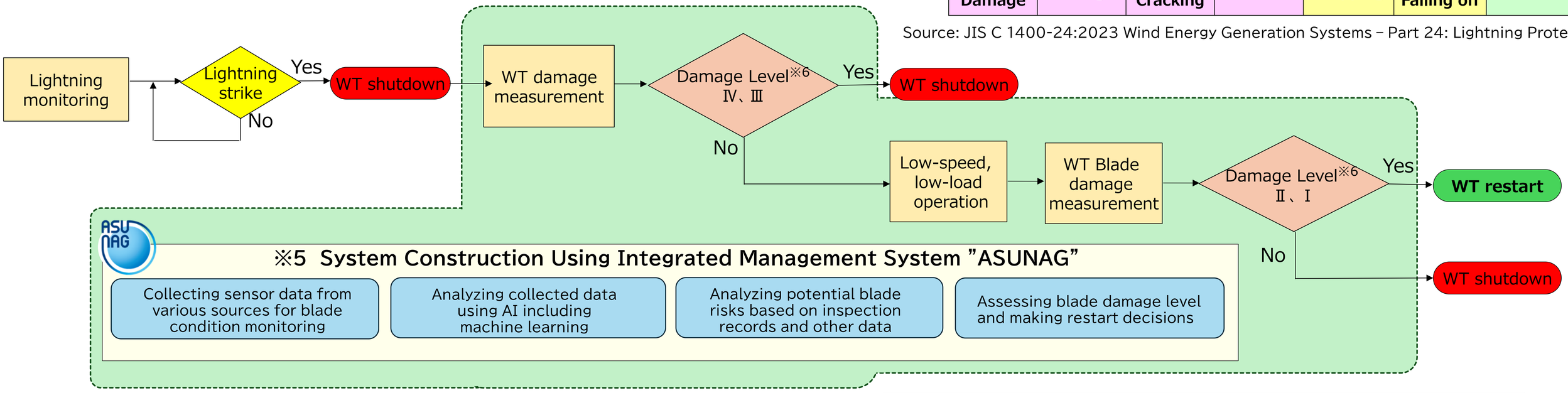
⇒ Reduction of Downtime

※6 Blade Damage Level

Ⅳ-a	Ⅳ-b	Ⅲ-a	Ⅲ-b	Ⅱ-a	Ⅱ-b	Ⅰ
Catastro-phic Damage	Burn Damage	Bond weld Cracking	Edge Crack	Surface Stripping	Receptor Loss / Falling off	Minor Event

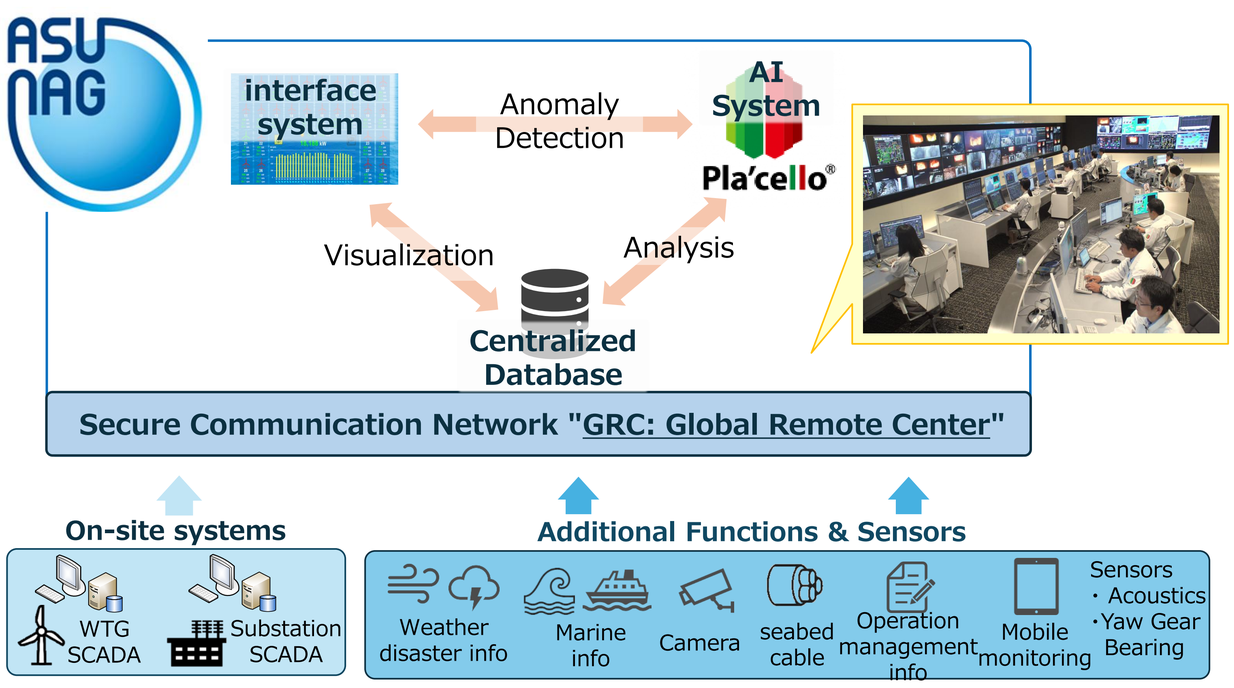
Source: JIS C 1400-24:2023 Wind Energy Generation Systems – Part 24: Lightning Protection

Wind Turbine Restart Decision System Flow

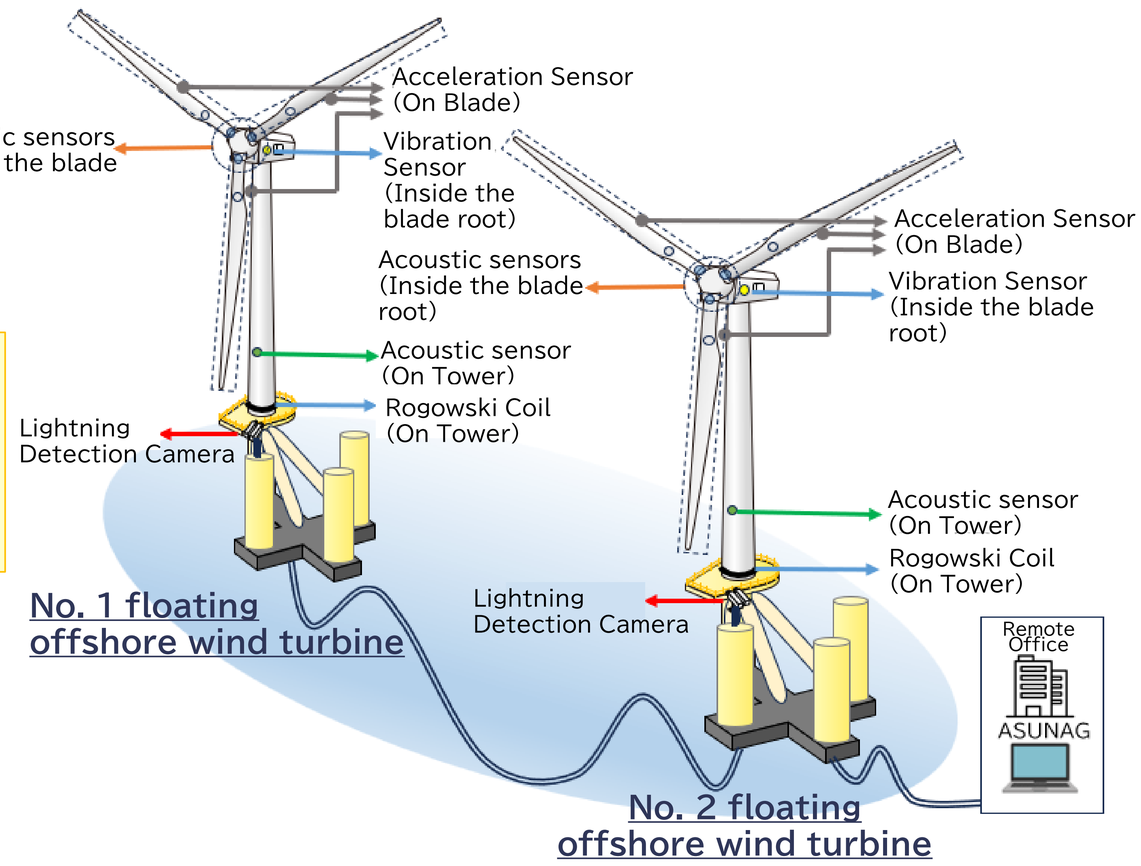


Integrated Management System ”ASUNAG”

Implementation of ”ASUNAG,” a system that digitizes and centrally manages all information in addition to integrated monitoring of on-site SCADA (wind turbines and substations), based on a secure communication network (GRC).



Sensor Equipment Layout for Floating Offshore Wind Turbine Demonstration



Sensors will be installed on both wind turbines (total of 2 units) during the demonstration to increase lightning strike detection opportunities and enhance data reliability.