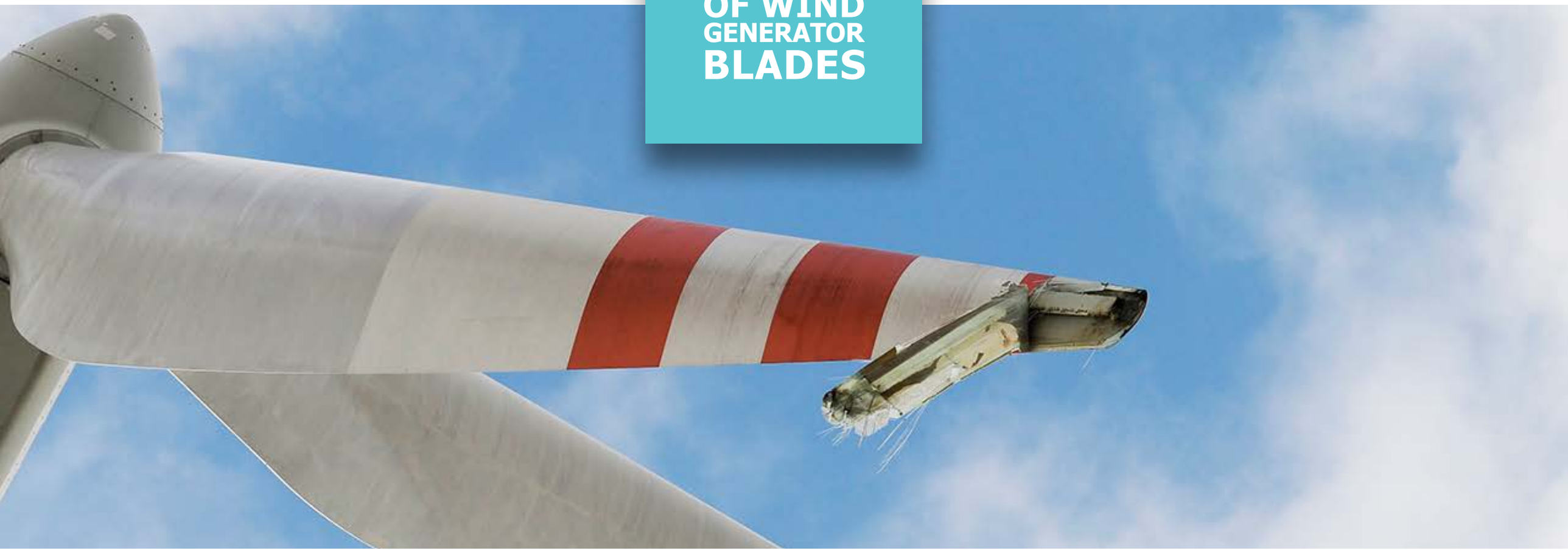
INSPECTION & REPAIR OF WIND GENERATOR BLADES



THE STYLE OF OUR COMPANY IS BASED ON

SAFETY, RELIABILITY AND QUALITY

ISO 9001
ISO 14001
ISO 18001

INSPECTION & REPAIR OF WIND GENERATOR BLADES

OFFSHORE / ONSHORE



Rotor blades are most affected by the environment and receive the highest loads in comparison with other parts of wind generators.

Maintenance of blades requires both extensive experience and deep technological knowledge.

Regular technical maintenance as well as the use of up-to-date technologies allows extending the lifetime of wind turbine generators.

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

SERVICES









Bearing in mind the current trend for the rapid development of the renewable energy sources industry, the **Gridin's Group** company is gradually expanding its range of services in the field of maintenance of wind generators.

By using the rope access method, **Gridin's Group** specialists can execute inspection and repair works for wind generator blades.

Services rendered:

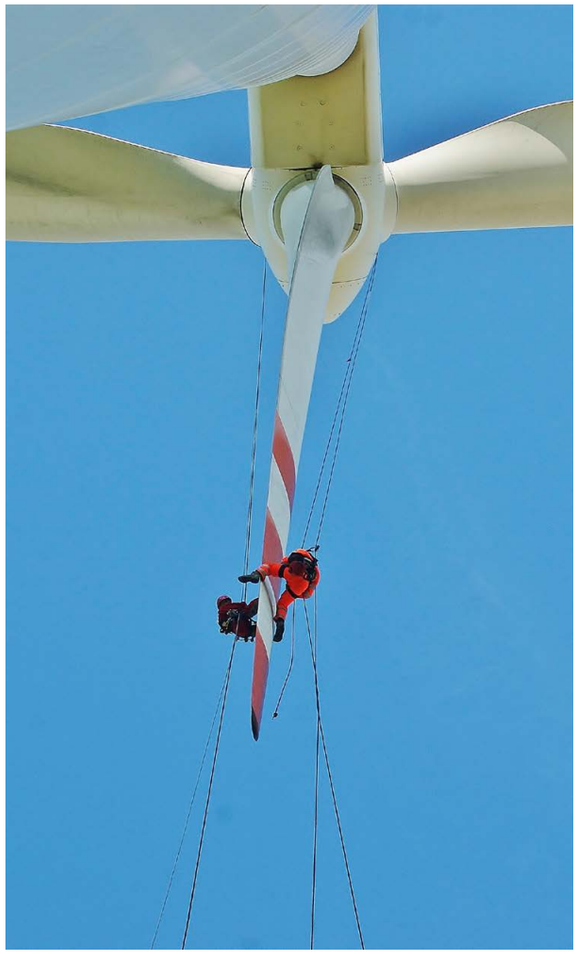
- Visual inspection;
- Thermovision inspection;
- Defect analysis and selection of repair technology;
- Repair of rotor blades;
- Paint coat recovery.

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

INSPECTION





The main objective of the inspection is to detect faults (defects) that occurred during the transportation, installation or operation of wind generator blades.

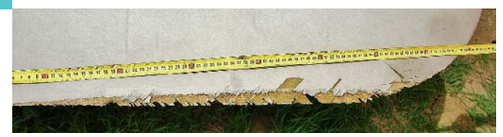
Range of services:

- Inspection after the transportation of rotor blades to the installation site;
- Post-installation inspection;
- Regular (annually) inspection during operation;
- Inspection of rotor blades prior to the expiry of their warranty period

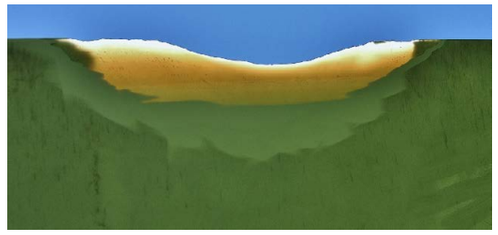
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INSPECTION & REPAIR OF WIND GENERATOR BLADES

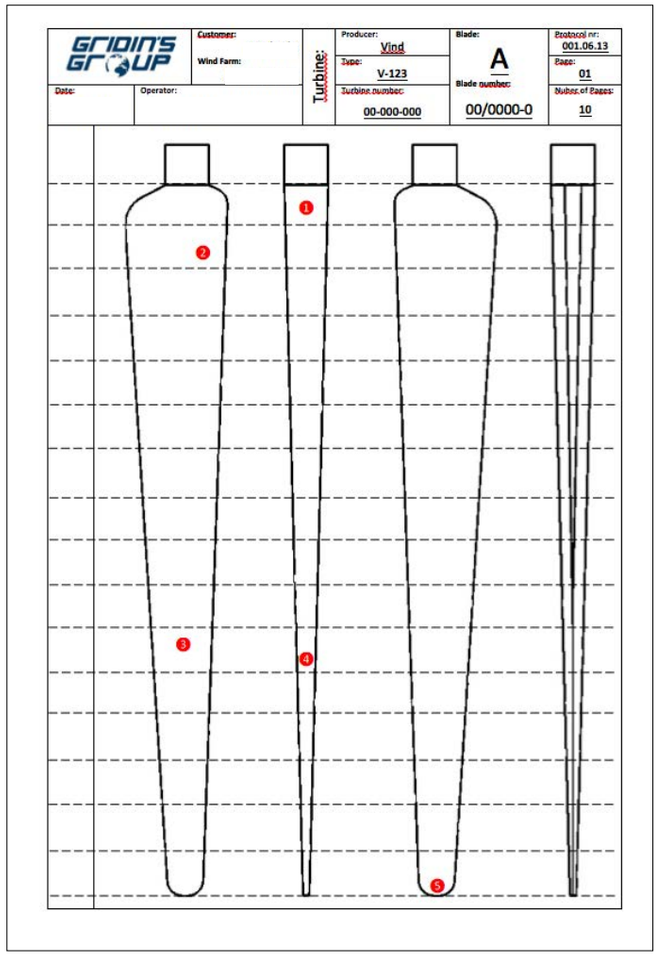
INSPECTION











Depending on the scope and complexity of the inspection carried out for a blade, the specialists of **Gridin's Group** prepare a protocol of inspection or a detailed report on the technical condition of the blade.

The report includes:

- schematic drawing of the blade with the location of detected defects specified;
- detailed description of individual defects with the dimensions (level) of faults specified;
- detailed description of the types of faults and the nature of detected defects;
- photo- and video-material;
- analysis of defects and recommendations for their elimination.

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

THERMOVISION







The thermovision method of faults detection is based on measuring the temperature difference of a component by using a high-sensitivity infrared camera. Due to the increase of the component's temperature, energy conversion occurs in structural defects. It's reading provides valuable diagnostic information.

Gridin's Group specialists, in cooperation with the experts from the **MONIT SHM** company (www.monitshm.pl), have developed a technology for the application of this type of inspection for detecting defects in the structure of wind generator blades. In addition, thermovision may be used for the inspection of blade repair quality.

APPLICATION OF THERMOVISION IN THE WIND POWER INDUSTRY IS AN INNOVATION HAVING NO ANALOGUES IN THE WORLD

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

REPAIR OF ROTOR BLADES



By analysing the results of the blade inspection report, the specialists of our company prepare recommendations and develop a technology for the repair of the detected defects. When developing the repair technology, account must be given to the kind and nature of the faults as well as acceptability of the defects.

Blade repair is carried out by the specialists having completed special training for working with composite materials (fibreglass and epoxy resin). To accelerate the repair process as well as to achieve the maximum quality of the blade repair, the UV curing system is applied.

After completing repair works for the structure, its paint coat is necessarily restored.

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

PERSONNEL TRAINING





In 2013, in the **Gridin's Group International Training Center,** a facility was created for training specialists to carry out inspection and repair works for wind generator blades.

Within the theoretical and practical training courses, the following subjects are taught:

- general course in the types of wind generators;
- design and aerodynamics of rotor blades;
- manufacturing technology of rotor blades and components used for this purpose;
- influence of external factors during the operation of rotor blades and areas of the highest wear;
- examples of defects and rupture, the nature of faults occurrence and methods of their detection;
- methods of conducting inspection and compiling reporting documentation;
- repair technologies; materials and equipment used for them.

INSPECTION & REPAIR OF WIND GENERATOR BLADES

MATERIALS USED





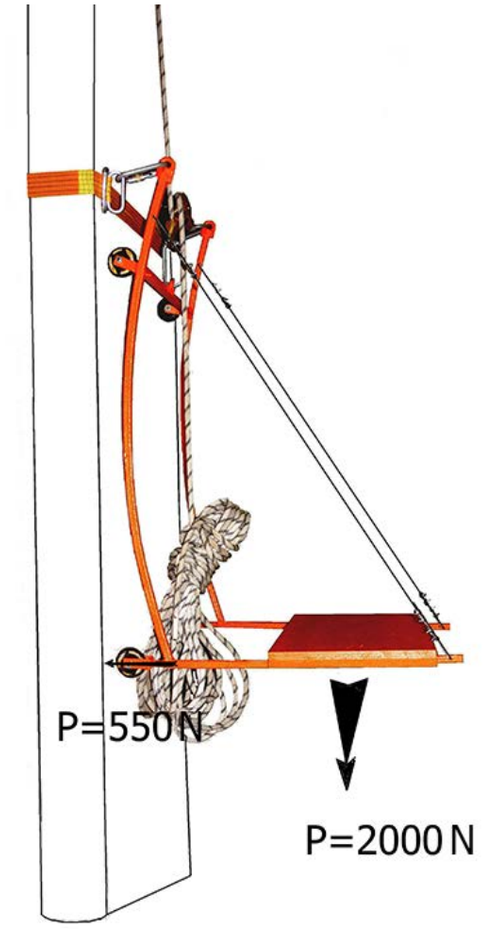
- Epoxy resins;
- Epoxy adhesives;
- Fibreglass;
- Paints;
- UV curing system.



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INSPECTION & REPAIR OF WIND GENERATOR BLADES

SUSPENDED PLATFORMS (GG-SPAN “COMFORT PODIUM”)





In early 2013, at the premises of **Gridin’s Group International Training Centre,** a workgroup consisting of design engineers and rope access technicians was created. The workgroup was given a task of creating a lightweight structure which would allow minimizing costs and time when carrying out various types of work on wind generators blades.

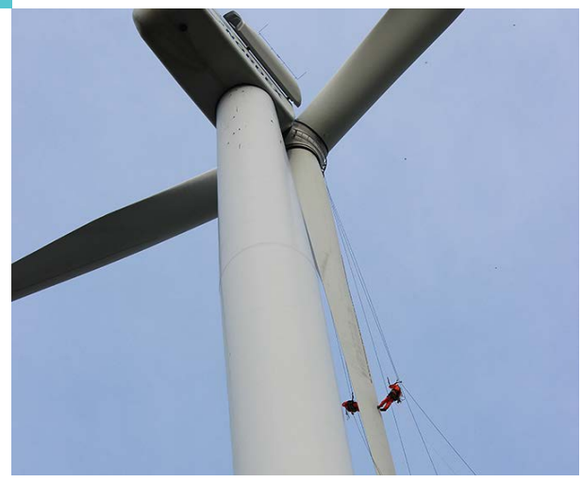
As a result, the workgroup designed an auxiliary steel structure as well as calculated its loads and developed working drawings for it.

Several prototype models of the suspended platform have already been manufactured. They are undergoing necessary tests and will be used in the projects related to the maintenance of wind generators in the nearest future.

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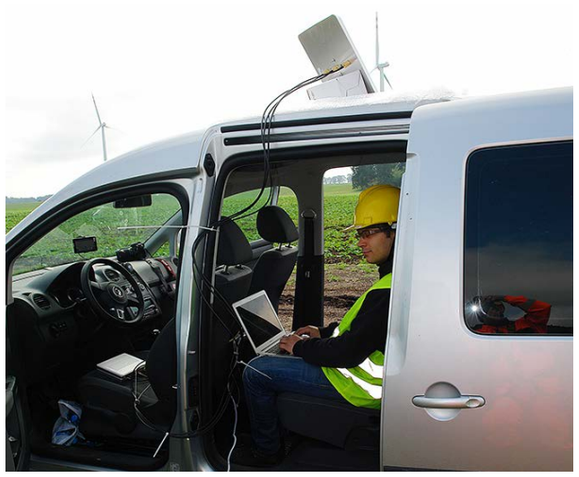
INSPECTION & REPAIR OF WIND GENERATOR BLADES

BLADE INSPECTION USING PULSED THERMOGRAPHY









During inspection of the wind generator blade, Gridin's Group rope access specialists successfully tested a method called pulsed thermography in practice.

In the wind power industry this method of inspection is an innovation in Europe. Before, inspections were carried out using only heavy lifting machinery.

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

COMPULSORY ADDITIONAL TRAINING







Before directly proceeding to work on a wind turbine, all specialists of **Gridin's Group** must undergo additional health protection and safety training in compliance with the requirements of the owners of wind farms or operating companies.

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INSPECTION & REPAIR OF WIND GENERATOR BLADES

COMPULSORY ADDITIONAL TRAINING







The training program includes the following theoretical and practical courses:

- Introduction to the design of wind generators;
- To avoid accidents, additional instructing on the dangers arising during the work (falling from height, electric shock, fire, rotating elements and physical fatigue) is offered;
- Explanation of the meaning of safety signs;
- Attachment points of equipment preventing falls from height, introduction to the devices ;
- Causes of fire and evacuation methods;
- Interaction and rules of conduct for operating personnel in case of emergency situations on wind turbines;
- Methods and procedure for alerting rescue services in case of emergency situations;
- First aid treatment. Plan and methods of evacuations of the injured from wind generators;
- Methods of moving around on the ladders and in the openings inside wind generators. Accessing the gondola of a wind generators;
- Working with the elevator and evacuation plan in case of its failure;
- Evacuation of an injured person inside the wind generators.

INSPECTION
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CERTIFICATES



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GRIDIN’S GROUP PHOTOGALLERY





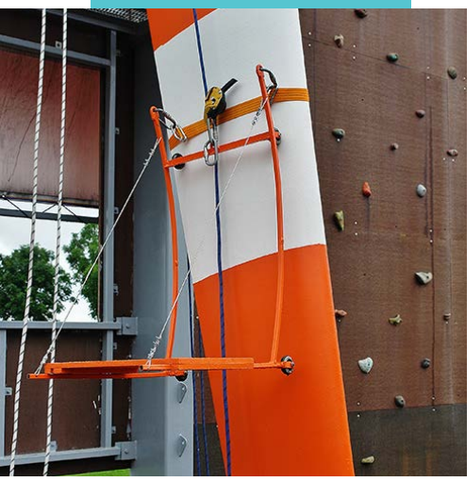




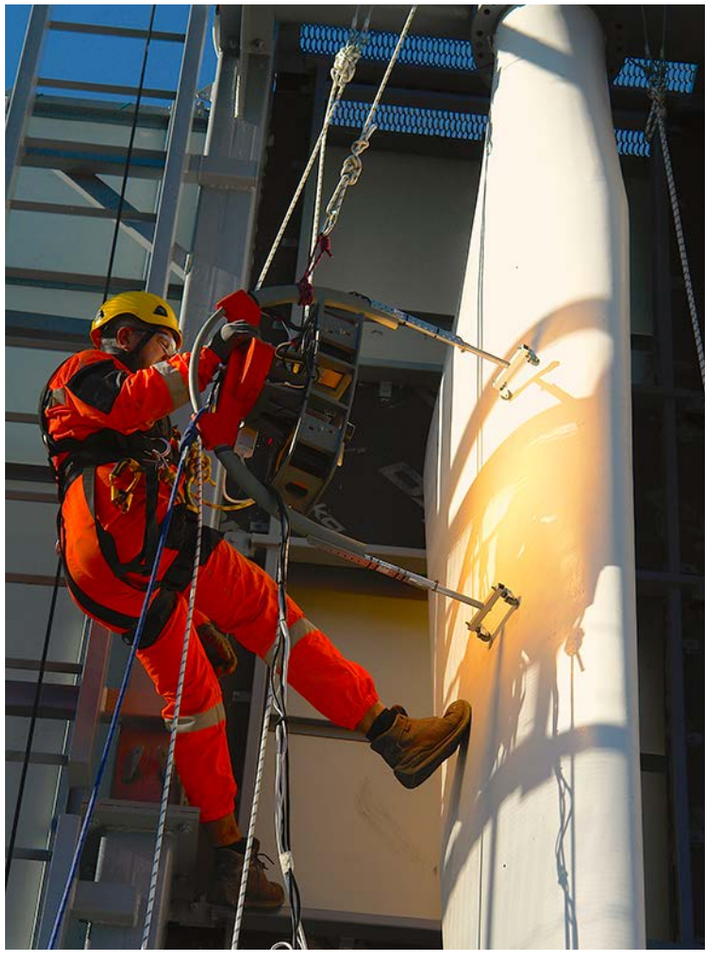
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GENERATOR
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GRIDIN’S GROUP PHOTOGALLERY











Achilles JQS Qualified · GW Global Wind Organisation · irata International · LLSRA · KLAIPĖDOS PRAMONININKŲ ASOCIACIJA

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VCA · VCU · DNV·GL · BUREAU VERITAS · Lloyd’s Register · ABS · NIPPON KAIJI KYOKAI

INSPECTION & REPAIR OF WIND GENERATOR BLADES

Gridin’s Group

The needs of our customers are our key priority and motivation leading us in the right direction!

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