



Thermographic and Optical Wind Blade Inspection

for extended availability at minimal risks

What if there were no more risks and concerns?

Several incidents in recent years have shown that the weather is not the only factor affecting the lifetime of turbines and blades. The technology and the method selected for inspections, as well as pre-existing manufacturing defects, have a major impact on blade service life and, consequently, on performance and costs.

Outdated visual inspection methods and difficult rope access increase costs, pose health, safety and environment (HSE) risks, and reduce energy yield.

Internal structural defects such as delamination cannot be detected with a visual inspection alone. This can result in unnecessary and incorrect repairs and can also lead to accidents. The findings of traditional inspection methods are subjective and not always reproducible.

A triple-constraint solution

HENSOLDT'S ground-based wind blade inspection combines thermal with optical imaging.

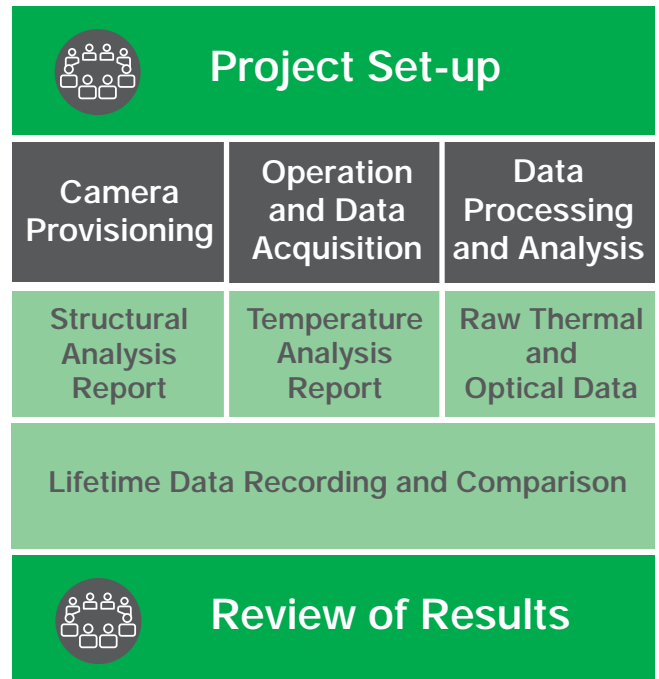
We provide high quality and performance, minimise HSE risks and have a competitive pricing model compared to existing solutions.



Global and scalable solution

Our inspection services cover the blade's entire service life, from commissioning to the end of life.

- Project set-up and general conditions
- Optical and thermal scanning of the entire rotor blade at the wind park
- Analysis and identification of flaws and failures
- Structural analysis report including optical and thermal images, flaw localisation and severity classification
- Temperature analysis report including absolute surface temperature and temperature distribution
- Data recording, monitoring and fatigue evaluation over the service life
- Review of the results with the customer and recommendation of measures
- Customers have the option to acquire the blade images themselves at the wind park using HENSOLDT's camera system based on different contract models.



Surface temperature scanning from the ground

HENSOLDT's surface temperature scanning is able to measure absolute temperature at a distance of more than 100 metres from the ground – even in extreme weather conditions and at night.

The temperature analysis report indicates the absolute temperature and its distribution over the entire blade surface. We ensure the functionality of the de-icing system in the shortest possible time and at low cost.

Seeing the invisible

Ground-based thermographic inspections



Solar energy is the only energy source used, meaning that no additional heating sources are required.

The optical and thermal camera system is placed on the ground at a distance of 100 to 200 metres from the turbine, eliminating any HSE risks and avoiding collateral damages due to rope access.

It takes only 60 to 90 minutes to complete an inspection with optical and thermal images for all three blades.

HENSOLDT's programme ensures that analysis reports with severity classification and flaw localisation are available quickly.

No risk of turbine damage, accidents or physical injuries

More transparency in blade quality

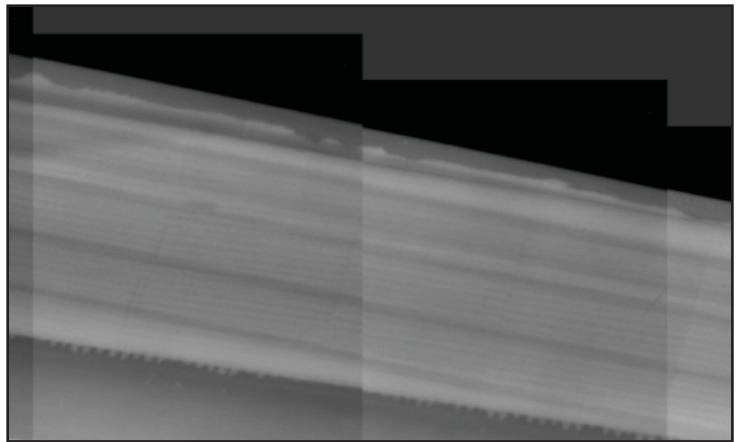
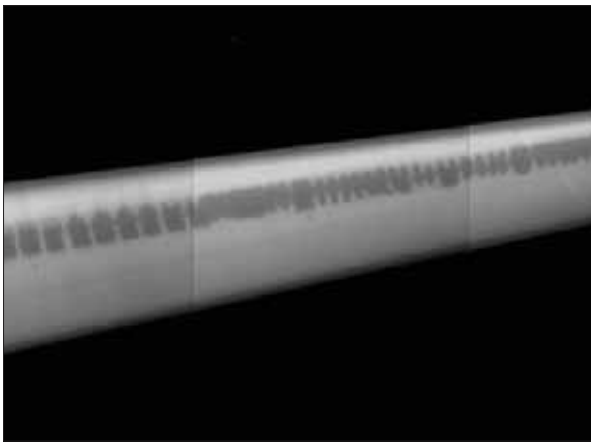
More efficient and predictable repair planning

Optimized energy production

Shorter inspection time

Precise blade diagnosis

Structural blade analysis



Both optical and thermal imaging technologies have unique benefits. The combination of both technologies is required to achieve the best quality for composite inspection and to detect a wider range of flaws on the outside and inside of the wind blade.

A second inspection is not required, as the images are reproducible and objectively reflect the condition of the blade.

	Inspection Methods		
	Rope access	HENSOLDT's solution	
		Optical	Thermal
Pollution	yes	yes	partially
Leading edge erosion	yes	yes	yes
Crack visible on surface	yes	yes	partially
Crack caused by filler	no	no	yes
Crack caused by blister	no	no	yes
Crack caused by wrinkle	no	no	yes
Delamination	partially (tapping)	no	yes
Trailing edge bonding	partially	no	yes
Beam to shell bonding	no	no	yes
Vortex generator	yes	yes	yes
Resin channel	no	no	yes
Dry laminate	no	no	yes
Internal humidity	no	no	yes

Records during the blade's entire life

Images can be compared from year to year and recorded during the blade's entire service life.

Service-life data records and fatigue evaluations are especially useful for periodic inspections and are essential in the decision-making process to extend blade lifetime.

Repairs can be better scheduled and performed and monitored more precisely.

The correct inspection platform

In addition to ground-based inspection, other non-destructive inspection platforms, such as drones and helicopters, are offered to meet customer requirements – both onshore and offshore.



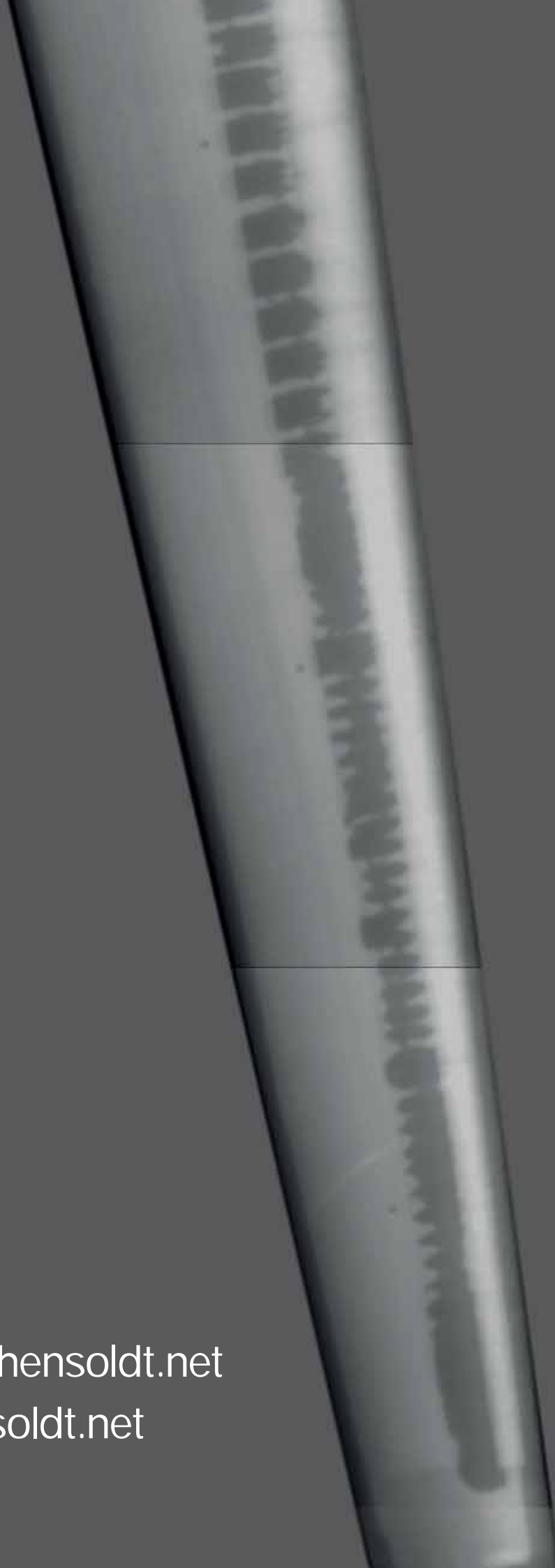
Drone



Ground-based



Helicopter



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100 YEARS

HENSOLDT – a century of creativity and innovation

Over 100 years creativity and innovation under one roof. Heritage of Zeiss, Dornier, Telefunken, MBB, Aerospatiale, EADS, Airbus Defence and Space. HENSOLDT has the appropriate experience, cutting-edge technologies and capable partners to meet complex and sophisticated requirements of thermographic inspection.

