



SOCOWIND

we quantify blade structural degradation

Jose del Corral. February, 2026

potential clients



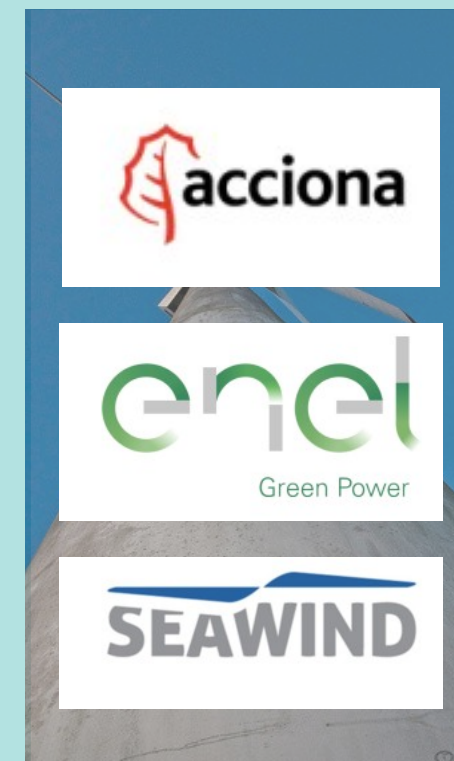
OEM

It improves product/service, making it more differentiated from the competition.



O&M

It reduces corrective costs, improves the planning of preventive maintenance, increases turbine availability and improves the quality of the service.



Developers

Greater control over the asset situation, elimination of catastrophic outage risk, increased estimated asset life and lessons learned for new projects.

Current situation

Wind assets are monitored from an **operational standpoint** through:

DCS/SCADA trend analysis

Drivetrain CMS

Visual inspections

Pitch monitoring and indirect load measurements



Current limitation

None of these systems directly measure the evolution of the **blade's structural stiffness**.

"Structural degradation progresses over years before manifesting as visible damage or severe dynamic anomalies."

BAIMS (Blade Advanced Integrity Monitoring System)

Structural stiffness characterization and trend analysis by blade section

Identification of degradation prior to visible damage

Estimation of the blade's apparent age (Remaining Useful Life, RUL)

Real-time modal behavior analysis

“Quantifies how the structure is aging.”

Physical Basis

From structural dynamics:

$$\omega_n = \sqrt{\frac{k}{m}}$$

if the blade loses stiffness (k decreases),
its natural frequencies decrease.

Dynamic relationship:

$$a(t) = -\omega^2 x(t)$$

$$\frac{\Delta f_i}{f_i} \approx \frac{1}{2} \frac{\Delta k}{k}$$

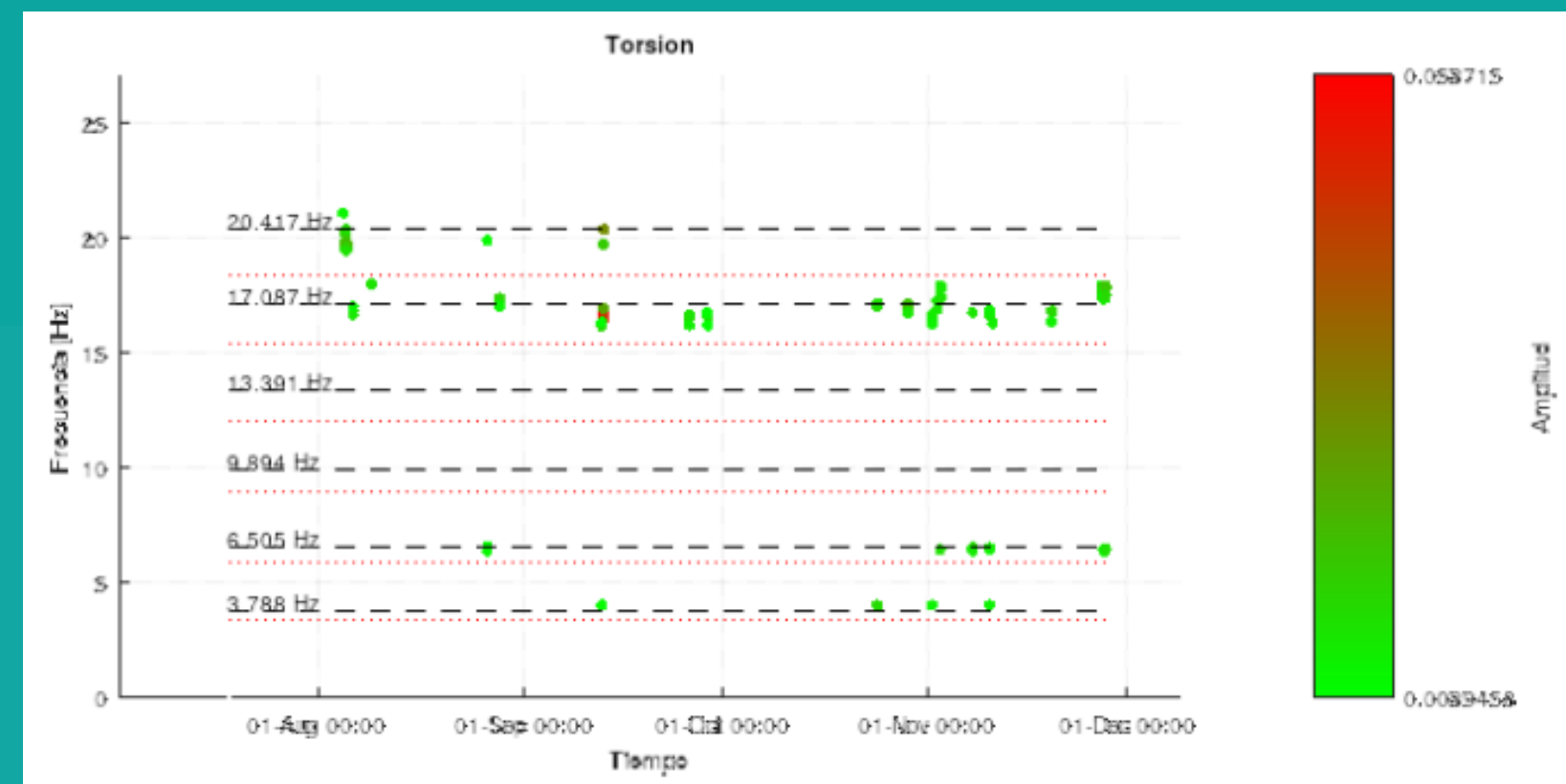
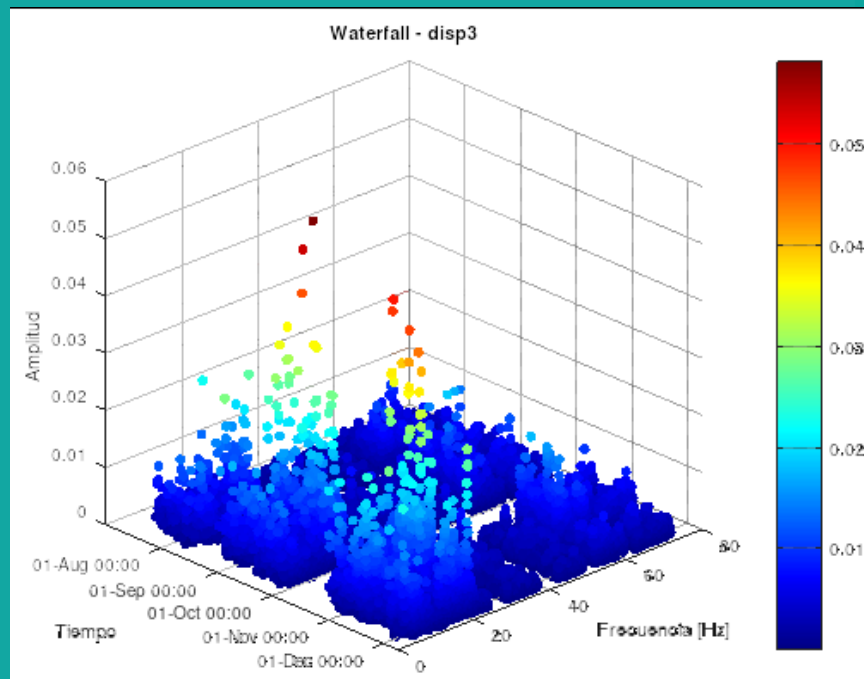
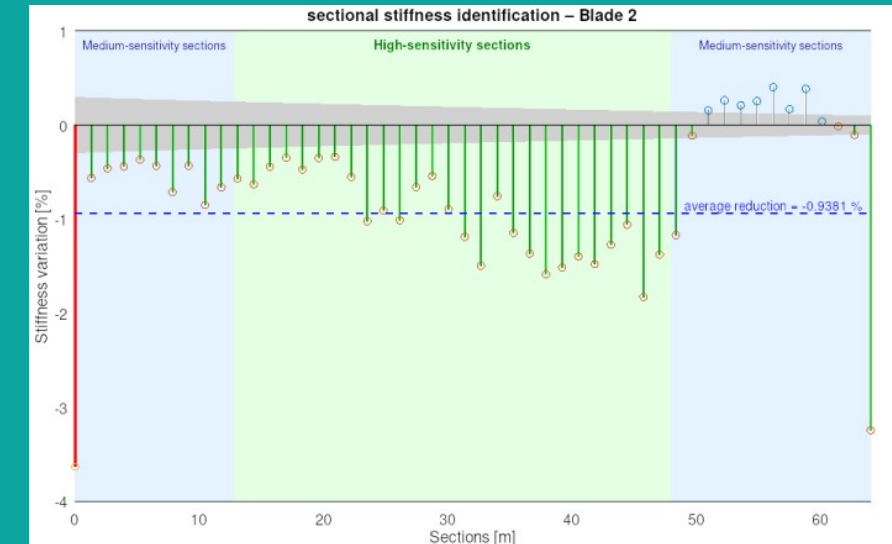
“Acceleration contains direct information about structural stiffness.”

BAIMS benefits

Quantifies stiffness loss by blade cross section (%)

Estimates remaining useful life

Real-time modal analysis



Business Applications

Operating expenditures (OPEX) optimization

Lifetime extension

Technical validation of repowering strategies

Technical support for insurers and investors

Justification for warranty extension

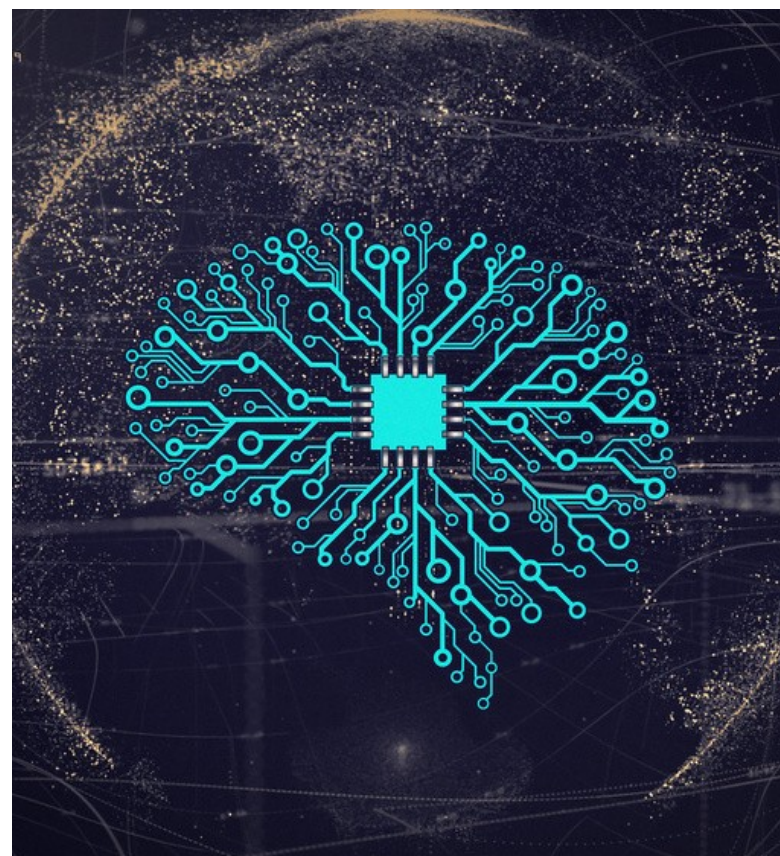
“Can you currently quantify the stiffness loss of your blades?”



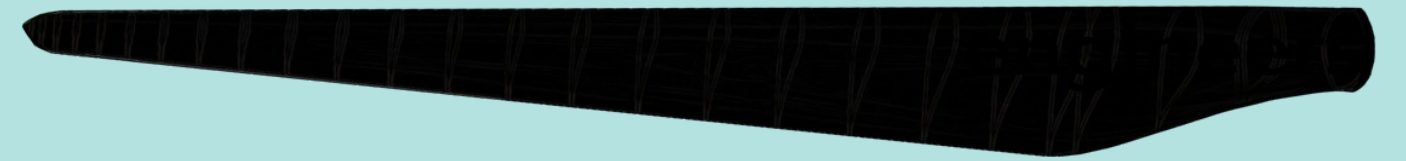
The Price

It is a B2B SaaS (Software as a Service):

Average annual price per turbine €10,000



SOCOWIND



Thank you

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