SUMATOSOFT

PROJECT TYPE

A web platform for IoT monitoring, analytics, and predictive maintenance with the integration with existing SCADA.

TECHNOLOGIES

Node.js, Python, React, TypeScript, PostgreSQL, TimescaleDB, Redis, MQTT, REST API, Modbus/OPC UA connectors, Python ML models, anomaly detection, Docker, Kubernetes, cloud (AWS / Azure)

DURATION

10 months

METHODOLOGY

Scrum, Kanban

TEAM

1 System Architect/Team Lead
1 Business Analyst/Product
1 Owner
2 Backend Developers
1 Frontend Developer
1 ML Engineer
1 QA Engineer

IoT- and ML-based predictive wind farm maintenance

The wind farm operator was experiencing unexpected failures in gearboxes and generators. We developed a predictive maintenance system based on IoT and machine learning that helps identify issues early and reduce downtime.
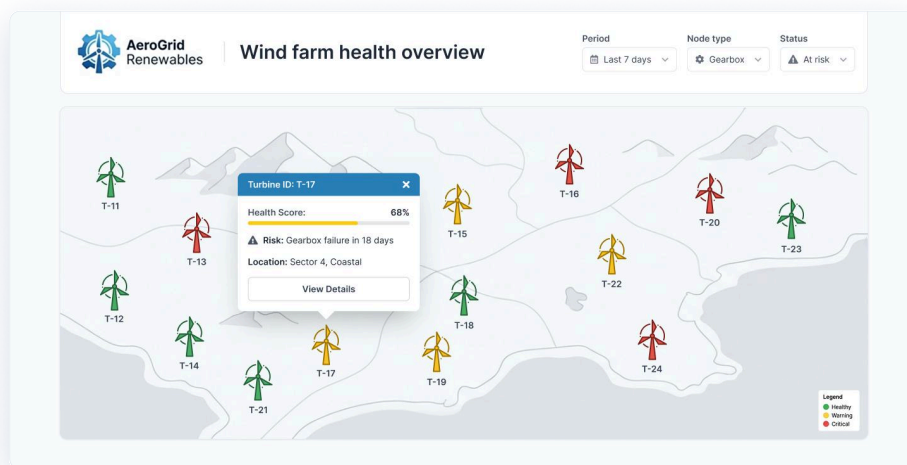
Project background

The Client manages a wind farm with several dozen turbines. The turbines are located over a large area in a rural region. Access to them depends on the weather and the schedule of contractors servicing cranes and special equipment.

The company relied on scheduled maintenance based on operating hours and basic SCADA alarms. Failures occurred without early warning. A turbine would fail, forcing the company to shut down generation, call in a crew and a crane, and order parts. This resulted in significant downtime and increased cost of ownership.

Project Distinctive Features

✓ Analytics on top of existing SCADA data without replacing equipment.

✓ Prediction of gearbox and generator failures based on vibration and temperature patterns.

✓ Unified web interface for operations and maintenance planners.

Business challenge

The Client wanted to:

- ✓ remotely monitor the technical condition of key turbine components,
- ✓ predict gearbox and generator failures before an accident,
- ✓ schedule maintenance during low-output windows and favorable weather,
- ✓ reduce the number of emergency responses and crane operations,
- ✓ use the existing SCADA and cable network rather than rebuild the infrastructure.

Our solution

SumatoSoft has developed an IoT solution for predictive maintenance that collects data from generator vibration, temperature, and current sensors and operates on top of the existing SCADA. Turbine data is sent to the cloud, where ML models generate "normal" for component operation and detect wear-related deviations.

The system displays turbine status in a web application, generates alerts, and helps schedule maintenance within convenient windows. Engineers use it to submit requests in the existing maintenance system via an API.
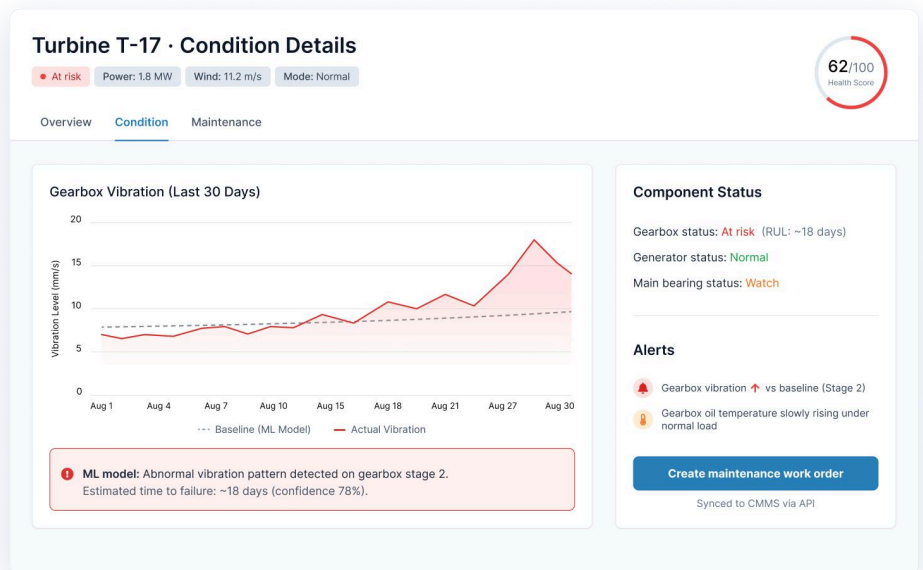
Customer's benefits

After launching the pilot on a subset of turbines, the Client achieved the following:

- ✓ a reduction in the number of sudden gearbox and generator failures,
- ✓ a reduction in unplanned downtime across the pilot fleet,
- ✓ fewer emergency crane calls and nighttime work,
- ✓ more accurate spare parts procurement planning,
- ✓ a unified overview of the condition of all turbines for the operations department.

What's happening with the project right now?

The system is operational across the entire wind farm. The Client is gradually adding new sites. SumatoSoft supports the solution, adding new analytics scenarios and integrations with other internal company systems.