



Technical Advisory Services for Globeleq Mesoamerica Energy

As a technical advisor specialising in the turbine drivetrain and other rotating parts, Romax InSight are regularly engaged by Global Eq Mesoamerica to reduce risk on their new projects and to support on warranty claims and failure investigation on operating assets.

Client

Globeleq Mesoamerica Energy (GME) is Central America's leading wind energy company. It operates wind farms in Costa Rica, Honduras and Nicaragua and continues to develop, construct and operate wind energy projects across the region.

Challenge

Identify potential problems and component issues in the nacelles prior to loading and shipment to the wind farms without disturbing the assembly process and shipping schedule; Report critical issues within 24 hours. Deploy multiple teams to the factory and the wind project sites for inspections with very short notices.

Solution

Using the expertise of Romax InSight's drivetrain consulting team, enable the client to plan and execute due diligence including all relevant quality documentation on manufacturing, assembly and test. Deploy engineers to thoroughly inspect compartments pre-shipment. Assist GME in finding resolution on found issues with O&M.

Benefits

With the technical advisory support of Romax, GME was able to mitigate risk to the project of future failures due to quality problems in manufacturing and assembly. One mitigated issue had **savings of \$400,000** for the project.

GME has been supported by Romax for 4 years at operating sites with root cause analysis, turbine inspections and as the drivetrain expert for the end of warranty settlement – with a good outcome for GME. Due to this experience GME sought Romax's rotating machinery expertise prior to site construction to reduce the risk of operational issues and ensure product compliance on the Altamira, Campos Azules, Vientos de la Perla and Vientos de Miramar projects.

With the requirement to mitigate risk to the project GME engaged Romax InSight to for Quality Assurance and Quality Control (QA/QC) inspections. The goal was to identify all component issues before shipping nacelles to the sites from the OEM factory in China. The scope of support included; expert representation for GME on compliance to quality requirements, a comprehensive review of all QA/QC documentation regarding the manufacture of the gearboxes, hubs, and tower sections, and nacelle/gearbox borescopes inspections utilising Romax's consulting engineers and Field Pro™ inspection technology.

"Romax InSight's technical expertise and high quality inspection reports were a major factor in GME's decision to partner with Romax. We have engaged Romax for this type of work for over 4 years and will continue to do so."

Josh Alvarado
Plant Manager GME

Drivetrain Quality Assurance and Quality Control (QA/QC)

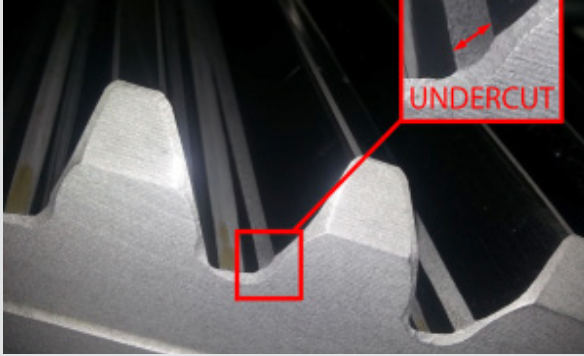
The project consisted of 40 x 2.0MW turbines. A few days before loading and shipment, Romax was given access to the nacelles in the OEM's factory to perform QA/QC inspections on the gearboxes inside the completed nacelles. In order not to interfere with the production schedule at the factory, Romax also performed quality inspections at the warehouse, prior to nacelle assembly. With support of Romax's expertise on manufacturing, GME was able to request the appropriate documentation, including end of line (EoL) test reports and manufacturing quality certificates from the OEM and their subcontractors. Romax reviewed this QA/QC documentation and combined the findings with the borescope inspections at the factory.

During the course of the project Romax's drivetrain engineers identified 14 gearboxes out of 40 with potential risks of long term reliability issues. All the key findings were summarized and presented to GME on a daily basis and the critical issues were discussed in depth. Romax also supported the discussion between GME and the OEM and their subcontractors. Examples of issues found and addressed are shown below.

"Because of Romax expertise we were able to respond to the OEM and provide technical justification for resolution on non-conforming issues. We use Romax for this type of due diligence as their depth of drivetrain knowledge and expertise is unique in technical advisory"

Josh Alvarado
Plant Manager GME

Due diligence inspect post manufacturer sign off



Gearbox manufacturing defect



Tooth root undercut will increase the risk of early life failure



Reject gearbox and replace with gearbox without an issue



Fracture



Crack on the planetary carrier



Customer entered extended warranty negotiation to cover any damages that may occur

When inspecting nacelles scheduled for shipment to a construction site, identifying and reporting on non-conforming issues within 24 hours is mandatory. To ensure Romax could provide a rapid assessment of the inspection, the inspectors utilized Romax's Field Pro™ cloud based inspection software. Field Pro™ allowed the inspection team to transmit inspection findings to the cloud each day from China and have rapid review by consulting experts in North America. The consulting team could quickly assess the damages and provide the customer a finalized inspection report with recommended corrective actions within 24 hours of the inspection taking place.

The due diligence activity provided a great benefit to GME, just one of the gearbox issues identified mitigated the risk of a future gearbox exchange and crane cost, with potential savings of over \$400,000 for the project.

Engineers in China - Inspect at factory ~ 8 hours

Exports & Customers in US - Review results <16 hours

Shipping Decision < 24 hours

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