

Ethos Energy

Gas Turbine solutions to enhance operational efficiency and reduce emissions

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Gas Turbine Solutions

to Enhance Operational Efficiency and Reduce Carbon Emissions

TLB Technology Showcase

MAY 29, 2024



Our Portfolio



Our services

We provide a full range of independent and OEM approved solutions for your turbine, generator and transformer products and services that are specific to your industry.



Gas turbines

Full-service provider offering gas turbine solutions across a range of OEMs.



Steam turbines

Industry-leading engineered solutions and turnkey support to increase reliability and efficiency.



Generators

Services include manufacturing of stators and rotors to generator winding kits.



Compressors

Inspect, repair, reverse-engineer and re-build centrifugal, axial and integrally geared compressors.



Transformers

Design and manufacture new grid transformers, autotransformers, and generator step-up (GSU)..



Field services

24/7 turbomachinery field services, rapid mobilization and industry leading safety performance



Operations and maintenance

Comprehensive third-party facility operations and maintenance service for power plants.



Supporting services

Steel construction, oilfield services and material handling in select geographical locations.

The sectors we serve



Power generation

- Natural Gas Fired Plant
 - Simple Cycle
 - Combined Cycle
 - Mobile Power Plant
- Grid Equipment (Transformer)
- Waste to Energy
- Hydro Energy
- Biomass Plant
- Geothermal
- Wind / Solar Farm (Transformers)
- Nuclear Plant (Control System, Steam Turbine & Generator)
- Coal fired Plant
- Synchronous Condensing Plant



Oil & Gas

- Upstream
 - Exploration & Production
 - FPSO
- Midstream
 - Gas Transport
 - Gas Storage
 - Station Processing Hub
- Downstream
 - Refinery
 - Petrochemical Plant



Industrial

- Automotive
- Ceramics
- Food & Beverage
- Hospitals
- Pharmaceutical
- Pulp & Paper
- Steel Mills
- Textiles



Aerospace

- Component MRO
 - Commercial
 - Business
 - Military

Our Energy Transition Portfolio



Our services

Our comprehensive suite energy transition solutions are designed to keep your operation viable and compliant, while driving decarbonization, and energizing performance.

Life Extension

Proven and reliable end-of-life solutions that meets or exceeds the original equipment manufacturer and extends the life of your rotor.

EcoView™

Our Life Cycle Assessment gives you the visibility to make informed equipment choices and fully understand your environmental impact.

LNG

Optimize LNG plant performance with reliable and cost-effective solutions for enhanced availability across global operations.

ECOMAX®

Automated and fully customizable combustion tuning platform. Our patented technology optimizes operating objectives.

Geothermal

Enhancing geothermal fields with customized, engineered solutions, and upgrades that improve steam turbine efficiency and reliability for future operating conditions.

Performance Center

Our Performance Center provides advanced real-time remote operations, asset monitoring, diagnostics and 24/7 on demand support.

Energy from Waste

Our tailored solutions and services enable plants to maximize turbine performance and minimize outage and provide the potential for sustainable power.

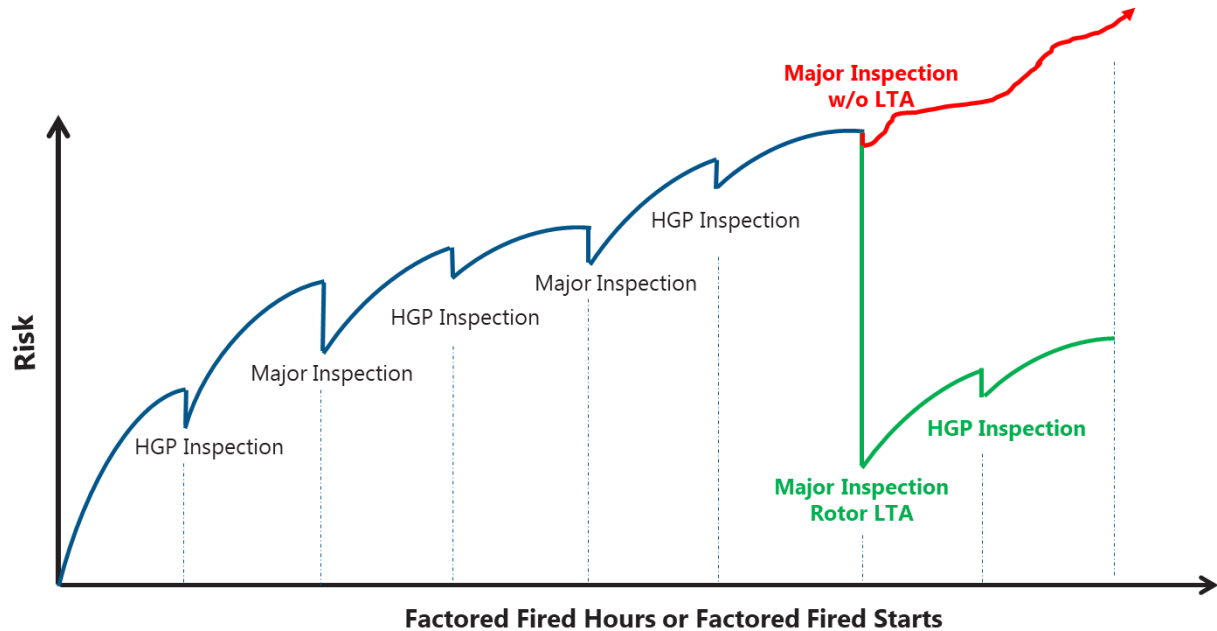
Hydrogen

Available, clean and safe renewable source of energy, our advanced technology and extensive expertise supports green and blue hydrogen energy infrastructure.

Eco Transformers

Bespoke environmentally friendly power transformers utilize an innovative eco-design and biodegradable insulating liquids

GT Rotor End of Life - Risk Management



Rotor components have finite design life!

Severity

Exceeding serviceable life can lead to substantial equipment damage and potential personnel injury



Forced Shut-down and Immediate Re-start



Restricted Operation
(e.g. loss of power)



Contained Failure
(e.g. Blade or Bucket liberation)



Uncontained Failure
(e.g. wheel burst)

GT Rotor LTA / LTE Program

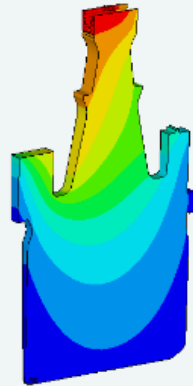
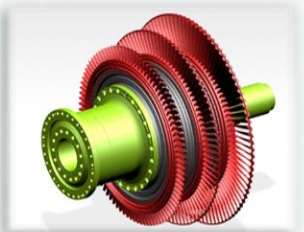
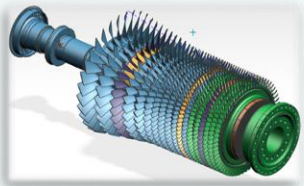


Generic

PHASE 1

Design Analysis

Full-engineered approach redesign process



Predictive

Unit-Specific

PHASE 2

Customer Unit-Specific Evaluation

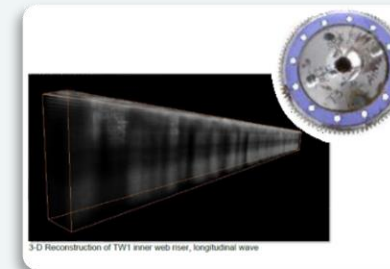
Predictive model tuning, site specific



PHASE 3

LTE scope implementation

Detailed inspection, overhaul & manufacturing



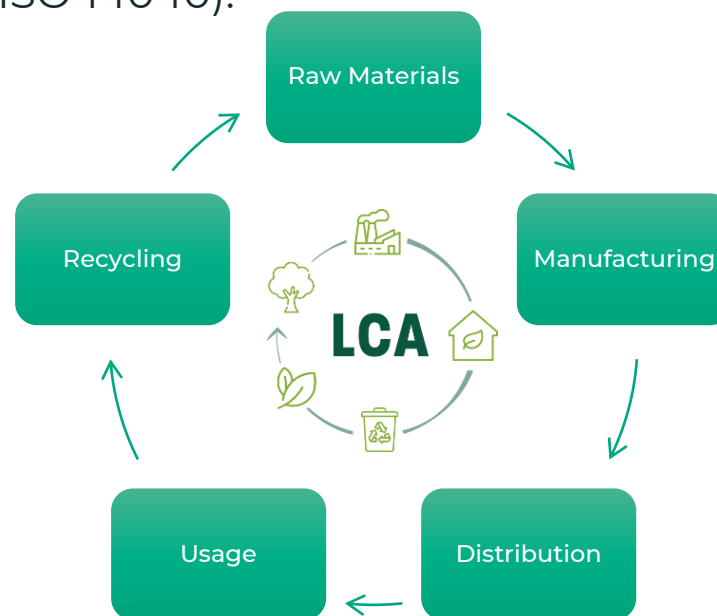
Reactive

Results of detailed inspections are factored into Predictive Process Guidelines

The industry's first Life Cycle Assessment (LCA) solution for gas turbine rotors

A tool to analyze the environmental impacts of a product or a service along all the phases of its life cycle (ISO 14040):

- Extraction of raw materials
- Processing of materials
- Assembly of the product
- Use and end-of-life scenario ("from the cradle to the grave")



EcoView™

The assessment covers all types of possible environmental impacts, such as:



Global Warming Potential



Water Consumption



Acidification



Abiotic resources consumption



Ozone Depletion



Eutrophication of water

Up to
40%

carbon emissions and
abiotic depletion savings

The Life Cycle Assessment (LCA) analysis, is the analytical tool that allows EthosEnergy to show the environmental footprint benefit of an LTE rotor vs. a brand new one



ECOMAX[®]

Automatic Tuning and Performance



Maintains Emissions Compliance



Reduce Combustion Dynamics



Increase Operational Range



Improves Thermal Efficiency

Measurable Return on Investment

- Real-time compliance; eliminates fines and eliminates manual seasonal tuning
- Increased power output and efficiency
- Turndown improves economics of lowering outputs versus shutdown + restart
- Avoid combustion dynamics issue that causes hardware damage
- Indication of combustion issues before trip conditions occur

125+

Installations on gas turbines at over 50 sites globally

99

ECOMAX® installs on F-class gas turbines

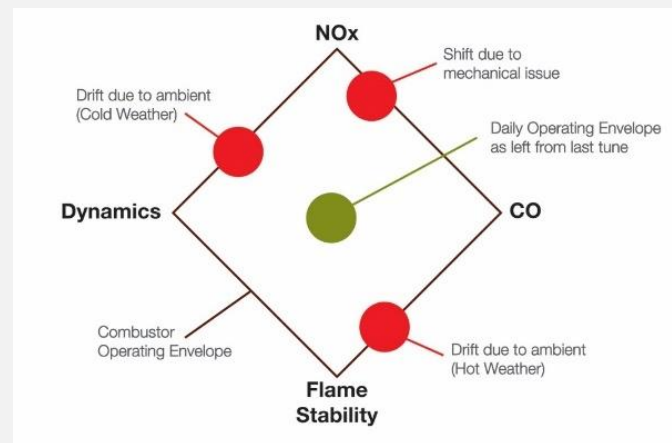
ECOMAX®

Automatic Tuning and Performance

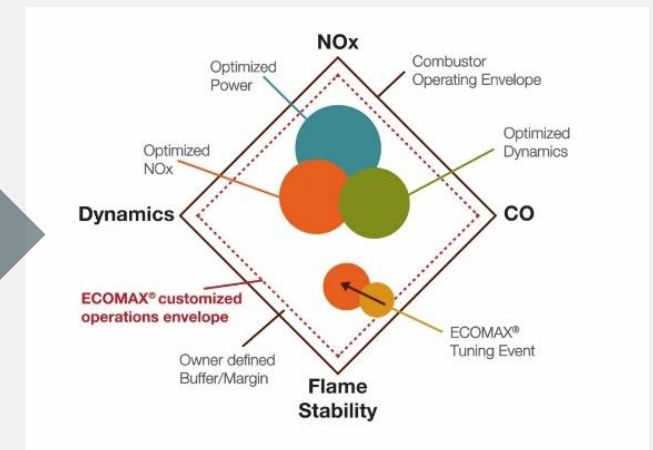


ECOMAX Operating Envelope

Manual Tune with Drift



ECOMAX® Optimization

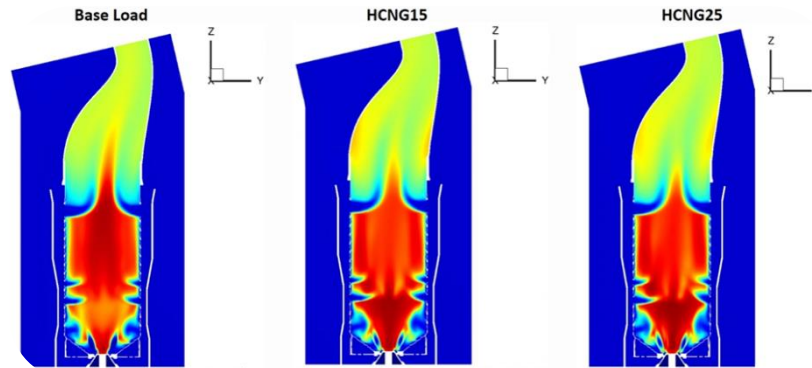


Available For multiple OEM combustion systems (e.g. GE, Siemens, etc.)

Hydrogen Combustion

EthosEnergy and Politecnico di Torino are partnering to develop Hydrogen Technology for the next generation turbine

- HIT 40 MW class - diffusive combustor project
- LIT 7 MW class – premixed injector, AM re-design
- Light gas turbine performance test rig facility with H₂ blending capability



12

Units expected to be tested per year

H₂

Q&A



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