

# Rayong Facility Overview

Industrial Turbine  
Component Repair

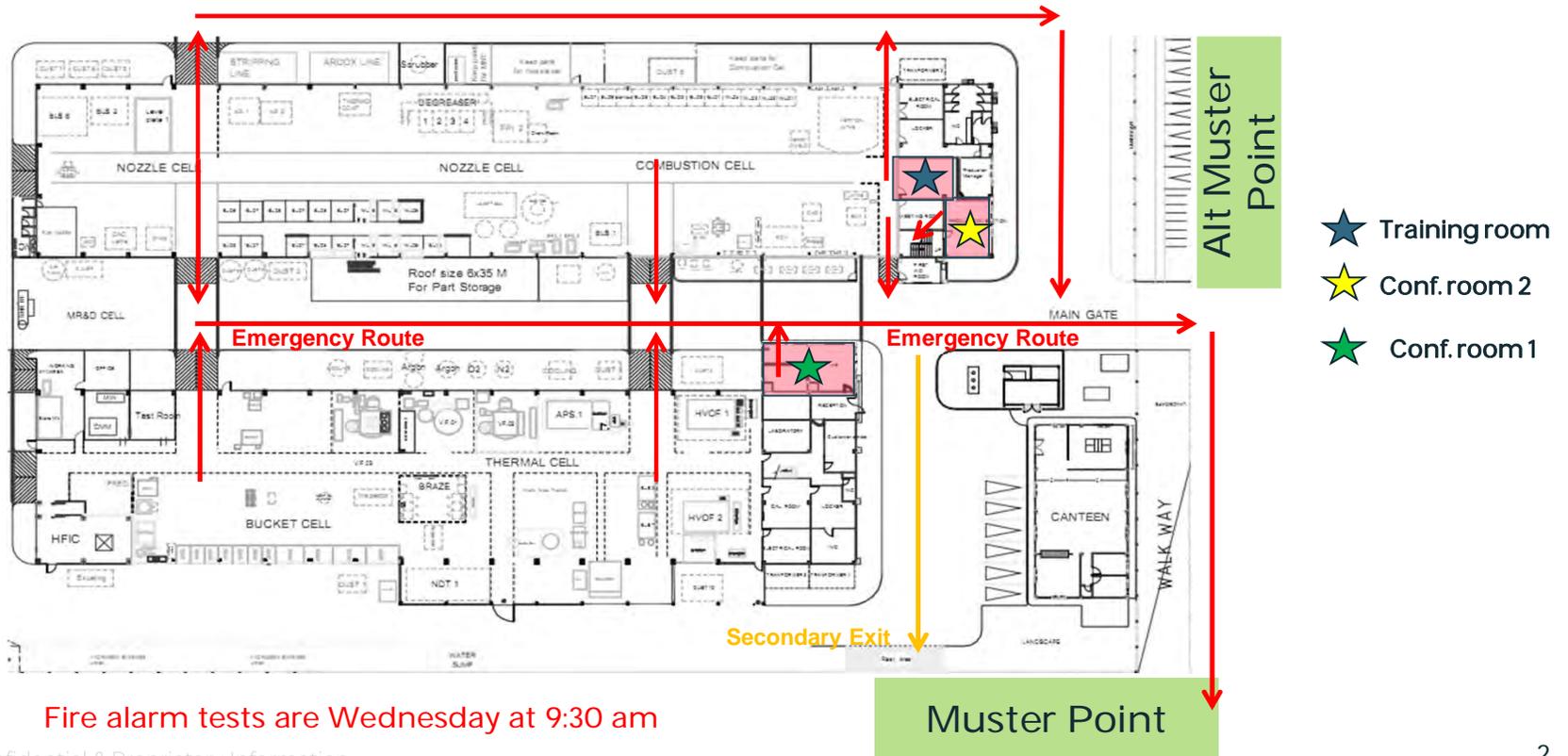
OCTOBER 25



# Facility Safety Orientation



In case of a fire alarm, proceed immediately to the emergency route below



# Facility Safety Orientation



## Facility Safety Rules

1. Safety glasses must be worn inside the shop area whereas safety shoe is required when walking into the red operation area.
2. Strictly follow the safety sign & applicable rules & regulations.
3. Do not enter the shop floor unless accompanied by EthosEnergy staff.
4. Photographs are permitted, but please ask prior to taking them.
5. Smoking is only allowed in the designated location.
6. Call 100 for any assistant you may need.



2 AEDs On Site

Stay Alert



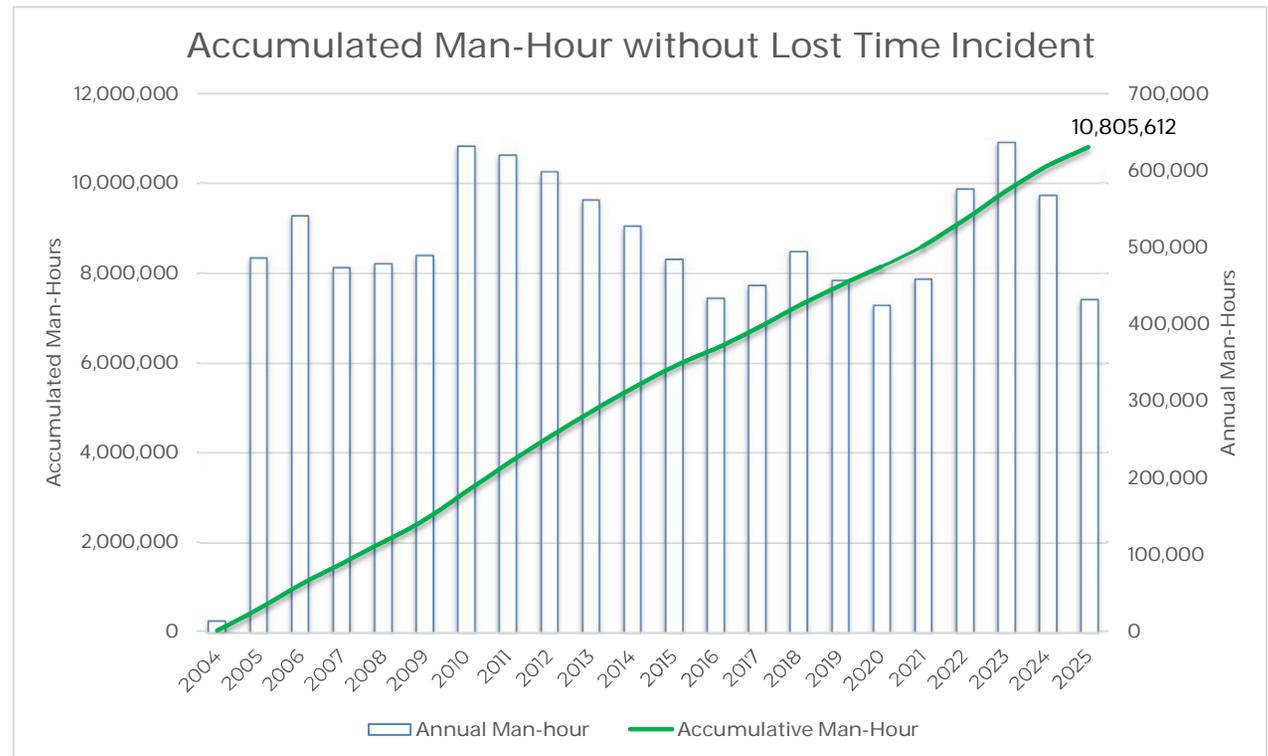
Stay Alive

# Safety Management



Year on year safety record without lost time incident achieved through multiple layers of safety awareness implemented through out the company.

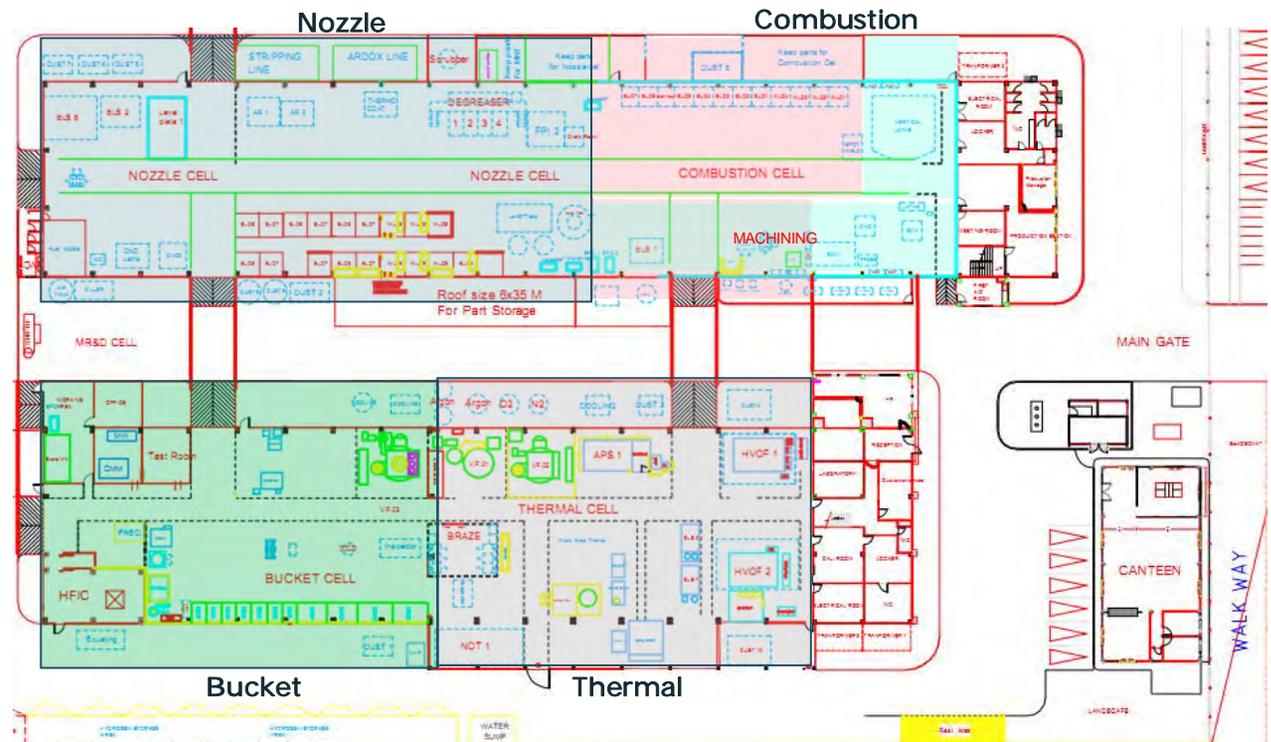
- Management internal audits reviewing safety, housekeeping and operational aspects
- Safety committee
- Toolbox talks
- Unsafe act, Unsafe condition and near miss reporting by all members of the team



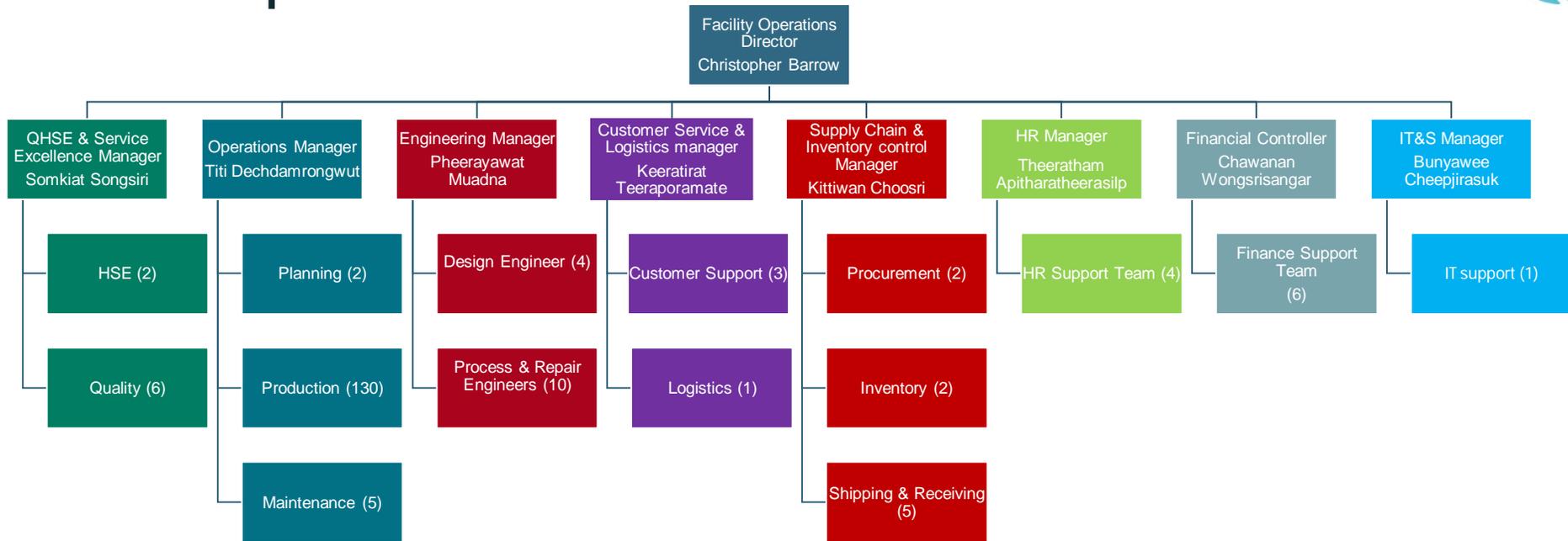
# Facility Overview



- Established in 1997
- Located in Rayong, Thailand
- Industrial Turbine Component Repairs
- 54,000 sq. ft. shop floor space on 6 acres
- 2 shifts with 19-hour standard coverage per day
- Over 800,000 components successfully refurbished
- 220+ Employees



# Our People



## Support Team and Dual line reporting to global functions

Design Engineering

Quality

Purchasing

Finance

Information Systems

Human Resources



# Our Integrated Management System



## Certificate



Management system as per  
**ISO 9001:2015**

The Certification Body TÜV NORD CERT GmbH hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

**EthosEnergy (Thailand) Limited**  
39/9 Sermusuan Road, Maptaphut,  
Muang, Rayong 21150,  
Thailand



with the locations according to the annex

operates a management system in accordance with the requirements of ISO 9001:2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope  
**Refurbishment, Repair and Field Service of Industrial Turbines**

Certificate Registration No. 64 100 010334      Valid from: 2025-02-19  
Audit Report No. SEA1H-0195-2025      Valid until: 2028-02-18  
Initial certification 2021

Bangkok, 2025-01-10 

Certification Body at TÜV NORD CERT GmbH

TÜV NORD CERT GmbH  
Am TÜV 1, 45307 Essen  
www.tuev-nord-cert.com




TÜV



## Certificate



Management system as per  
**ISO 14001:2015**

The Certification Body TÜV NORD CERT GmbH hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

**EthosEnergy (Thailand) Limited**  
39/9 Sermusuan Road, Maptaphut,  
Muang, Rayong 21150,  
Thailand



operates a management system in accordance with the requirements of ISO 14001:2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope  
**Refurbishment and Repair of Industrial Turbines**

Certificate Registration No. 44 104 102179      Valid from: 2025-02-19  
Audit Report No. SEA1H-0195-2025      Valid until: 2028-02-18  
Initial certification 2020

Bangkok, 2025-01-10 

Certification Body at TÜV NORD CERT GmbH

TÜV NORD CERT GmbH  
Am TÜV 1, 45307 Essen  
www.tuev-nord-cert.com




TÜV



## CERTIFICATE

Management system as per  
**ISO 45001 : 2018**

The Certification Body TÜV NORD CERT GmbH hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

**EthosEnergy**

**ETHOSENERGY (THAILAND) LIMITED**  
39/9 Sermusuan Road, Maptaphut,  
Muang, Rayong 21150,  
Thailand

operates a management system in accordance with the requirements of ISO 45001: 2018 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope  
**Refurbishment and Repair of Industrial Turbines**

Certificate Registration No. 44 128 23 80 0018      Valid from 2023-03-17  
Audit Report No. SEA1H-0195-2023      Valid until 2026-03-16  
Initial Certification 2023



Certification Body  
at TÜV NORD CERT GmbH

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TÜV



**2001**  
ISO9001



**2010**  
ISO14001



**2023**  
ISO45001



# Our Capability Buckets & Blades



## Full Inspection and Repair services

- Full dimensional Insp.
- Full fluorescent penetrant insp.
- Cooling hole wall thickness insp.
- Eddy Current, Natural Frequency Testing
- Air flow inspection
- Dynamic flow inspection
- Base material SEM & Met. evaluation
- Rejuvenation heat treatment
- Tip height & angel wing restoration
- Chamber & elevated temperature welding
- Full coating options
- Pulsed Thermography inspection
- Surface finishing
- Balancing and sequencing



## Specialized Solutions

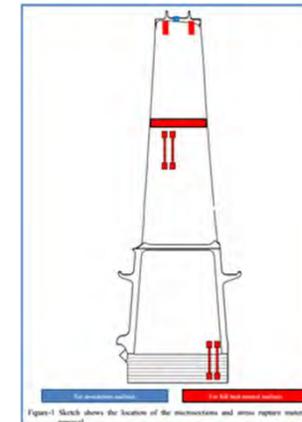
- Lifetime extension
- TMF crack repair (scrap reversal)
- Cutter tooth modification
- PSP repair / enhancement
- Bucket rock correction
- Single crystal material repairs

# Our Capability



## Lifetime Analysis - Destructive Test (DT)

- Offered for rotating components that are at or near the OEM recommended lifetime.
- Testing involves removal of one component from an engine run set.
  - Sample is sectioned for evaluation of the current engine run condition of the base material.
  - Additional sections exposed to full rejuvenation heat treatment processes.
  - As received sample and fully heat-treated samples are exposed to the following evaluations:
    - Fluorescent penetrant inspection
    - SEM (scanning electron microscope)
    - High temperature stress rupture testing.
    - Hardness inspection
    - Metallurgical inspection
- Results evaluated in comparison to the original base material property requirements, level of rejuvenation obtained and condition of components
- Based on the findings, recommendations for continued service or removal from service will be submitted within a detail technical report
- Components that have been accepted for continued service will be supplied in the refurbished condition with our full warranty.



# Our Capability

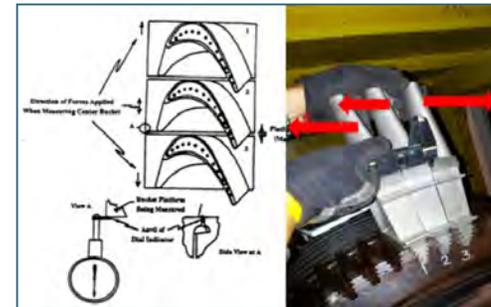


## Bucket Root Rock Correction

When operational stresses cause wear to the rotor dove tail slots and or buckets roots, users sometimes experience an unacceptable level of bucket rocking.

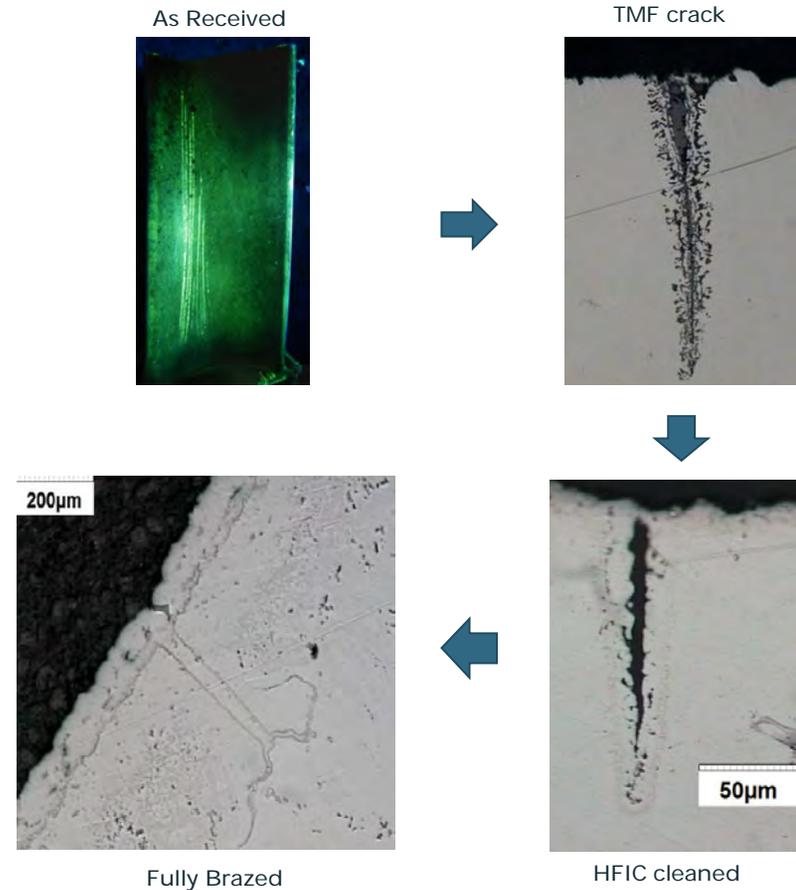
The root rock can be mitigated through dimensional inspections and specially applied root coatings.

Special coating applied as a strip to bucket/ blade roots, designed to ensure a tight fit.



# Our Capability

- Thermal Mechanical Fatigue (TMF) cracking occurs in areas of buckets that cannot be weld repaired due to engine stress & temperature during operation with limited blend repair allowances due to wall thickness requirements.
- Condition is frequent cause of scrap due to the lack of approved repair processes, Until Now.
- Specialized cleaning processes developed to remove oxide conditions from within the cracking.
- Brazed with specially developed super-alloy powders.
- Sample showing a service induced TMF crack that has been 100% filled using the TPR process.
- Result is a 100% healed condition with equal base material properties to the original component.



# Our Capability



- Service induced corrosion with extensive base material loss.
- Standard weld repairs to correct this will result in distortion and heat effected zone defects.
- Areas of corrosion removed via machining, and surface cleaning operations.
- Area restored to required dimensions and properties utilizing Pre-sintered Preforms (PSP) technology and re-machining to required dimensions.
- Result is a 100% healed condition with equivalent base material properties to the original component.

Corroded area machined off



Replaced by PSP plate



Repair technique using Pre-sintered Preforms (PSP) brazing that can recover material to original design

# Our Capability Nozzles & Vanes



## Full Inspection and Repair

- Material Met. evaluation
- Rejuvenation Heat Treatment
- Dimensional Restoration
- Fluorescent penetrant Insp.
- Wall thickness Insp.
- Air flow inspection
- Controlled weld repairs
- Turbine assy. Fixture & Dim. Insp.
- Multiple Coating Options
- Wall Thickness restoration
- Harmonic Analysis
- Insp. & Rep. of sub-assembly details



## Specialized Solutions

- Downstream Deflection Rectification
- Air foil Coupon Replacements
- TPR (transient phase restoration) Rejuvenation
- Brush seal upgrades
- Specialized coating configurations

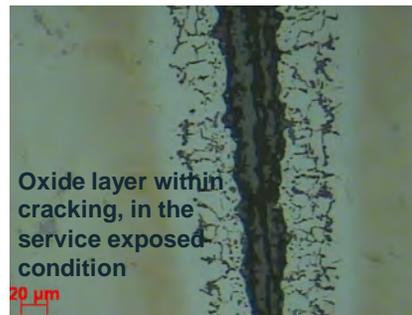


Partial TBC improves oxidation and thermal protection without impacting efficiency or discharge pressures

# Our Capability



- Repairs surface cracks and material thickness build-up of Nickel and Cobalt based vanes/ nozzles.
- Cleaned using Hydrogen Fluoride Ion cleaning (HFIC) and subjected to high temperature, high vacuum brazing.
- Developed specialized cleaning processes utilized to remove oxide deposits prior to restoration.
- Utilizes same super alloy filler material as the original component base materials, whereas typical weld repairs utilize an alternate material to the base material.
- Does not require the removal of acceptable material surrounding defects in order to repair the defects that would be required using standard weld repairs.

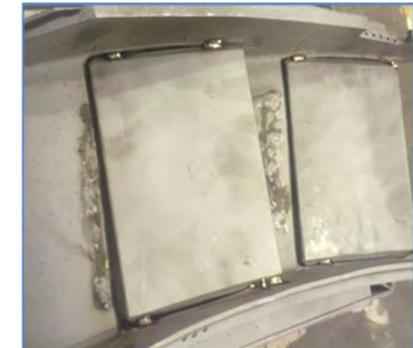
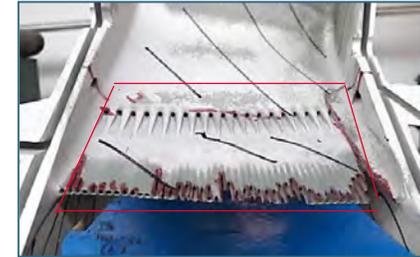


Sample shows a service induced crack that has been cleaned & filled using the TPR method

# Our Capability

## Nozzle / Vane Airfoil Coupon Replacement

- Engine operation in heavy fuel units can lead to extensive deformation and missing material at the nozzle/ vane trailing edge which are beyond any standard repair.
- Rather than scrapping the segment, we have developed a repair to remove the effected areas and replace with new cast airfoil sections.
- Product is a repaired segment with uniform material properties and entirely new material in the highest stress area.



# Our Capability



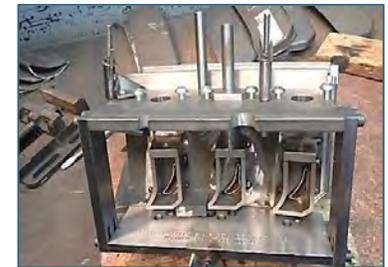
## Pressurized to Non-Pressurized & Brush Seal Modifications

- Originally designed 2<sup>nd</sup> stage nozzles for GE frames fitted with a labyrinth seal on the nozzle diaphragm.
- Labyrinth seal style nozzles can be modified to receive brush seals.
- Operational advantage of brush seals:
  - Minimizes air leakage
  - More tolerant of misalignments
  - More durable than labyrinth seals
- Modifications can include upgrades from pressurized to non-pressurized.

Original labyrinth seal



Non-Pressurized Upgrade



Complete upgraded set with brush seals



# Our Capability



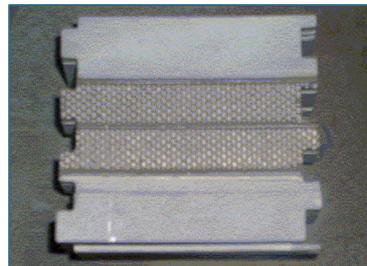
## Shroud Blocks and Ring Segments

- Full Inspection and Repair
- TPR repair capability
- Dimensional Restoration
- Vacuum brazed Honeycomb replacements
- Turbine assembly Fixture & Dimension Inspection
- Abradable Wear Coating Application
- Welding Plug Pin Dowel Holes



## Specialized solutions

- Air seal replacements
- Honeycomb upgrades



# Our Capability



## Combustion Liners and Baskets

- Standard, DLN 1 & 2 Capability
- Wall thickness insp.
- Full Dimensional insp.
- Controlled weld repairs
- Sub-assy. Part Replacement
- Cowl cover restorations
- Dimensional Restoration
- Coating Applications (MCrAlY / TBC & Wear Coating)
- Turbine assy. Fixture & Dim. Insp.

## Specialized solutions

- CLIP upgrades
  - Liner Stop Material Changes
  - Wear Strip Application
  - Wear coating applications
- Sectional Replacements



# Our Capability



## CLIP Upgrade for Combustion Liners

- The CLIP upgrade (**Combustion Life Improvement Package**) is a series of unique EthosEnergy modifications made to the combustion equipment
- Modification aids in extending the combustion inspection intervals to 24 or 32k hours



Specific upgrades for liners

# Our Capability



## Sectional Body Replacements

- Severely deformed liners or liners exhibiting burn through are the most common cause of scrap.
- Repair developed to return parts to a serviceable condition.
  - Removal of the entire lower body section.
  - Rolling of new material to original dimensional requirements.
  - Drilling of dilution holes to match required design.
  - Replace existing section with new material.
- Capable of replacing sections to match original material or perform material upgrades.



# Our Capability

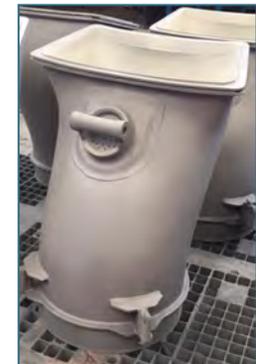


## Transition Pieces

- Wall thickness inspection
- Full Fluorescent penetrant inspection
- Turbine assembly Fixture & Dimension Inspection
- Material Met. evaluation
- Controlled weld repairs
- Wear strip replacements
- Floating seal repair and replacement
- Dimensional Restoration and contouring
- Floating seal repairs & replacements
- MCrAlY / TBC and Wear Coating Applications

## Specialized solutions

- CLIP upgrades
- Wear strip upgrade
- H Block material change
- Exit end replacement with material upgrade
- External Body Coating



# Our Capability



## CLIP Upgrade for Transition Pieces

- The CLIP upgrade (**Combustion Life Improvement Package**) is a series of unique EthosEnergy modifications made to the combustion equipment.
- Modification aids in extending the combustion inspection intervals to 24 or 32k hours.



## Specific upgrades for Transition Piece



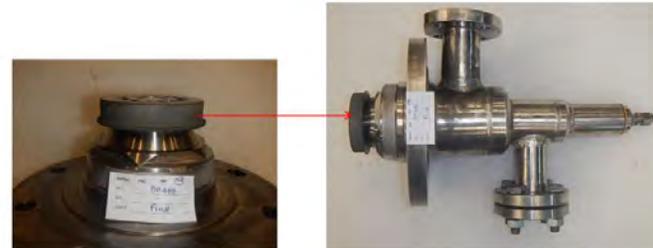
# Our Capability



## Standard & Dual Fuel Nozzles

- Full Inspection and Repair
- Wear Coating Application
- Sub-assembly Part Replacement
- Flow Testing (Liquid and Air flow)
- Pressure/ Leak Testing

CLIP MODIFICATION:



HFC@ SURFACE CONTACT AREA



# Our Capability



## Combustion Accessories

- Bullhorn Brackets
  - Full inspections and Repairs
  - Wear Strip Applications
  - Material and Design Upgrades
- Cross Fire Tubes / Retaining Clips
  - Full Inspection and Repairs
  - Anti Rotation Modification
  - End Tube Replacement
  - Wear Coating Applications
- Flow Sleeves
  - Full Inspection and Repairs
  - Pin replacements
  - Clip holder replacements and material upgrades



Dimensional investigation and corrections to make spare combustion sets interchangeable



# Product Capability & Experience



Engine	Config	Buckets			Nozzles			Shroud Blocks			Transition Piece	Combustion Liner / Cap	Fuel Nozzles	Combustion Accessories
		1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd				
GE Frame 3	3001	X	X		X	X		X	X		X	X		X
GE Frame 5	5001	X	X		X	X		X	X		X	X	X	X
	5001 NP	X	X		X	X		X	X		X	X	X	X
	5002 D	X	X		X	X		X	X		X	X	X	X
GE Frame 6	6B	X	X	X	X	X	X	X	X	X	X	X	X	X
	6FA (.01, .02, .03)	X	X	X	X	X	X	X	X	X	X	X	EE	X
GE Frame 7	7B	X	X	X	X			X			X	X	X	X
	7EA	X	X	X	X	X	X	X	X	X	X	X	X	
	7FA+e (.01, .02, .03)	X	X	X	X	X	X	X	X	X	X	X	EE	X
	7FA+e (.04/.05)	X	X	X	X	X	X	X	X	Dev	X	X	EE	Dev
GE Frame 9	9B	X	X	X	X	X	X	X	X	X	X	X	X	X
	9E	X	X	X	X	X	X	X	X	X	X	X	X	X
	9FA+e	X	X	X	X	X	X	X	X	X	X	X	EE	X

X = Repair Experience  
 EE = Repair at other Ethos facility  
 DEV = Under repair development

# Product Capability & Experience



Engine	Config	Blades					Van					Heat Shield	Combustion
		1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th		
ABB11	11B	X			X	X	X		X				
	11D4A		X			X	X	X					
	11D5	X	X	X	X	X	X	X	X	X	X		
ABB	GT10B/SGT600	X	X	X			X	X	X			X	X
ABB13	13D	X	X			X	X	X	X	X			
	13D2	X	X	X	X	X							
	13E1	X	X	X	X	X	X	X	X	X	X	X	X
	13E2	X	X	X	X	X	X	X	X	X	X	X	X
ABB	T9	X	X	X	X		X	X	X	X			

Engine	Blades				Van			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Siemens V93.1	X	X	X	X	X	X	X	X
Siemens V94.2 / SGT5-2000E	X	X	X	X	X	X	X	X

X = Repair Experience  
 EE = Repair at other Ethos facility  
 DEV = Under repair development

# Product Capability & Experience



Engine	Config	Blades				Vaness				Transition	Ring Segment	Combustion Basket
		1st	2nd	3rd	4th	1st	2nd	3rd	4th			
MHI501	501F						X					X
MHI701	701D	X	X	X	X	X	X	X	X	X	X	X
	701F	Dev	Dev	Dev	Dev	Dev	Dev	Dev	Dev	X		X
W251	251B8/ SGT900	X	X	X		X	X	X		X	X	X
	251B11/12	X	X	X		X	X	X		X	X	X
W501D SGT6-3000	D4	X	X	X	X	X	X	X	X	X	X	X
	D24	X	X	X	X	X	X	X	X	X	X	X
	D5	X	X	X		X	X	X		X	X	X
Fiat	TG50	X	X	X		X	X	X		X		X

X = Repair Experience  
 CAP = Technically ready, await repair opportunity  
 DEV = Under repair development

# Key equipment on site



Repair Equipment		
Chemical Stripping Line (2)	Thermal spray coating booths / Robotic (3) (HVOF & APS)	Vacuum Furnaces (3)
Aqueous cleaning units (3)	Grit Blast, Walk in (2) Automated CNC unit (1) Standard (5)	Vertical Lathe (78" dia.)
Hydrogen Fluoride Cleaning	Diffused Aluminide coating booth	5 Ton Overhead Crane (4)
Welding / Blending stations (39)	High speed EDM drilling (5) Plunge EDM (3)	3 axis CNC (4) 5 axis CNC (2)
Elevated temperature induction welding stations (3)	Hydraulic Press & Rolling / forming unit	Ceramic Peening Machine (1)
Air Furnace (2)	Automated shot peen	Spot Welding

# Key inspection equipment on site



Inspection Equipment		
Pulse Thermography	Air and Liquid Flow Testing	Dynamic Flow Cooling Hole testing
CMM Measurement	Eddy Current Inspection	Magna Mike Eddy Current
Tensile Testing	Functional Fit Fixtures	Fluorescent Penetrant Inspection
Frequency Testing	Radiographic Evaluation	Ultrasonic Wall Thickness



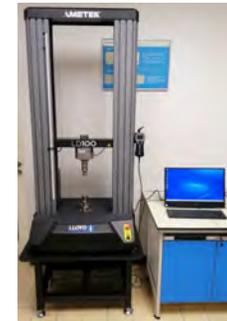
# Material Analysis Lab



- Metallurgical Material Evaluations
- Component Life Assessment (DT)
- Material Hardness Testing
- Thermal Spray Coating Evaluations
- Surface Roughness Measurements
- Portable Alloy Analysis (PMI)
- Universal Tensile Testing



Inside the Material Analysis Lab



Universal Testing Machine



Analyzes chemical composition and materials by using Handheld X-Ray Fluorescence (XRF)



Digital Microscope with 1000x Magnification for material sample analysis



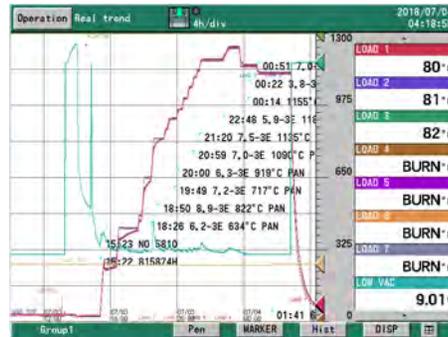
Micro-Vickers hardness tester with CCD-Camera and measurements by computer

# Our Process



## Heat Treatment

- **Equipment**
  - Argon Atmospheres
  - High Vacuum Furnaces
  - High Temperature
- **Processes**
  - Rejuvenation Heat Treatment
  - High Temp Transient Phase Restoration
  - Solution Heat Treatment
  - Heat Tint
  - Coating Diffusion
  - Stabilization
  - Age Heat Treatment



## Vacuum Furnace

- One bottom loaded vacuum furnace with working dimension of 72" Diameter x 60" Height
- Two front loaded vacuum furnace
- Qualified in accordance with **AMS2750**
  - Qualified Temperature Range 530 – 1230 °C
  - Vacuum Furnace Class 4
  - Instrument Type B
  - TUS +/- 10 °C
  - SAT +/- 2.2 °C
  - Recorder – Chino KR3000
  - Controller – Honeywell DCP551 Series
  - Over Temp Controller – Azbil SDC26

# Our Process



## Protected Atmosphere GTAW Chamber Welding

- Improved microstructure.
- Reduced oxidation.
- Reduced contamination.
- Produces clean inter-pass welds.



## Elevated Temperature Welding System

- Maintains equalized temperature within welding zone.
- Improves heat affected zone microstructures.
- Welding performed at or near solution HT temperature.
- Improves weldability on most casting types.

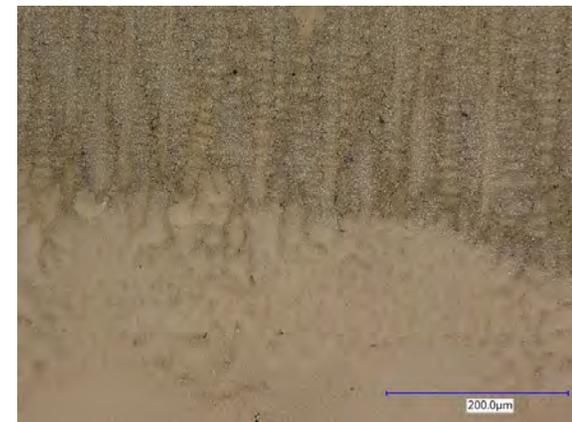
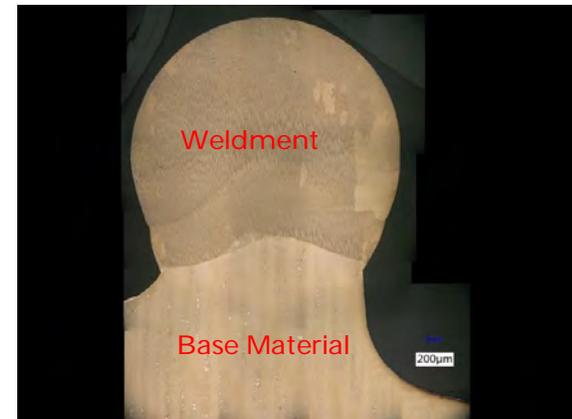


# Our Process



## Single Crystal Cast Material Welding / Refurbishment

- F and G class Turbine components are utilizing Single Crystal casting materials in order to improve the component properties and ability to operate at higher firing temperatures.
- Single Crystal type castings are extremely difficult to repair and or weld due to the internal grain or lack of grain boundaries within the base materials.
- Standard welding techniques lead to fusion interface cracking, cracking of the base material due to stresses during welding and or in post welding heat treatments.
- EthosEnergy has developed a specialized welding process that yields a high-quality weld build up and restoration of the single crystal materials with 100% acceptable material properties and defect free fusion line and material deposit.



# Our Process



## Thermal Spray Coating Systems

- High Velocity Oxygen Fuel (HVOF) & Air Plasma Spray (APS) applications.
- Strict quality controls for all coating development & production criteria.
- 100% robotic coating applications with fixed programming.
- Slurry diffusion coatings.



Coating Types	
Wear Coatings (CrC & WC)	Abradable Coatings
Dual Coatings Systems (MCrAlY's and TBC's)	Ceramic TBC (Thermal Barrier Coatings)
Shear Coatings (Al & NiAl)	Diffused Aluminide coatings
MCrAlY Coatings	
NiCoCrAlY	CoNiCrAlY

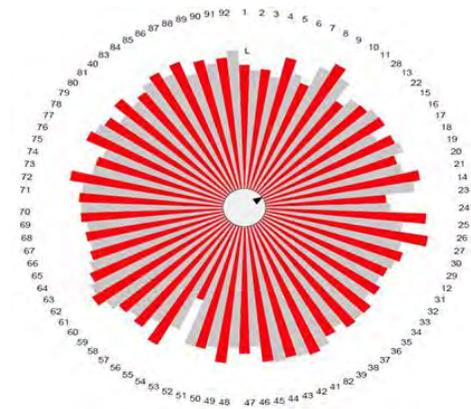
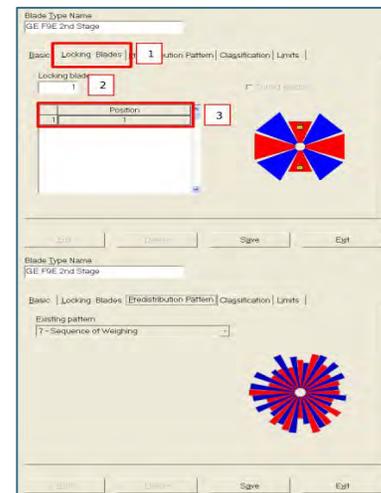


# Our Process



## Moment Weight Balancing

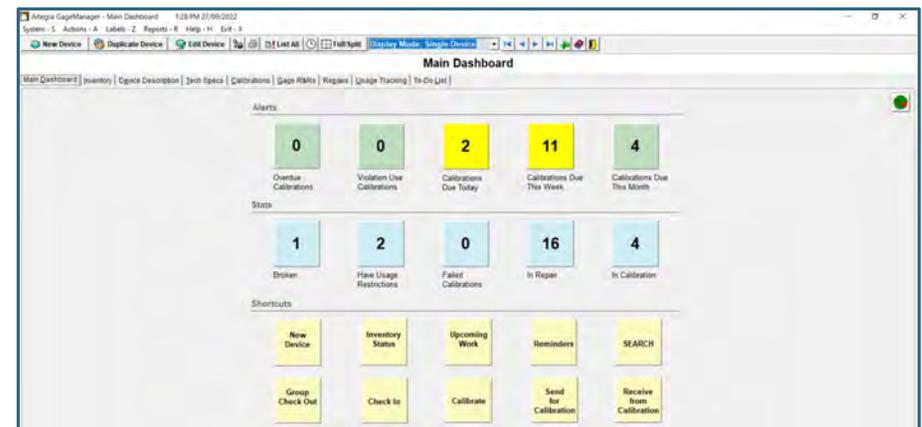
- All rotating parts accompanied by moment weight chart.
- Blades/ buckets individually weighed and recorded.
- Computer generated sequencing based on true moment weight of blade/ bucket.
- Sequencing based on weight distribution required to balance bucket/ blade set onto the rotor during assembly.
- Ability to specify location of locking blade.
- Optimized distribution based on disk unbalance.
- Detailed reports of weights and balance chart supplied.



# Qualifications & Certifications



- **NDT Inspectors** trained and certified in accordance with NAS-410 (National Aerospace Standard) & ASNT-TC-1A (American Society of Non-destructive Testing).
- **Welders** are qualified & certified based on material type and thickness range based on the requirements of AWS-D17.1.
- **Heat treatment Furnaces** calibrated and certified to the Aerospace requirements of AMS-2750 (temperature uniformity, recording leak testing verifications).
- **Fixtures & Tooling designed** based on actual gas turbine assembly requirements.



GageManager - the calibration software to manage calibrated equipment's & recall

# Inspection



## Coating Development and Quality Control

- All coating Programs are developed and verified by Eng. & QA prior to release for production coating.
- All programs are frozen processes and not capable of being altered by operators.
- 100% verification and acceptance of test samples must be obtained by the QA Lab prior to production coating.

Coating Programs Verification	
Coating Thickness	Interface Conditions
Porosity Levels	No Delamination
Oxide Levels	No Cracking
Bond Strength	Un-melt Particle

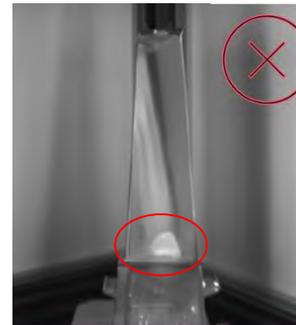
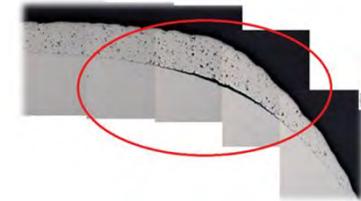
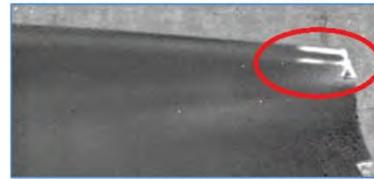


# Inspection



## Pulse Thermography Inspections

- Used to verify applied coatings are 100% bonded to substrate material:
  - Utilizes high intensity light and infrared camera to analyse an objects heat signature response.
  - Thermal responses of coated components vary regarding geometry, orientation and thickness.
- Fully bonded coating returns a uniform response across the component surface:
  - Any areas of un-bond or cracking returns a disparate heat response, indicating a lack of diffusion in the base material.
  - A combination of contrast change and analysis of a Log Temperature-Time graph allows identification of any problem areas.



# Inspection



## Dynamic Flow Inspection

- A vapor flow process utilized on all cooled rotating blades and buckets. Inspection process is utilized and incoming inspection and final inspection to verify all cooling holes are free of blockage or partial blockage.
- Process allows visual verification of air flow from each cooling hole and ensure there is no unwanted turbulence or reduction of flow from each cooling hole.
- Process does not create moisture build up within the cooling hole that can cause material from being lodged within the cooling holes and subsequently be heat treated and solidified.
- Process allows the visual inspection of the full flow from each hole and does not limit the inspection to areas based on wire diameters when using wire inspection checks.

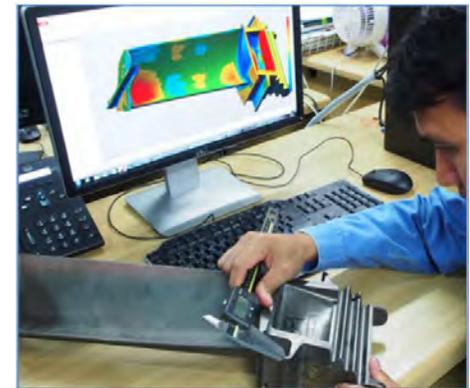
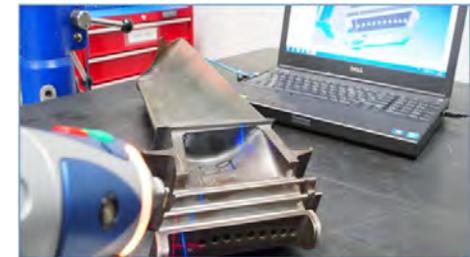


# Repair Development



## Inspection and Design Engineering Capabilities

- Portable Blue light Laser Scanning
- Customer site inspections and evaluations for data collection
- Solid Works solid modelling software
- Rapid Form cloud point data software
- AutoCAD modelling software
- Coordinate measuring machine (CMM)
- EE Global support for Design Analysis



# Customer Communications



- Online portal to give customers direct access to the status of their orders 24/7.
- Works off a standard internet connection and utilizes a direct link to our business systems.
- Order status pulled directly from our order tracking system, is triggered by the shop staff clocking in and out of orders in real time.
- The system features imbedded training video for all users.
- Allows communication of key schedules milestones and dates of completion to be monitored by customer.
- Customers have ability to customize updates they would like to receive for repair updates.
- System works as the FTP server for transferring all inspection reports.

**EthosEnergy Customer Virtual Service Centre Homepage**

Welcome to the EthosEnergy Virtual Service Centre. Please note that only shipped items in the last 60 days are shown. However older orders can be accessed via the Search screen. If you wish to speak to your assigned customer support representative, please contact your assigned customer support representative:

Kamran Khan, EthosEnergy | +66 81 782 0699  
Thogburan, Laksana (EthosEnergy) | +66 (0) 28 698911

**WATCH OUR VIDEOS NOW**

**Expected Completion Date** (hover to preview, click for detail)

Month	Tue	Wed	Thu	Fri	Sat	Sun	Month	Tue	Wed	Thu	Fri	Sat	Sun
June 2022	30	31	1	2	3	4	July 2022	1	2	3	4	5	6
July 2022	7	8	9	10	11	12	13	14	15	16	17	18	19
August 2022	20	21	22	23	24	25	September 2022	26	27	28	29	30	31

Order Summary	All Events	Notified Events			
PO	End User PO	Part Number	Part Desc	Qty	# of Lines
# 516040021		GE8L01M91E	GE M9001E STAGE 1 BLADES	92	1
# 516040021		GE8L03M91E	GE M9001E STAGE 2 BLADES	92	1
# 516040021		GE8L03M91E	GE M9001E STAGE 3 BLADES	92	1
# 516040021		GE8C00M91E	M9001E CROSS FIRE RETAINER	28	1
# 516040021		GE8B02M91E	GE M9001E SHROUD BLOCK STG 2	48	1
# 516040021		GE8B02M91E	GE M9001E SHROUD BLOCK STG 3	32	1
# 516040021		GE8Z03M91E	GE M9001E STAGE 1 NOZZLE	12	1
# 516040021		GE8Z03M91E	GE M9001E STAGE 2 NOZZLE	16	1
# 516040021		GE8Z03M91E	GE M9001E STAGE 3 NOZZLE	16	1
# 516040021		GE8N00M91E	M9001E FUEL NOZZLE	14	1
# 516040021		GE8C00M91E	GE M9001E CROSS FIRE TUBE	14	1
# 516040021		GE8P00M91E	GE M9001E TRANSITION PIECE	14	1
# 516040021		GE8P00M91E	GE M9001E BULL HORN	14	1
# 516040021		GE8L00M91E	GE M9001E COMBUSTION LINER	1	1
# 516040009		GE8Z03M91E	GE M9001E STAGE 2 NOZZLE	16	1
# 516040009		GE8C00M91E	GE M9001E STAGE 2 BLADES	92	1
# 516040009		GE8C00M91E	GE M9001E CROSS FIRE TUBE	14	1
# 516040009		GE8P00M91E	GE M9001E TRANSITION PIECE	14	1
# 516040009		GE8L01M91E	GE M9001E STAGE 1 BLADES	92	1
# 516040009		GE8P00M91E	M9001E FUEL NOZZLE	14	1
# 516040009		GE8L03M91E	GE M9001E STAGE 3 BLADES	92	1
# 516040009		GE8C00M91E	GE M9001E COMBUSTION LINER	1	1
# 516040009		GE8C00M91E	M9001E CROSS FIRE RETAINER	28	1
# 516040009		GE8P00M91E	GE M9001E BULL HORN	14	1

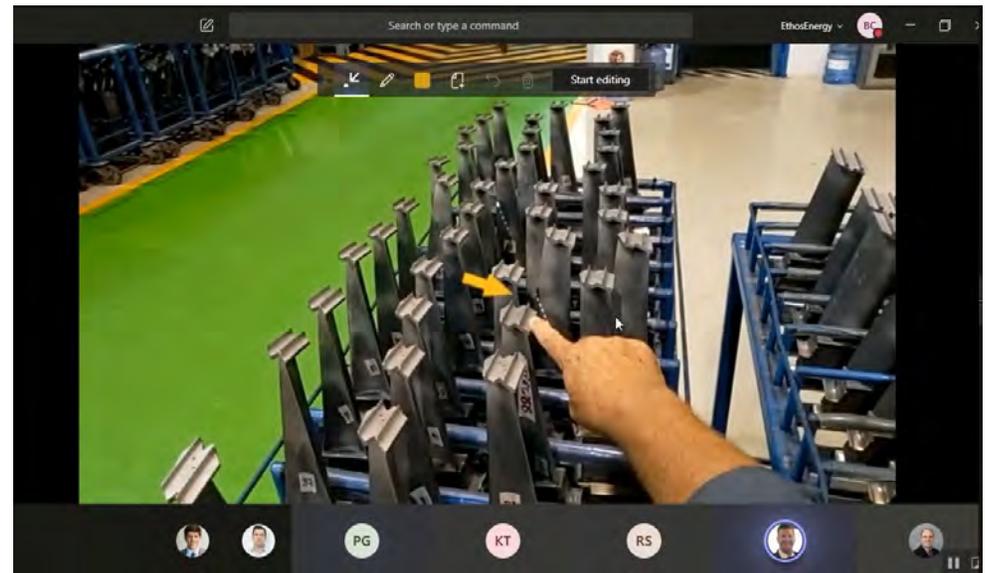
Filter: None	Column select	Print Download	Date Mode: Full Short Relative																	
PO	Sales Order	Line	Part Number	Part Desc	Qty	PO Required	Expanded Completion	Status	Days On Hold	Key Dates	Receipt	Insp. Start	Insp. Comp.	Report Sub.	Start Repair	Start Cooling	Witness	Packing	Job Comp.	Shipped
Detail # 10484	902767	001	GE8L01M91E	GE M9001E STAGE 1 BLADE	92	25/May/14	03/Jun/14	Job Complete	1	20/Dec/13	03/Jan/14	05/Feb/14	12/Feb/14	13/Feb/14	N/A	N/A	25/Jun/14	28/May/14		
Detail # 10484	902767	006	GE8L03M91E	GE M9001E STAGE 3 BLADE	92	25/May/14	03/Jun/14	Job Complete	4	20/Dec/13	25/Dec/13	03/Feb/14	04/Feb/14	08/Feb/14	N/A	N/A	26/Jun/14	28/May/14		
Detail # 10484	902767	009	GE8B01M91E	GE M9001E STAGE 1 SHROUD BLOC	48	25/Jun/14	13/May/14	Packing Complete		20/Dec/13	26/Dec/13	10/Jan/14	22/Jan/14				17/Jul/14			
Detail	PO 14052/PO 13644	903011	GE8N01M91E	GE M9001E FUEL NOZZ DLN PRM	14	23/Jun/15	30/Jul/15	Part Received		18/Apr/15										

# Customer Communications



Online, live virtual service allowing customer review of product throughout entire repair process.

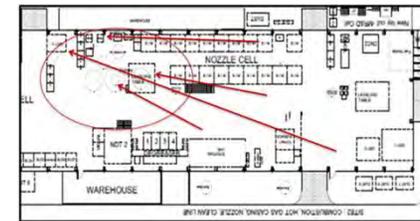
- Holographic user interface.
- Live video feed.
- Saves time, reduces travel time and or time needed to review inspection / repair status and results.
- Cost Saving, reduces costs of travel in order to review components within the repair facility.
- Superior video quality.
- Allows hand free video and audio connections anywhere within the facility.
- Customer interface using "Microsoft Teams" free platform.



# Lean Manufacturing



- Lead time reductions and cost control measures allow the facility to be competitive, even for geographically distant customers.
- Continual improvement through lean manufacturing techniques.
  - Inventory level control
  - Single piece flow
  - Piece part movement reduction
  - Operation level loading
  - Multi-skilled workforce
  - Implementing new repair techniques
- Improvements solicited primarily from shop level employees.
- Lean techniques implemented throughout the entire business



# Logistics



- Strict Packing Procedures utilized to ensure all product is safely delivered.
- “Shockwatch” label attached to shipments to monitor cargo condition in transit.
- Each container is package to withstand various climate conditions.
- Full capability to repair/ replace damaged containers as required.
- Fully compliant with international shipping regulations.
- Resources on site to assist with shipping paperwork and customs clearance.



# Logistics

- A dedicated team of logistics professionals on-site with years of experience in handling freight in and out of all areas of the world.
- Specialized, approved freight forwarders that are available 24 hours a day.
- EthosEnergy (Thailand) works under special privileges from the Thailand, Board of Investment giving us expedited deliveries in and out of customs within Thailand (average 1 to 2 days max).
- Multiple transportation modes available: Sea, Air, Truck or any combination thereof.
- Facility is 45 minutes from the seaport and 2 hours from the international airport.



Frequent  
Shipping  
Locations



# Our Customers around the globe



## America's

- Chevron
- Exxon Mobil
- Watson Cogen
- Ocean State
- Graphic Packaging
- Shell
- Saguario
- Exelon (Grande Prairie)
- MEG (Canada)
- Air Liquide
- Air Products
- Colorado Bend
- Linden Cogen
- AECI Dell Power
- Martinez Cogen
- Western Farmers
- Hermiston Generating
- Power Generation Co. of Trinidad and Tobago
- Empresas Publicas De Medellin E.S.P (EPM)
- Ende Guaracachi
- CAPSA CAPEX

## Asia Pacific

- GPSC
- GLOW
- B. Grimm
- EGAT
- EGCO Cogeneration
- Star Petroleum
- Electric Power Gen. Ent. (EPGE)
- MEPE Ywama Power Station
- Shell (Seraya – Singapore)
- Des Gadong Pow. Stat.
- Energy Australia
- West Coast Power
- CEPCO
- Tonen General Sekiyu
- Kyushu
- Dongguan Tongming
- Sunon Asogli Power
- CNOOC and Shell

## Europe, Middle East & Africa

- Engie
- Saudi Electric Company
- TECMO Arabia
- Kahrabel FZE
- NOMAC / ACWA Power
- Mass Global
- CenPower
- Ramat
- Raban Al Safina
- BP (ETAP & Magnus)
- Public Power Corp. (Greece)
- Repsol (Spain and UK)
- KTR / KPO
- Energie Und Wasser Potsdam
- Evonik Rheinfelden
- Perenco
- EDF
- Lavera Energies
- BASF Schwarz Heide
- Erdemir
- Electrabel
- Edison Spa
- Infraleuna
- Freiburg
- Ciech / Kwg Stassfurt

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Or watch our shop video at: <https://youtube/QMoSKbpyt9k>

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