



Overview of VBR Turbine Partners technical capabilities

VBR Turbine Partners are independent ISO 9001/2015 certified maintenance improvement experts for GE LM2500(+), LM6000, TM2500(+) and NP PGT25(+) aeroderivative gas turbines, Speedtronic & Woodward control systems and all associated auxiliary systems.

We support our customers to improve reliability, availability, efficiency & maintainability and to reduce operation & maintenance costs.

Mechanical field services

● (Semi) Annual inspection of the gas turbine unit including but not limited to:

- Variable stator vane (VSV) hardware and control High pressure (HP) recoup – preferred operating range
- Igniter plug and ignition lead
- Flame detectors and sight glasses
- Fuel nozzles or pre-mixers
- Lube oil & scavenge pump
 - ✓ Screens
 - ✓ Chip detectors
- External engine
- Starter motor
- On-engine air/oil lines
- On-engine cable work
- Gt inlet
 - ✓ Inlet plenum
 - ✓ Fod screen
- Non return valves
 - ✓ Gas fuel
 - ✓ Steam
 - ✓ Water
 - ✓ Liquid fuel
- Gt exhaust
- Load coupling
- Turbine enclosure

● Borescope inspection

● Level 1 and 2 inspection, repair, overhaul & exchange/ Replacement of:

- Lube & scavenge pump
- Magnetic detector plug (Chip detector)
- Igniter plug and ignition lead
- Thermocouple probe (T5.4 / T4.8) and harness
- Power turbine inlet pressure (P5.4 / P4.8) probe
- Lube system temperature

- RTD
- Accelerometer
- Gas generator outside piping and wiring
- Gas turbine outside piping and wiring
- High pressure compressor
- Inlet/temperature (P2/T2)
- Gas generator (GG) speed sensor
- Power turbine (PT) speed transducer
- Air/oil separator
- Pneumatic starter
- Hydraulic starter
- Flame sensor
- Accessory gearbox carbon seals
- Hydraulic pump
- Variable stator vane (VSV) controller
- Hydraulic control unit (HCU)
- Hydraulic filter housing and element
- High pressure compressor
- (HPC) discharge temperature (T3) sensor
- Gas generator inlet duct
- Center body
- Accessory gearbox (AGB)
- Radial drive shaft
- Inlet gearbox (IGB)
- Compressor front frame (CFF)
- A-sump components
- Turbine mid frame (TMF)
- C-sump components
- Combustion chamber

● High pressure turbine (HPT) module

- ✓ HPT rotor
- ✓ HPT stage 1 nozzle
- ✓ HPT stage 2 nozzle
- ✓ HPT rotor blade
- ✓ Hot section
- ✓ Compressor repair
- ✓ Gas generator assembly replacement

● HPC

- ✓ Blade replacement
- ✓ Blade repair
- ✓ Dry ice cleaning
- ✓ Gas generator assembly replacement

● Power turbine (LPT)

- ✓ Casings
- ✓ Stage 1 rotor blades
- ✓ Power turbine forward adapter
- LPT stage 1 nozzle assembly
- Low pressure turbine replacement
- Gas turbine assembly replacement
- High speed power turbine (HSPT)
- HSPT exchange and alignment

● Low & high pressure compressor incl.:

- ✓ Compressor stator casings
- ✓ Compressor variable stator vanes
- ✓ Compressor vane shrouds
- ✓ Compressor fixed stator vanes
- ✓ Compressor rotor blades
- ✓ HPC bushings repair (LM6000)
- ✓ VSV hardware
- ✓ VSV rigging
- ✓ Variable stator vane torque shaft
- Alignment
- Vibration analysis
- Technical assessment/audit
- Auxiliary systems inspection & repair
- Troubleshooting and problem solving
- (VSV) off-schedule Inspection





Overview of VBR Turbine Partners technical capabilities

Control systems & instrumentation field services

- **Our speedtronic & woodward services include:**
- Ignition exciter replacement
- Power turbine (pt) speed transducer electrical cable replacement
- Vibration monitoring system functional check
- DLE mapping, full mapping on-site, corrective mapping on-site & remote
- Degradation flmae eye
- Software modifications & upgrades
- On-engine/package instrumentation checks, including full loop check
- On-engine/package sensor calibration
- Overspeed protection inspection and calibration/adjustments
- Assessment of modules: tc, rtd, actuators
- Degradation of T4.8 / T5.4
- Cleaning of control system: modules, cards & filters
- Back up of control unit software and tunables
- Back up of HMI
- Spare parts maintenance
- Power supply check-up's
- Testing reaction time of staging valves in the field
- Control system retrofits & re-commissioning
- New HMI based on citect or ifix
- Fat with using simulator
- Technical audits to increase availability/reliability/maintainability
- Commissioning / recommissioning

Maintenance agreements

- 24/7 Maintenance agreements
- Maintenance management support
- Strategic maintenance planning
- Project & resource management
- Recommendations management
- Speedtronic & Woodward

Engineering

- Emission reduction retrofits
- Co2 emission reduction by increased efficiency and fuel flexibility
- Service interval & engine life extension
- Power plant relocation

Spare parts

- Strategic spare parts planning
- Critical parts life management
- Sensors
- Probes
- On- and off-engine cables
- Lube & scavenge pumps – new/overhauled
- Starters – new / overhauled
- Valves – new / overhauled
- Actuators – new / overhauled
- LM consumables (filters, seals, gaskets etc.)
- Speedtronic & Woodward controls cards
- LM tooling and maintenance toolboxes

Education & training

- Introduction & familiarization
 - ✓ Gas turbine basics
 - ✓ Major components
 - ✓ Auxiliary systems
 - ✓ Turbine maintenance
 - ✓ Turbine operations
 - ✓ An introduction to turbine controls
- Engine control operations
- Advanced engine instrumentation/hardware
- Advanced engine control operations
- Advanced controls hardware & software
- Troubleshooting & real-life cases
- DLE mapping principles
- Performance monitoring & optimization
- Managing effective borescope inspections
- Managing effective Level 1 and Level 2 maintenance

Remote digital maintenance solutions

- DECIDE longer term decision support to prevent unscheduled engine outages
- RAPID immediate problem solving to reduce engine downtime
- Augmented reality support to improve problem solving on site.
- Gastops MetalSCAN for very early warning of upcoming bearing failure

Consulting

● Gas turbine maintenance contract monitoring:

- Preparation of the request for quotation
- Evaluation of the proposals
- Establishment of maintenance work scope
- Monitoring of the maintenance process
- Evaluation of the maintenance activities
- Assessment of the maintenance invoices

● Gas turbine overhaul support:

- Preparation of the request for quotation
- Evaluation of the engine overhaul proposals
- Establishment of the overhaul work scope
- Monitoring of the depot work on the engine
- Monitoring of the testing of the engine
- Evaluation of the entire overhaul process
- Assessment of the final overhaul invoice

For more information please contact info@vbr-turbinepartners.com

