**Customer value proposition**

We support GE LM users to improve reliability, availability & performance and to reduce total cost of ownership on their gas turbine operations.

- Independent maintenance improvement experts for aero-derivative gas turbines
- ISO 9001:2008 & SCC** certified
- Specialized in GE LM1600 LM2500 LM6000 gas turbines & control systems

**VBR solutions & services overview**

**Maintenance improvement solutions**
- Troubleshooting, problem solving
- RAPID remote operation support
- Human error reduction
- Maintenance agreements
- Inspection, repair & replacement
- Engine overhaul, hot section
- Control system retrofit & re-commissioning
- Remote DLE mapping
- Strategic spare parts planning
- Emission reduction retrofits
- Service interval & engine life extension
- Power plant relocation

**Maintenance improvement services**
- Controls & Instrumentation
- Overhaul Consultancy
- Engine overhaul, hot section
- Mechanical Field Service
- Education & Training
- Strategic spare parts planning
- Condition Monitoring
- Power plant relocation
- Human error reduction

**Authorized distribution**
- Meggitt, Whittaker Controls Valves
- Esterline / Weston Aerospace
- GasTOPS MetalSCAN
- Cheng Cycle / Cheng Low NOx
- JADwash
**Troubleshooting, problem solving**

**Situation**
When an engine trips or shows an uncommon series of alarms it is usually hard to determine the cause of these alarms in a short time.

**Solution**
Apply condition monitoring and data logging applications which enable experienced engineers (both I&C and mechanical) to analyse all data and to determine the cause of the trips or alarms in a quick & effective way.

VBR provides condition monitoring & data logging applications and experienced service engineers that are well trained & highly motivated to solve the gas turbine problems of our customers.

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**RAPID remote operation support**

**Situation**
Gas turbine operators face ongoing demands by their customers, managements and governments to keep improving their levels of reliability, availability & performance while reducing their operation & maintenance costs and exhaust emissions.

**Solution**
Optimize gas turbine operation & maintenance management by implementing intelligent diagnostic solutions to increase revenues and to reduce costs in a sustainable way.

VBR provides RAPID remote operation support: the permanent gathering & analysis of all key parameters of a gas turbine to determine what kind of operation decisions & maintenance actions are required and to predict when they are required.

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**Human error reduction**

**Situation**
Research shows that approx. 59% of the preventable lost production in the global process industry is primarily caused by technical error and that approx. 42% is primarily caused by human error. (Source: ARC Advisory Group)

**Solution**
Reduce human error in gas turbine operation & maintenance in a sustainable way by providing predictive operation decision & maintenance action support and dedicated education & training to the gas turbine operation & maintenance staff.

VBR provides predictive operation decision & maintenance action support (based on RAPID intelligent diagnostics) and dedicated education & training to reduce human error in day-to-day gas turbine operation & maintenance in a sustainable way.
Maintenance agreements

**Situation**
Every gas turbine in operation requires scheduled and unscheduled maintenance to ensure effective operation over time.

**Solution**
Maintenance agreements enable gas turbine operators to reduce the total amount of unscheduled stops and to reduce the total downtime of an engine in case of a scheduled or unscheduled stop.

VBR supports GE LM operators with maintenance agreements that are tailor made to the wants, needs and requirements of these operators.

Inspection, repair & replacement

**Situation**
Every gas turbine in operation needs scheduled and unscheduled inspections. In case of an unexpected stop the cause of this stop needs to be determined and the malfunctioning parts need to be repaired or replaced.

**Solution**
Develop an aligned combination of in-house maintenance expertise and external maintenance capabilities to reduce the total downtime of the engine after a scheduled or unscheduled stop.

VBR provides inspection, repair & replacement of malfunctioning parts. Our field service engineers always bring a standard set of replacement parts to site in order to reduce the total downtime of an engine.

Engine overhaul, hot section

**Situation**
The major part of a gas turbine maintenance budget is assigned to engine overhauls & hot section exchanges. Consequences of possible decisions about the required scope and the associated costs of an overhaul are often unclear to the operator.

**Solution**
Bring transparency to the engine overhaul process by using independent experts to monitor the entire overhaul process from the initial writing of an overhaul tender to the professional review of the final overhaul invoice.

Independent VBR overhaul consultants are former key executives of GE authorized overhaul facilities (GE Rheden, MTU Berlin-Brandenburg). They support LM operators to realize the best possible price to performance ratio on their engine overhauls.
Control system retrofit & re-commissioning

**Situation**
Obsolete, mature or poorly commissioned new control systems are a serious constraint for reliable gas turbine operation.

**Solution**
Apply a control system retrofit or re-commissioning to improve gas turbine reliability, availability & performance and to reduce gas turbine operation & maintenance costs.

VBR provides OEM and third party control system retrofits for obsolete & mature control systems and re-commissioning services to improve poorly commissioned new control systems.

Remote DLE mapping

**Situation**
GE LM engines with DLE emission reduction require regular (re)mapping of key parameters in the DLE system to ensure performance as required. Experienced DLE mappers are scarce and expensive.

**Solution**
Realize the conditions for remote DLE mapping on your engine to enable quick, easy and cost effective access to remote DLE mapping expertise and capabilities.

VBR provides remote DLE mapping services to improve the reliability, availability & performance and to minimize the NOx, CO & CO2 emissions of a DLE LM gas turbine.

Strategic spare parts planning

**Situation**
Every engine in operation needs spare parts for scheduled and unscheduled engine stops.

**Solution**
Strategic spare parts planning can reduce the downtime of an engine after a scheduled or unscheduled stop and can reduce spare part purchasing & stocking costs in a sustainable way.

VBR provides strategic spare parts planning services to improve engine availability & maintainability. This avoids unnecessary spare part purchasing & stocking costs.
Emission reduction retrofits

**Situation**
European operators of older gas turbines need to apply some form of emission reduction to comply with the new NOx emission limits of the European Industrial Emissions Directive (IED).

**Solution**
For European operators of older gas turbines fitted with steam injection, a Cheng Low NOx (CLN) retrofit will most likely be the most cost-effective way to comply with the IED.

VBR is the authorized distributor of Cheng Low NOx (CLN) emission reduction retrofits for Europe, the Middle East and Africa.

Service interval & engine life extension

**Situation**
Gas turbine operators are looking for opportunities to extend the operation of their engines between maintenance service intervals and to extend the total lifetime of their power plants.

**Solution**
Move from time-based maintenance strategies & approaches to condition-based maintenance strategies & approaches to enable extension of maintenance service intervals and extension of the total lifetime of a gas turbine power plant.

VBR provides condition-based maintenance programs for GE LM gas turbines that are based on systematic operation & maintenance improvement philosophies, strategies & approaches.

Power plant relocation

**Situation**
In Europe, a lot of LM power plants are closing down because it is no longer economically viable to keep them in operation due to high gas prices and low electricity prices.

**Solution**
These power plant packages can be sold to parties outside of Europe that are able to operate them in a more profitable way.

VBR provides systematic decommissioning and recommissioning services for used LM power plant packages to realize effective start-up and operation at their new location.
VBR Turbine Partners
Maintenance improvement services

**Controls & Instrumentation**

**Situation**
> 75% of all unscheduled outages are caused by issues related to the control system, the instrumentation or the electrical wiring on an aero-derivative gas turbine.

**Challenge**
Obsolete, mature and poorly commissioned new control systems and the associated instrumentation & wiring are a serious constraint for reliable GE LM gas turbine operation.

VBR provides inspection, calibration, re-commissioning, remote monitoring & troubleshooting, updates, upgrades and retrofits for all OEM & third party LM control system hardware & software.

**Mechanical Field Service**

**Situation**
Gas turbines in operation require regular inspection, troubleshooting & problem solving and repair or replacement of defective parts to ensure an ongoing effective operation over time.

**Challenge**
Experienced operators and maintenance engineers retire without sufficient opportunity to transfer their knowledge and capabilities to the younger generations of gas turbine operators and maintenance engineers.

VBR provides well trained & very experienced mechanical field service engineers with excellent troubleshooting & problem solving capabilities to reduce engine downtime in case of a scheduled or unscheduled engine stop.

**Condition Monitoring**

**Situation**
Many operators look for opportunities to extend the maintenance service intervals and the total lifetime of their gas turbines by shifting from (reactive) corrective maintenance to (pro-active) preventive & predictive maintenance.

**Challenge**
Extending maintenance service intervals and the total lifetime of an engine requires more detailed information about the condition of the engine and its subsystems.

VBR provides GE LM condition monitoring solutions for service interval extension, life extension, revenue improvement and maintenance cost reduction.
Overhaul Consultancy

**Situation**
The major share of a gas turbine maintenance budget is assigned to engine overhauls and hot section exchanges.

**Challenge**
Consequences of possible decisions about the required scope and the associated costs of an engine overhaul are often unclear to the gas turbine owner/operator.

VBR provides independent overhaul consultancy services to support gas turbine owners & operators to realize the best possible price to performance ratio on the overhaul or the hot section exchange of their engine.

Education & Training

**Situation**
Experienced gas turbine operators and maintenance engineers retire and are replaced by younger operators and maintenance engineers with limited expertise & experience.

**Challenge**
Reduce human error in gas turbine operation & maintenance in a sustainable way by educating & training the less experienced gas turbine operation & maintenance staff.

VBR provides gas turbine training courses from the perspective of optimizing operation & maintenance activities in order to reduce human error in day-to-day operation & maintenance.

Spare Parts

**Situation**
Spare parts are required for the day-to-day maintenance of a gas turbine to ensure sustainable effective operation.

**Challenge**
Since gas turbine parts can fail at unexpected moments it is required to have access to a quick, reliable and cost effective source for gas turbine spare parts, especially critical parts.

VBR keeps a permanent stock of critical spare parts and has extensive expertise & experience in supplying guaranteed quality spare parts in a cost effective way with minimal lead times.
VBR Turbine Partners
Authorized distribution

Meggitt / Whittaker Controls valves

About
Meggitt / Whittaker Controls is the OEM of many critical valves used in GE and RR aero-derivative gas turbines.

Why
Meggitt also supplies these new valves (under the Meggitt brand and through their authorized distributor) directly to GE & RR end users at much better prices & lead times compared to the supply of these new valves through the gas turbine OEMs.

VBR is the authorized distributor for new Meggitt / Whittaker Controls valves in land based & marine GE LM & RR gas turbines in Europe, Russia, the Middle East & Africa.

Meggitt / Whittaker Controls overhaul

About
Meggitt / Whittaker Controls is the OEM of many critical valves in GE LM and RR aero-derivative gas turbines. Meggitt also performs OEM certified “back to zero hour” overhauls on these valves.

Why
Many Meggitt / Whittaker Controls valves are ATEX certified. Only the authorized Meggitt OEM valve overhaul facility can deliver the required ATEX acceptance testing and certification.

VBR is the only authorized OEM overhaul facility for Meggitt / Whittaker Controls valves in land based & marine GE & RR gas turbines in Europe, Russia, the Middle East & Africa.

Esterline / Weston Aerospace

About
Esterline Advanced Sensors is an approved supplier to General Electric and Rolls Royce for critical gas turbine sensors and probes (temperature, speed).

Why
Esterline Advanced Sensors is especially known for their calibrated Weston T4.8 thermocouples that enable gas turbine operators to improve the efficiency and power output of their gas turbines.

VBR is the authorized distributor for new Esterline sensors & probes in land based & marine GE & RR gas turbines in Europe, Russia, the Middle East & Africa.
GasTOPS MetalSCAN

About
GasTOPS MetalSCAN is the most effective solution for early detection of bearing damage in aero-derivative gas turbines.

Why
In case of bearing damage MetalSCAN information allows operators to proactively plan the necessary maintenance actions and bring the engine to a scheduled stop to minimize engine downtime and avoid secondary damage.

Cheng Cycle / Cheng Low Nox (CLN)

About
Cheng Power Systems is the OEM of Cheng Cycle power output & efficiency enhancement and Cheng Low NOx (CLN) emission reduction retrofits by means of advanced steam injection.

Why
For owners and operators of older gas turbines with steam injection a CLN retrofit is the most (cost) effective way to comply with the new European legislation about exhaust emissions.

JADwash

About
JADwash green performance cleaner is a REECH compliant, very effective, environmentally friendly and entirely biodegradable gas turbine compressor cleaner.

Why
At a competitive price JADwash delivers an improved cleaning performance with a reduced environmental impact compared to all other major gas turbine compressor cleaning products.
Over 230 corporate & public sector customers

Maintenance service locations
- Netherlands
- Russia
- United Kingdom
- United Arab Emirates (Abu Dhabi & Dubai)

Maintenance service agents
- Australia
- New Zealand

Providing GE LM solutions & services
- Europe
- Russia
- Middle East
- Africa

Providing GE LM spare parts
- all over the world

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