

**VBR**  **TURBINE PARTNERS**



# **Strategic spare parts planning for industrial gas turbines**

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## Strategic spare parts planning ...



■ By rewiring the boat himself, Bob thought he could scrape together enough cash for a trailer.





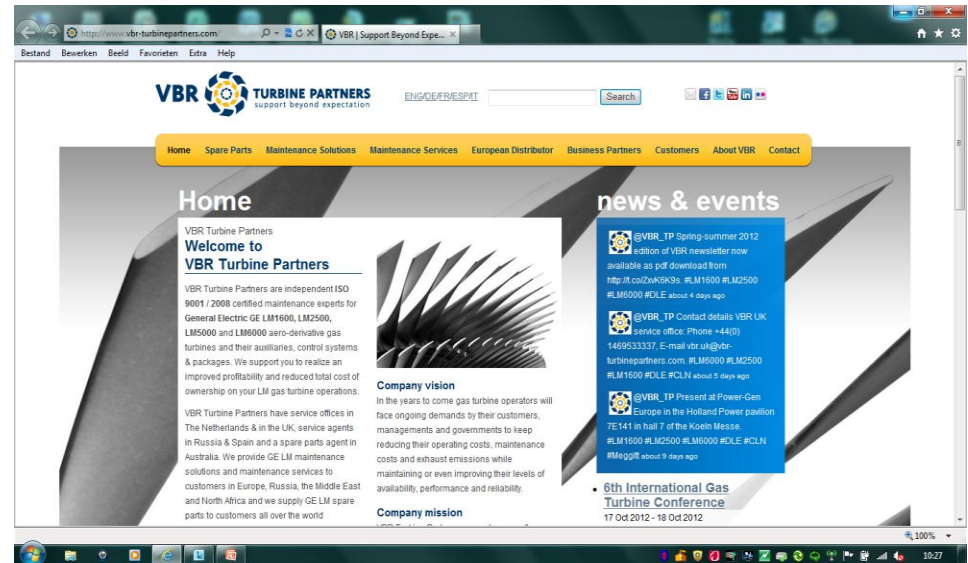
# VBR Turbine Partners at a glance

VBR Turbine Partners :

Independent ISO 9001/2008 certified maintenance experts for GE LM1600, LM2500(+), LM5000 and LM6000 aero-derivate gas turbines and their packages & auxiliaries.

VBR maintenance solutions

- 24/7 maintenance agreements
- Maintenance management support
- Trip prevention & performance upgrade
- CLN emission reduction retrofits
- Inspection, repair & replacement
- Engine overhaul & hot section exchange
- Control system upgrade & retrofit
- DLE mapping
- Strategic spare parts planning



Located in the Netherlands and in the UK



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# 1. Why strategic spare parts planning?

Traditional spare parts planning will keep the profitability and the total cost of ownership of your gas turbine operation exactly the same as it always was.

Strategic spare parts planning supports the objectives of most gas turbine operators & owners: improving gas turbine profitability and decreasing total cost of ownership by

1. improving gas turbine availability
2. improving gas turbine reliability
3. improving gas turbine performance
4. reducing spare parts purchasing costs

Strategic spare parts planning focuses both on gas turbine revenues and on gas turbine costs: revenues up, costs down.



## 2. How can spare parts planning support these objectives?

Spare parts planning can support the objectives of gas turbine operators in four ways:

1. By differentiating between internal and external gas turbine parts
2. By differentiating between very critical, medium critical and non critical external parts
3. By strategically deciding on spare part origin & spare part condition
4. By strategically deciding on type of supplier and purchasing conditions



### 3. Internal and external gas turbine parts

Gas turbine parts:

- internal parts
- external parts

Internal gas turbine parts: rotors, blades, vanes, combustors etc.

External gas turbine parts: parts outside of the gas turbine and all auxiliary systems.

Internal gas turbine parts are obviously very crucial for the proper functioning of a gas turbine but **the majority of all unscheduled stops and unscheduled gas turbine down time is related to a dysfunction of the external parts of a gas turbine.**





## 4. Spare parts planning for internal gas turbine parts

Internal gas turbine spare parts are:

- most commonly sourced through an OEM
- most commonly part of a maintenance and/or overhaul contract with an OEM
- most commonly procured at the prices and terms & conditions of an OEM

Result: gas turbine owners and operators are very dependent upon the OEM.

But ... this situation is changing because alternatives are available now:

- non OEM manufacturers of internal gas turbine parts (e.g. Heico, Chromalloy)
- non OEM companies that refurbish and stock internal parts (several U.S. based companies)

By leaving the internal gas turbine parts (strategically) out of a maintenance and/or overhaul contract with an OEM all gas turbine owners and operators can realize substantial quality benefits and cost benefits.



## 5. Spare parts planning for external gas turbine parts

External parts are all parts outside the gas turbine, e.g. auxiliary systems, hydraulic actuators, gas valves, pressure transmitters, starter systems, thermocouples, speed & flame sensors, control systems, monitoring systems etc.

We distinguish three categories of external gas turbine parts:

1. Very critical parts: dysfunction will result in engine shut down or failure to start
2. Medium critical parts: dysfunction will not immediately result in engine shutdown
3. Non critical parts: dysfunction will not result in engine shutdown or failure to start



## 6. Category 1: very critical external gas turbine parts

Very critical parts are those external gas turbine parts that will cause the engine to shut down or to not start up in case of dysfunction.

Typical examples of very critical parts:

gas valves, CDP-transmitters, starters, IGV-systems, L&S-pumps etc.

Typical characteristics of very critical parts:

long order lead times, high cost items, limited amount of suppliers.

Preferred sourcing option for very critical parts:

In order to reduce the amount of unscheduled shut downs and in order to reduce the total down time of a gas turbine these critical parts need to be either on stock or very close at hand (e.g. a stocking agreement with a preferred gas turbine maintenance service provider).



## 7. Category 2: medium critical gas turbine parts

Medium critical parts are those external gas turbine parts that will not immediately cause the engine to shut down or to not start up in case of dysfunction.

Typical examples of medium critical parts:

Brackets, cables, redundant systems such as speed sensors, flame sensors etc.

Typical characteristics of medium critical parts:

Availability good, average priced items, limited amount of suppliers.

Preferred sourcing option for medium critical parts:

Since the average lead time is longer than the time to total gas turbine failure:

- medium critical spare parts either on stock or very close at hand
- participating in a spare parts pool (with other gas turbine operators)
- stocking agreement with a preferred gas turbine maintenance service provider



## 8. Category 3: non critical external gas turbine parts

Non critical parts are those external gas turbine parts that will not cause the engine to shut down or to not start up in case of dysfunction.

Typical examples of non critical parts:

Gaskets, o-rings, nuts & bolts etc.

Typical characteristics of non critical parts:

Availability good, average prices low, several suppliers.

Preferred sourcing option for non critical parts:

Buy for planned maintenance from preferred gas turbine maintenance service provider.



## 9. Required origin and condition of gas turbine spare parts

A gas turbine operator has the following options for origin and condition of spare parts:

Options based on the origin of the part:

1. OEM part, OEM branded
2. OEM part, not OEM branded
3. Non OEM part (alternative, re-engineered, remanufactured, PMA etc.)

Options based on the condition of the part:

1. New - factory new
2. New - old stock (NOS)
3. Refurbished/overhauled (OEM certified)
4. Used Serviceable (tested & certified)

Strategic decisions on the required origin and the required condition of gas turbine spare parts can lead to substantial cost benefits.





## 10. Type of supplier and purchasing conditions

A gas turbine operator has the following options for the type of supplier for gas turbine spare parts:

1. an OEM, OEM branded
2. an original parts manufacturer, not OEM branded
3. a non OEM parts manufacturer (alternative, PMA, remanufactured)
4. an independent gas turbine maintenance service provider
5. an independent spare parts broker or trader

In the procurement of gas turbine parts price obviously plays an important role but also other purchasing conditions like:

1. lead time
2. warranty
3. stock position

Strategic decisions on the required type of supplier for gas turbine spare parts and on the required purchasing conditions can lead to substantial cost benefits.



# 11. Conclusions

Strategic spare parts planning can contribute substantially to decreasing the amount of the unscheduled engine stops and the total down time of an engine. This means:

1. Improved availability of the gas turbine
2. Improved reliability of the gas turbine
3. Improved performance of the gas turbine

Strategic spare parts planning can also contribute to a substantial cost reduction in the procurement of gas turbine spare parts due to strategic purchasing decisions:

1. Decisions regarding the purchasing of internal and external gas turbine spare parts
2. Decisions regarding the purchasing of very critical, medium critical & non critical parts
3. Decisions regarding the required origin and the required condition of spare parts
4. Decisions regarding the required spare part supplier and required purchasing conditions

Therefore the implementation of a true strategic spare parts planning will contribute substantially to improvement of the profitability of any gas turbine operation.



## 12. Questions?

Questions?



## 13. Thank you for your attention

Thank you for your attention!

More information:  
[www.vbr-turbinepartners.com](http://www.vbr-turbinepartners.com)

