



SIEMENS



With
Rolls-Royce
Aero Engine
Technology

Industrial RB211–Gzero Gas Turbines

Power Upgrade

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Optimised power and performance

Upgrade delivers 10 per cent more power

For global oil & gas mechanical drive and power generation applications, the Industrial RB211 gas turbine systems have earned a market leading reputation as the most reliable and efficient in their class. Available from 37,465 to 45,316 horsepower at ISO conditions, more than 700 units have been sold, recording over 30 million operating hours.

The Industrial RB211-Gzero retrofit upgrade provides existing users of Industrial RB211-C and Industrial RB211-G gas generators, utilising RT-56 and RT-62 power turbines, with a nominal 10 per cent power increase depending on ambient temperature. The Industrial RB211-Gzero upgrade further enhances the productivity and customer value of these reliable units.

The Industrial RB211-Gzero upgrade can be easily achieved with minimal modification to the existing package design during routine unit overhaul. This cost-effective and simple retrofit approach ensures facility down-time is minimised, while performance, power and operator profitability are optimised.

The Industrial RB211 has been refined through in-field experience, including remote and offshore operations where availability and rugged reliability are of crucial importance.

Track record of performance enhancements

Siemens has a proven track-record of applying systematic product enhancement and upgrade improvements to increase power output and enhance the efficiency and emissions performance of equipment for owner operators. The first Industrial RB211 gas turbine went into service in 1974, rated at 26,418 horsepower. Our team of expert design and field-service engineers has applied fleet performance data insights from operating hours accumulated in the field to drive continuous Industrial RB211 unit performance improvements. These have included power and efficiency upgrades and improvements such as the Industrial RB211-GT, and now the Industrial RB211-Gzero.



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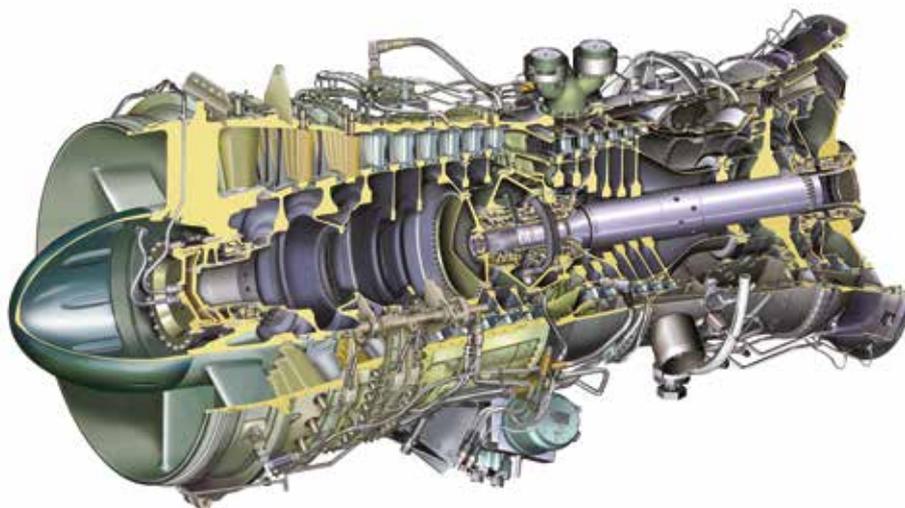
Cost effective solution minimises downtime

The Industrial RB211-Gzero is a power enhancement programme particularly relevant to operators of the 440-plus worldwide installed fleet of Industrial RB211-C and -G gas generators with RT-56 or RT-62 power turbines.

The programme offers operators an upgraded version of the Industrial RB211-G gas generator which, when harnessed to a power turbine, delivers enhanced prime mover power capacity. The Industrial RB211-Gzero gas generator upgrade is achieved with increased air flow featuring zero-staging, partial re-blading of the intermediate pressure compressor and upgrading of the inlet vane of the power turbine to suit the higher flow.

For existing Industrial RB211-C engines, the conversion, easily made during the overhaul cycle in one of the Siemens approved repair and overhaul bases worldwide, combines the existing -C to -G turbine refit with the Industrial RB211-Gzero compressor upgrade to create the Industrial RB211-Gzero gas generator. The new Industrial RB211-Gzero engine is interchangeable with the current -G engine, with similar dimensions and interfaces.

Ease of gas generator refit is a key element of the upgrade alongside minimal package alteration to ensure a cost-effective modification in the field with minimal downtime.





Optimised power and performance

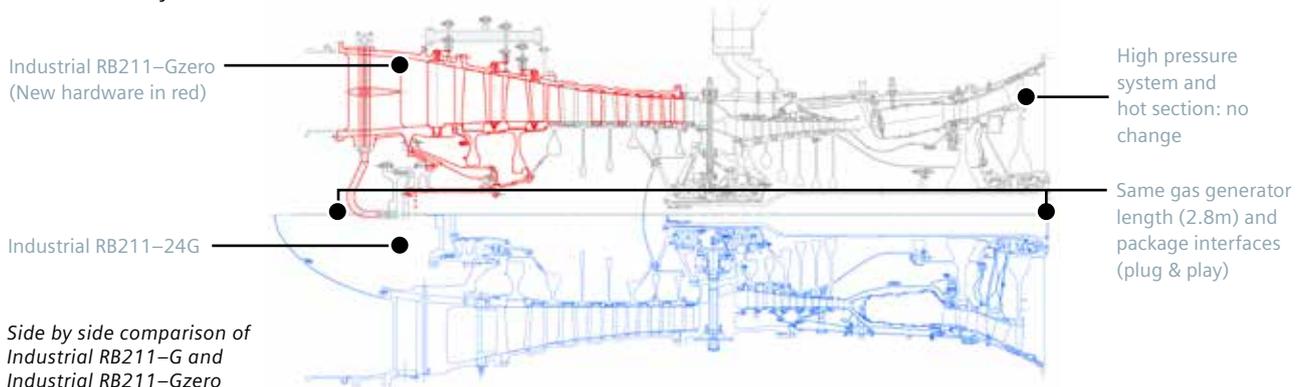
Technical benefits

The Industrial RB211–Gzero upgrade focusses on two of the five Industrial RB211 modules: air intake and intermediate pressure compressor. The remaining three modules remain unchanged and are taken from the donor engine during retrofit.

Module 1, the air intake casing, has been redesigned and shortened to ensure identical engine interface length is maintained, compensating for the increased length of module 2, the intermediate pressure compressor. A redesigned elliptically–profiled nose bullet extends further forward in the air stream and achieves ideal airflow entry to the compressor.

Core elements of the upgrade focus on the intermediate pressure compressor module. Here the existing stage one disc and blade row is removed and replaced with a new stage zero and stage one discs and blade assembly, designed to mate with the existing stage two–to–five drum assembly.

The new Industrial RB211–Gzero stage zero and stage one discs are in titanium and replace the existing stage one steel disc. Blades on the new discs feature an elliptical leading edge design for improved efficiency. High wedge–angle and 3D tangentially–bowed vane technology contribute to improved compressor efficiency across the widest operating range. The total number of variable–geometry stages increases from one on the Industrial RB211–G to three: one row of variable inlet guide vanes and two stages of variable stator vanes.



Side by side comparison of Industrial RB211–G and Industrial RB211–Gzero

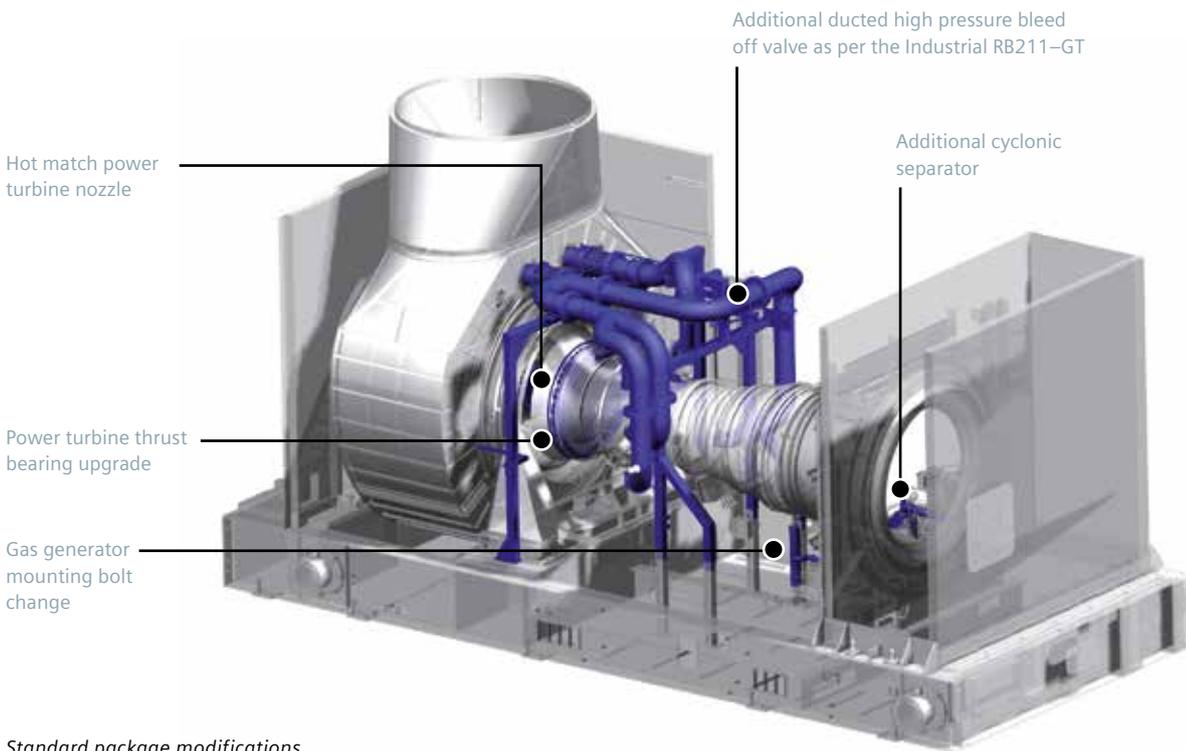


“The modular design allows the Industrial RB211-Gzero gas generator modules to be removed and replaced, individually with new or leased modules at a service centre, while the originals are being repaired or overhauled.”

Flexible, modular package for ease of maintenance

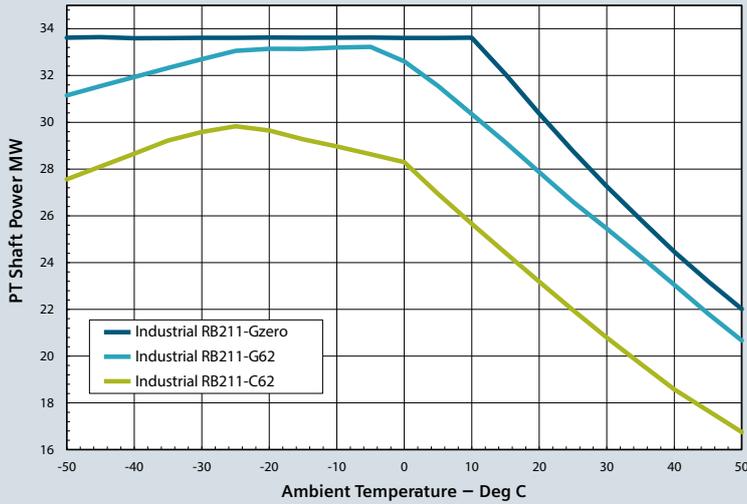
Engineered as a modular package, the Industrial RB211-Gzero is factory tested and ready for rapid, low-risk installation and commissioning. The Industrial RB211-Gzero design incorporates most engine accessory systems integral to the package, simplifying installation.

The modular design allows the Industrial RB211-Gzero gas generator modules to be removed and replaced, individually with new or leased modules at a service centre, while the originals are being repaired or overhauled.



Standard package modifications

Industrial RB211–C62, Industrial RB211–G62, & Industrial RB211–Gzero
Nominal performance uninstalled, gas fuel, ISO conditions



Optimised power and performance

Industrial RB211 operators worldwide gain from Gzero conversion

Industrial RB211 operators can gain significant benefits from the Industrial RB211–Gzero conversion, which delivers 10% more power at ISO conditions, compared with the Industrial RB211–G62.

Current Industrial RB211–C and –G operators worldwide can take advantage of these far-reaching gains, including Industrial RB211s that:

- Operate in all climates
- Provide ‘island’ generation (particularly offshore)
- Power mechanical drive installations
- Provide grid power generation

An integrated suite of routine repair, service and maintenance processes is available to ensure each Industrial RB211–Gzero delivers optimum performance throughout the equipment life cycle. These include:

- Quality replacement parts and expert maintenance service
- Experienced, highly trained, technical field personnel
- Total care service agreements
- Long–Term Service Agreements
- Engineered Solutions
- Remote Monitoring and Diagnostics
- Technical training



“Industrial RB211 operators can gain significant benefits from the Industrial RB211-Gzero conversion, which delivers 10 per cent more power at ISO conditions, compared with the Industrial RB211-G62.”

Technical description

ISO power	<ul style="list-style-type: none"> • 32MW (43,000 SHP) • 10 per cent increase from Industrial RB211-G • Up to 31 per cent increase from Industrial RB211-C, depending on existing package configuration
Efficiency	37.7 per cent
Heat rate	9541kJ/kWh
Compressor ratio	23.4
Exhaust gas flow	102 kg/s
Exhaust gas temperature	477°C
Gas generator	Industrial RB211-G / Industrial RB211-C
Combustion	Phase II, DLE (Pk1 to PhII conversion required)
Power turbine	RT56/RT62
Starter	Existing start system

Scope of work

Gas generator	Upgrade to Industrial Gzero standard at overhaul base
Power turbine	<ul style="list-style-type: none"> • 1st stage PT vane • Thrust bearing
Package*	<ul style="list-style-type: none"> • New bleed ducting • Cyclonic separator • Gas generator mounting bolt
Fuel controls system	Change operating limits

** site survey will be required to determine additional package scope of work*

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