

# MS5002C to MS5002D Upgrade

## Benefits

- ■ ■ Increased production
- ■ □ Higher efficiency
- □ □ Compliance with environmental regulations
- □ □ Availability and Reliability
- ■ □ Life extension

Customer benefits include:

- Significant increase in shaft output power with limited modifications to the existing package
- Increased gas turbine efficiency
- True zero-hour high and low pressure modules (optional)
- Retrofitting activities can be carried out during a major overhaul without affecting engine availability

Especially if it is planned to coincide with a major overhaul of the existing MS5002C, this uprate has a small incremental cost and a relatively short pay-back period.

### Performance

The table on the right hand side shows the effect of compressor inlet temperature on output and heat rate at base load with zero inlet and zero exhaust pressure drops at sea level, 60% RH, and natural gas, at 100% LP shaft speed.

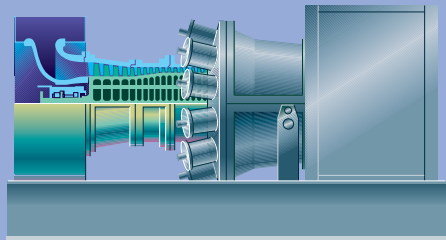
Performance gains are dependent on site conditions; for a more detailed evaluation, please contact your GE Oil & Gas representative.



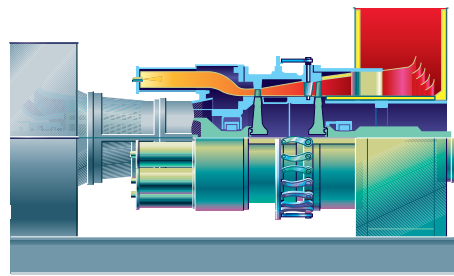
MS5002D

### PERFORMANCE

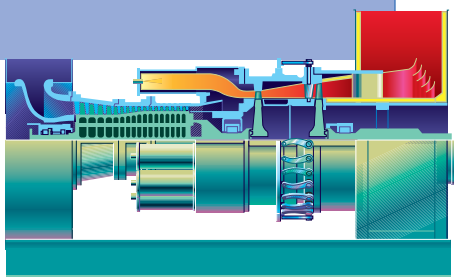
	Output power	Heat rate
Basic uprate	13.7%	-2.5%
'Full performance' option	15.0%	-3.3%



MS6001B



MS5002C



MS5002D



## What it is

The MS5002D gas turbine is the evolution of the proven and successful MS5002C, with rated ISO shaft power output of 32.6 MW and 30% efficiency. Most of the improvements have been made on the High Pressure (HP) module (axial compressor, combustors and HP turbine), but the Low Pressure (LP module) has also been improved for enhanced performance.

The MS5002C and D share high operating efficiency over a wide range of speeds and loads along with simple design and extreme robustness. The D version maintains a broad operating speed range to meet the requirements of the most common driven equipment (centrifugal compressors and pumps), as well as the ability to burn a wide variety of gaseous and liquid fuels.

Because of their similarity in overall dimensions and their modular design, the replacement of an older C model with the D model at the site is feasible with limited impact on the package and auxiliaries.

With more than 20 units already successfully retrofitted, the MS5002C to D upgrade is one of our most customer-preferred and proven upgrades.

The MS5002D is a two-shaft gas turbine that builds on our proven MS6001B axial compressor and MS5002C combustor and low pressure module experience. Shipments began in 1998, and since then, more than 100 units have been delivered and more than 1 million running hours have been accumulated. The MS5002D shares the modular design approach typically found on our two-shaft heavy duty gas turbines.

### High Pressure Module

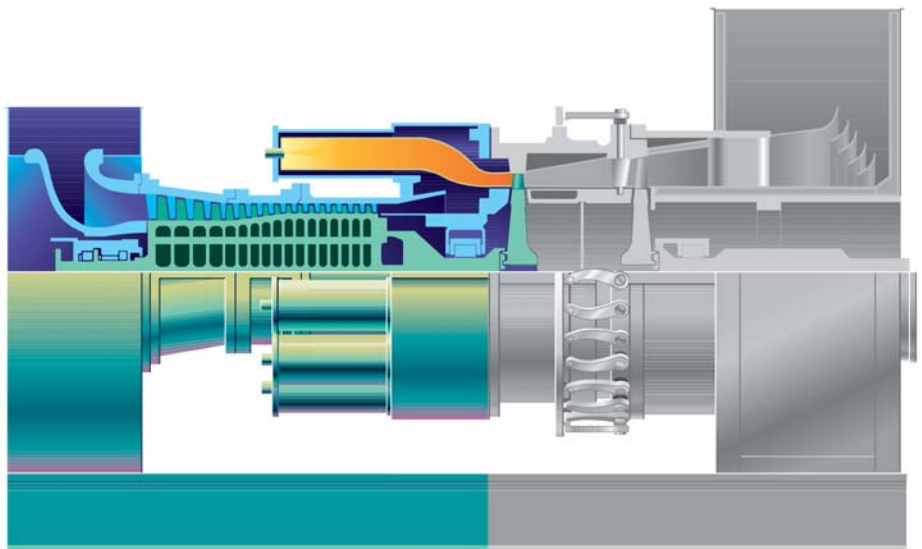
The high pressure module consists of the inlet plenum, inlet casing, axial compressor, #1 and #2 bearings, combustion chambers and high pressure turbine. This module delivers an additional 13.7% of airflow and 37°F of firing temperature to the LP power turbine as a consequence of the following major improvements beyond the previous MS5002C:

- New inlet plenum and inlet frame
- High flow GTD-450 IGV with enhanced robustness and corrosion allowance
- New 17-stage axial compressor with 10.75: 1 pressure ratio
- #2 bearing modifications
- Modified outer wrapper
- Advanced seals
- 1<sup>st</sup> stage nozzle with reduced throat area, improved cooling and 2 vane design

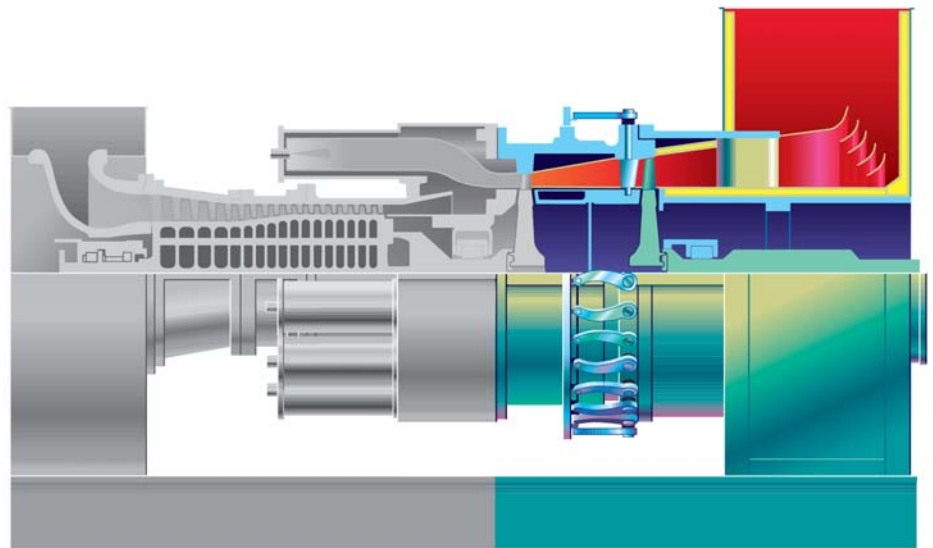
### Low Pressure Module

The low pressure module consists of the turbine case, variable 2<sup>nd</sup> stage nozzle, power turbine, exhaust frame and exhaust plenum. This section is essentially the same as that of the MS5002C with the following key improvements:

- Modified thrust bearing due to higher output power
- Optimized strut profile for enhanced performance
- 2<sup>nd</sup> stage buckets in Inconel 738 for higher performance
- Reinforced exhaust diffuser to withstand higher flow



HP Module



LP Module

## How it works

The MS5002D is the natural upgrade path for the MS5002C when higher shaft output power is required. Thanks to the commonality of the footprint, centerlines and flange the conversion can be carried out with little modification to the standard MS5002C package.

### Scope of Supply

The basic scope of supply includes the following:

- High pressure module (orange portion of *Figure 1*)
- New low pressure module thrust bearing
- New 530 kW starter motor and torque converter
- Upgrade kit for control and lube oil lines

- Upgrade kit for cooling and sealing lines
- Upgrade kit for SRV/GCV plugs and burner tips
- Control panel software upgrade

The following items must be evaluated on a case-by-case basis:

- The ability of the inlet air system/ filter house to deliver increased airflow
- Driven equipment rating to be verified (load coupling, gear box, etc.)

### Optional scope of supply to achieve full performance benefits:

- New exhaust frame with enhanced struts
- 2<sup>nd</sup> stage buckets in Inconel 738 for enhanced performance (case-by-case)

### Optional scope of supply to accelerate field activities:

- Turbine casing and variable 2<sup>nd</sup> stage nozzles preinstalled in the high pressure module (yellow portion of *Figure 1*)
- Complete low pressure module (will also provide full performance benefits)

### Optional scope of supply for DLN units:

- Inlet bleed heating for DLN extended operability
- Stainless steel exhaust frame for DLN extended operability

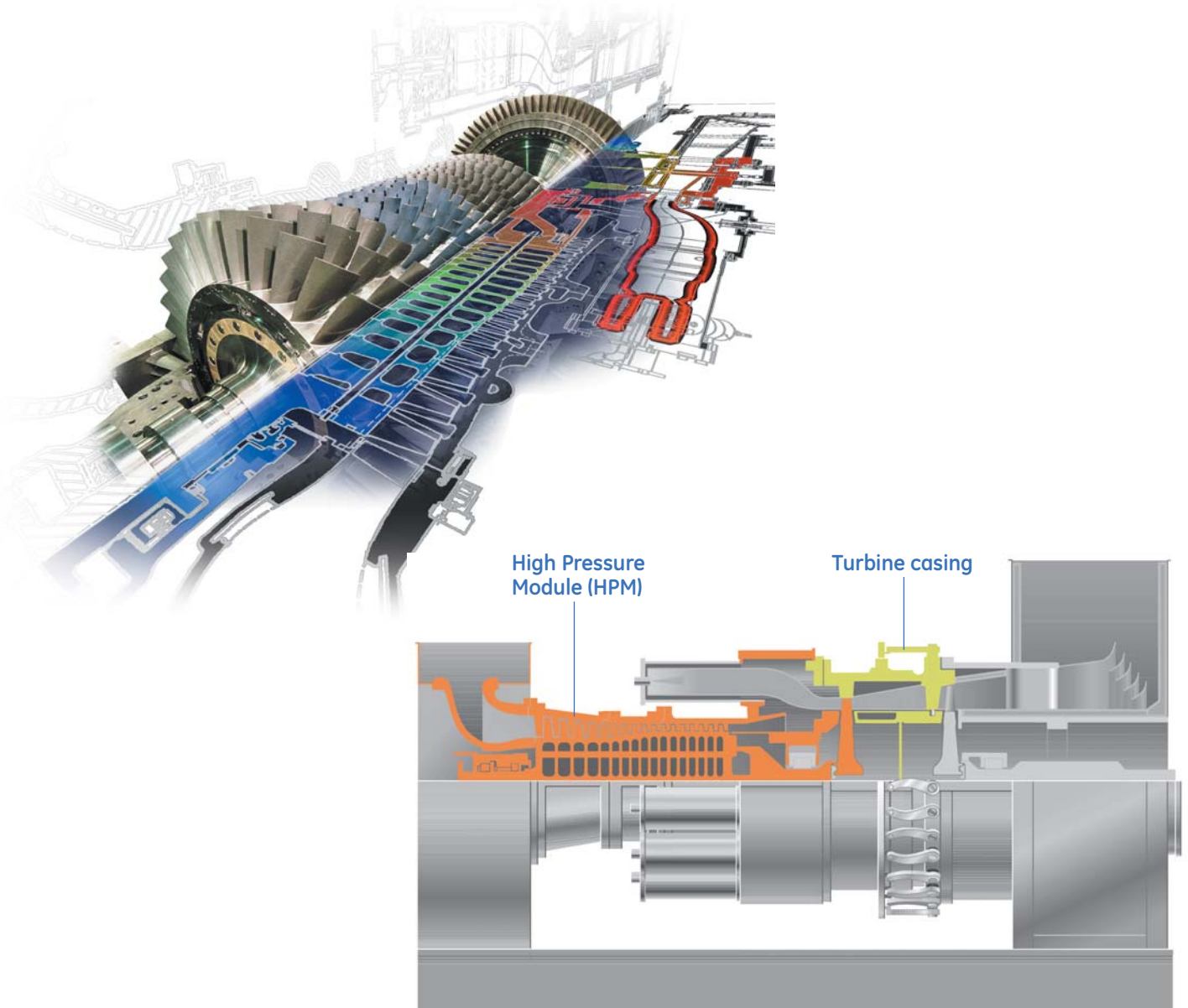


Figure 1



GE imagination at work

GE Oil & Gas  
via F. Matteucci, 2  
50127 Florence - Italy  
T +39 055 4272500  
F +39 055 4232800

Nuovo Pignone S.p.A.

E [customer.service.center@ge.com](mailto:customer.service.center@ge.com)  
[www.ge.com/oilandgas](http://www.ge.com/oilandgas)

COMK/MARK 839/II - Designed by: Studio Tre Fasi  
Printed by: Sagraf - 1-2008  
©2008 Nuovo Pignone S.p.A. all rights reserved