Operational Flexibility Upgrade for SGT5-4000F Gas Turbines

The worldwide demand for flexible production of electricity has increased significantly in recent years. Siemens Energy anticipated the changing needs of the market and reacted accordingly by further developing its range of energy products and services. Siemens Gas Turbines are renowned for their high availability and reliability as well as high power output and low emissions.

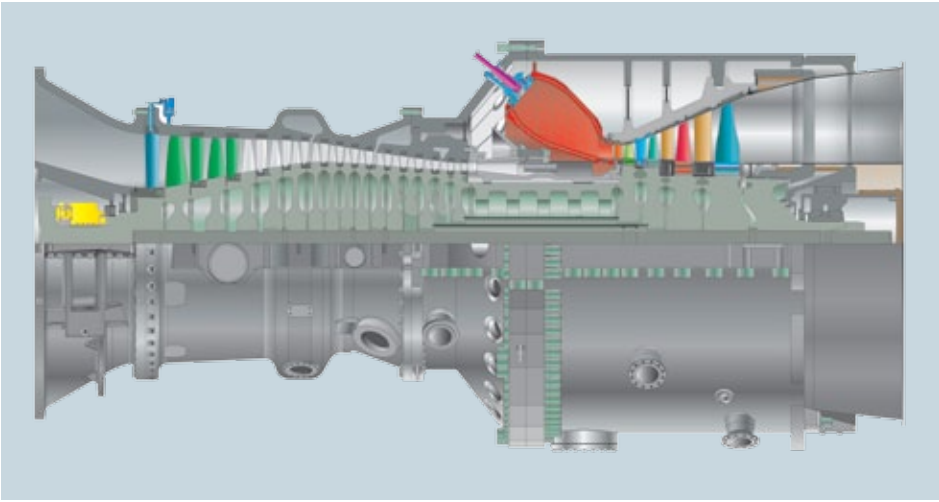
One of the innovative solutions offered by Siemens Energy Service to help you improve the overall performance and competitiveness of your gas turbine and combined cycle power plant is the Operational Flexibility Upgrade.

Our product
The Operational Flexibility Upgrade is an integration of proven products optimizing the individual power plant performance and increasing the operational flexibility within a long term service agreement. The Operational Flexibility Upgrade that addresses customers with long term service agreements combines proven technology including improved blade and vane design and enhanced combustion technology. This modernization package is the entry card into a flexible operating regime extending the Original Equipment Manufacture coverage beyond 100,000 equivalent operating hours (EOH) and can be implemented at any outage during the long term service agreement program.

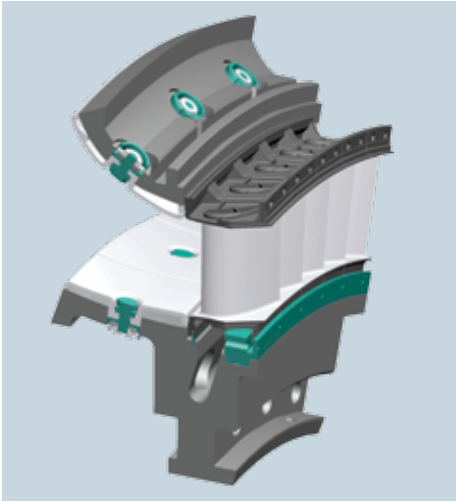
The Operational Flexibility Upgrade includes a turbine performance upgrade modifying key turbine components and hot gas parts which may allow for a significant firing temperature increase. These results are achieved by new coatings for turbine blades and vanes and cooling air reduction in the hot gas path. This modernization has been designed to help yield potential power increase, heat rate improvement and additional exhaust energy. In addition to the achieved performance increase, the Operational Flexibility Upgrade can allow for a maintenance interval extension resulting in an increased availability for the entire plant.

Your benefits
The Operational Flexibility Upgrade can be a cost-effective means to help you improve the overall performance of your gas turbine and combined cycle power plant integrating various technical solutions.

Optimized compressor blades and vanes



Schematic illustration of the Operational Flexibility Upgrade



Optimized hot gas path components

Benefits may include:
- More operational flexibility for intermediate and cyclic operation
- Up to 13 MW gas turbine power output increase in simple cycle operation
- Up to 21 MW combined cycle power output improvement (1x1)
- Up to 0.4 % points combined cycle efficiency improvement
- NO_X emission reduction down to 15 ppm possible.

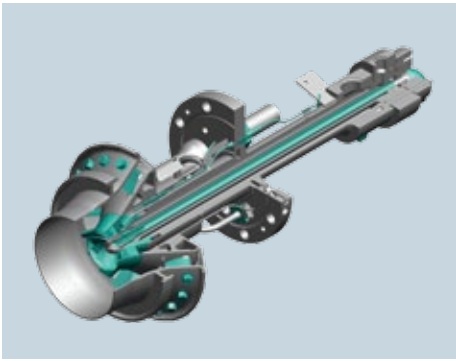
The hardware technology of the Operational Flexibility Upgrade is state-of-the-art for new SGT5-4000F (V94.3A) Siemens Gas Turbines manufactured since August 2008.

Scope of supply

The scope of this upgrade includes an optimized hot gas path, turbine and compressor components including instrumentation and control modifications:
Optimized hot gas path and turbine components:
- Latest design turbine blades stages 1 and 2
- Latest design turbine vanes stages 1, 2, 3 and 4
- Turbine ring segments and turbine vane carrier with modified cooling holes and turbine leakage air reduction
- Improved metallic heat shield design
- Cooling air reduced combustion chamber with improved cooling air pattern, new impingement cooled tile holders and optimized ceramic heat shields
- Premix-Pilot burner with reduced swirl.

Optimized compressor components:
- New inlet guide vane and the first two stages of compressor blades and vanes
- New hydraulic inlet guide vane actuator and position sensor
- New combined axial and radial compressor bearing with hydraulic axial shifting device and required hydraulic pump skid
- Auxiliary systems for modified inlet guide vane adjusting device, hydraulic clearance optimization, two stage burner operation, and the fuel gas preheating equipment.

Depending on the actual gas turbine configuration, the above mentioned hardware scope can be reduced.
The Operational Flexibility Upgrade will be typically implemented at the 100,000 EOH outage. Siemens Energy Service offers a full range of field service capabilities to help you manage your maintenance and outage schedules.
The Operational Flexibility Upgrade is retrofitable. With the above mentioned scope of supply the Operational Flexibility



Premix-Pilot burner

Upgrade is applicable for the SGT5-4000F (V94.3A) frame and may be combined with other modernizations. (Advanced Stability Margin Controller, Wet Compression, Evaporation Cooling, FODS and ACCSpro)

References

Since the first application in 2008, more than 30 units worldwide are utilizing the Operational Flexibility Upgrade technology and have logged more than 340,000 EOH.*)

*) As of July 2012

For more information please contact your local Siemens sales representative.

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