

SIEMENS

Hydraulic Clearance Optimization for Siemens Gas Turbines

Performance Enhancement – Gas Turbine

Siemens Energy's continuous focus on research and development answers the ever-increasing market demand for combined cycle power plants with high performance, improved efficiency, low emissions, operational flexibility and reduced life cycle costs.

To help you improve the performance of your gas turbine and your plant competitiveness Siemens Energy Service offers many innovative solutions. One of these is the Hydraulic Clearance Optimization (HCO) upgrade.

Our product

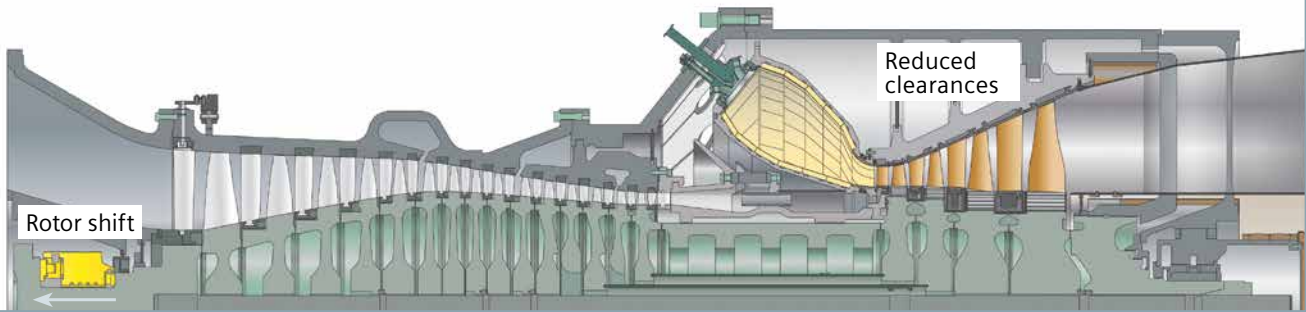
The performance enhancement feature of the Hydraulic Clearance Optimization upgrade is achieved by shifting the rotor against flow direction to optimize turbine clearances during steady state operation. The axial shift of the rotor is performed automatically by hydraulic pistons behind the compressor thrust bearing. The gain in power and efficiency due to the conical shape of the turbine is expected to be higher than the potential losses on the compressor side. The HCO upgrade starts to function after a one hour warm-up period, i.e., when differential thermal expansions of rotor and casing components have equalized. Should a loss of hydraulic pressure occur, the system is designed for the rotor to move back to its original position automatically in a fail-safe manner.

The HCO provides significant performance advantages and offers attractive financial payback options.



Hydraulic Clearance Optimization pump skid

Answers for energy.



Schematic illustration of the Hydraulic Clearance Optimization upgrade

Your benefits

The HCO upgrade offers you a clear technically and monetarily quantifiable benefit and can be a cost-effective means to help you improve the overall performance of your gas turbine plant. Benefits may include:

- Power improvement of up to 2 MW in simple cycle operation and up to 3 MW in combined cycle operation*
- Efficiency improvement of up to 0.3 %-pts. in simple cycle operation and up to 0.2 %-pts. in combined cycle operation*) **

The Hydraulic Clearance Optimization Upgrade is applicable for the SGT5-4000F (V94.3A) and SGT6-4000F (V84.3A) and may be combined with other modernizations such as the Compressor Mass Flow Increase (CMF+) or the Turn Down upgrade.

The Compressor Mass Flow Increase has been designed to raise the mass flow for higher power output and exhaust energy from your gas turbine, whilst the Turn Down upgrade helps to increase the efficiency of combined cycle plants in part load operation. This results in a reduced minimum part load, lower carbon monoxide emissions and an almost constant gas turbine outlet temperature.

Scope of supply

The HCO upgrade from Siemens Energy is just one of the many innovative modernization packages available. The scope of this upgrade includes:

- New combined compressor bearing
- Hydraulic pistons installed behind the compressor axial bearing
- Auxiliaries (e.g. additional hydraulic system, control device and piping)

Usually it makes sense to install this upgrade during a major outage. We offer a full range of field service



Hydraulic Clearance Optimization bearing

capabilities to help you manage your maintenance and outage schedules.

The HCO is state-of-the-art for new Siemens gas turbines of the SGT5-4000F (V94.3A) since 2005 and SGT6-4000F (V84.3A) since 2009.

References

Since 2003 (first time application) more than 160 units of the frame types SGT5-4000F (V94.3A) and SGT6-4000F (V84.3A) have been in operation worldwide with the Hydraulic Clearance Optimization upgrade and have logged more than 3,000,000 equivalent operating hours (EOH).***

Thereof:

- Two units in Germany
- One unit in New Zealand
- Two units in Spain
- Two units in Vietnam
- One unit in United Kingdom

We provide products and services to support your goal of maximizing your return on investment.

* actual results may vary

** turbine exhaust temperature = constant

*** as of August 2013

Published by and copyright © 2013:
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Energy Service Division
Order No. E50001-G500-A143-V1-4A00
Printed in Germany
Dispo 34805, c4bs No. 7816 , 7821
TH 258-130571 WÜ DB 461407 08130.5

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