Centrifugal Compressors

Centrifugal compressors are designed for long life but, after many years of service, wear may reduce their performance; or the process conditions for which they were originally designed may have changed. In either case, design re-evaluation and revamping to align them with current process requirements is usually a cost-effective means of adding additional years of productive service.

What we do

GE has an expert engineering team, state-of-the-art design and analysis tools, modern shop and test facilities, and the years of experience needed to restore optimum performance of centrifugal compressors.

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imagination at work

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GE
Oil & Gas

Centrifugal Compressors

Superior solutions for maximum performance

Customized solutions for every machine and budget

GE's Conmec engineers and technicians bring a fresh, objective approach to solving compressor problems. While OEMs rely on pre-engineered designs and parts, we develop customized solutions and components. We first inspect and analyse your compressor to identify potential opportunities for performance enhancement. Then, using our state-of-the-art computational tools and a wealth of compressor design experience, our engineers evaluate those enhancements against your price and delivery requirements.

Whether you need reduced horsepower consumption, more or less flow or head, better seals, or more stable operation, we can modify your current compressor to meet present and future requirements.

Rerates and retrofits

Customers usually underestimate what can be achieved with a rerate. Sometimes the OEM has told them there are too many engineering hurdles to overcome. Other times, the unit's reliability is so poor or maintenance requirements are so high, that it is difficult to envision the possibility of significant improvements. However, by combining the most modern metallurgical advances and our own advanced design techniques, GE can often rerate your compressor to achieve significant increases in output and efficiency or rectify reliability issues.

Our engineering approach always gives you the flexibility to balance performance and cost. For greater economy and faster turnaround, we use as many of your existing components as possible. All services are backed by available API performance guarantees and equipment warranties.

Re-applied equipment

In some situations, particularly plant expansions, reapplied equipment provides the fastest and most economical solution. We have successfully installed refurbished equipment at more than 20 customer sites for a variety of service applications. Through our worldwide engineering and sales networks, we locate the previously owned machinery that best matches your needs, then modify it to meet API or customer specifications. Modern manufacturing facilities, strict quality processes and detailed attention to project management assure optimal field performance and on-time delivery.

New equipment

If the solution requires a new unit, GE can design and build a replacement that matches the existing mounting and connections - while offering the most modern features and performance.

Designs that redefine your expectations

Single stage test rig, Bethlehem, PA.

Pre-testing for post-performance

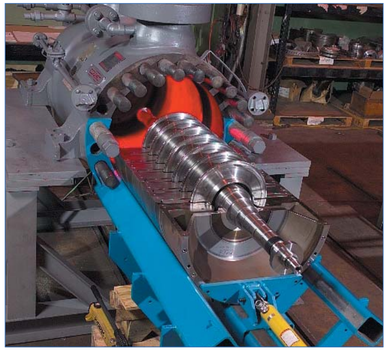
Optimized aerodynamics

We designed and constructed a specialized single-stage test facility which uses scale models of equipment to test and analyze designs before the full-size machinery is constructed. The entire compressor stage is instrumented and tested – including equipment for the entire stage (e.g. inlet, impeller, diffuser, crossover and return channel). Defects and underperformance can be isolated, improved and re-tested within days.

For multi-stage centrifugal compressors, we use the test rig to verify individual stage performance. Our experience has shown that by thoroughly evaluating each component, we are able to more accurately analyze overall performance.

Our test facility is also used as a development tool. By testing various parameters during the design stage, we are able to optimize solutions and push performance beyond the traditional limits. This is done by fully understanding the effects of:

- Inlet guide vanes on stage performance
- Vaned, pinched and tapered diffusers
- Diffuser radius diameter to impeller diameter
- Return bend geometry
- Low flow/high flow coefficient stage design
- High inlet mach number design
- Blade scalloped impellers



New aerodynamics for H_2 Recycle compressor

Superior components

GE offers a wide selection of quality components for improved performance and reliability. Some of the items most commonly used in compressor retrofits include the following:

Aero assemblies
We provide custom-designed hardware to meet your operating condition requirements, and always strive to maximize reuse of your existing components wherever possible during the rerate.

Couplings
Dry flexible couplings and GE-engineered fully enclosed guards are the low-maintenance alternative to lubricated couplings.

Gas seals
An excellent solution for eliminating seal oil contamination and waste.

Honeycomb, Torlon® or Fluorosint® seals
Help improve compressor efficiency by reducing internal recirculation.

Journal bearings
Our optimized bearing design improves mechanical reliability

Oil seals
Reduce maintenance and environmental contamination by replacing high-leakage bushing seals with a low-leakage design.

Service applications

- Air
- Carbon Dioxide
- Chlorine
- Chlorofluorocarbons
- Ethane
- FCC Wet Gas
- Hydrofluorocarbons
- Isobutane
- Natural Gas
- Propylene
- Ammonia
- Charge Gas
- Coker Gas
- Cracked Gas
- Ethylene
- Feed Gas
- Hydrogen
- Methyl Chloride
- Propane
- Synthesis Gas

Advanced capabilities

Our rerate proposals sometimes predict such impressive gains that customers wonder if they're too good to be true. But our comprehensive design and engineering analysis always provides the proof. With extensive field experience backed by the latest computational tools, our approach ensures that systems perform as planned.

Design and engineering

In addition to GE's proprietary engineering software developed specifically for turbomachinery applications, we use Pro/E software for solid modeling.

Finite Element Analysis (FEA)

Using ANSYS® and Pro/MECHANICA tools, we can safely push the design envelope of your existing equipment to optimize performance.

Aerodynamics

NREC's COMIG™ compressor programs are used to design more efficient stages. CFX-TASCflow Computational Fluid Dynamics (CFD) code is available to check the final COMIG design; optimizing the flowpath increases machine performance.

Rotor dynamics

Every machine we build is custom engineered. This allows our experienced rotor dynamics group to optimize the material characteristics of each and every machine, usually within the normal work scope of a rerate or upgrade. These improvements are often invisible at first but pay off with years of reliable operation. Our rotor experience includes tilting bearing, dry seal and dry coupling retrofits, plus other mechanical upgrades that correct or avoid machinery vibration problems and improve reliability.

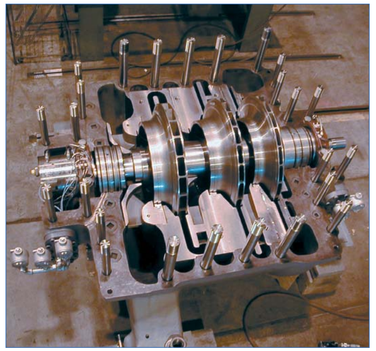
Case study

Rerate achieves 19% flow increase at same steam rate

Recently, a customer was faced with a challenging situation. Two of its 17-year-old compressors were no longer meeting capacity requirements, and the OEM indicated that replacement was the only viable solution. We evaluated the equipment and determined that a rerate could significantly increase flow while staying within the steam turbine horsepower capability. Both units were aerodynamically redesigned for high nozzle velocities and fitted with the following new components:

- three new impellers
- intake diffusers
- shaft and impeller eye labyrinths
- five interstage diaphragms
- intersection diffusers
- shaft sleeves
- balance piston labyrinths

GE personnel provided around-the-clock support during the turnaround – the project resulted in a 19% increase in flow rate and a very satisfied customer.



Air compressor for FCCU unit

Surplus equipment rerated and installed