

CASE STUDY

Sulzer completes seal modernization and digital transformation of a mixed refrigerant loop compressor (MRL)

Recently, a provider of natural gas service to over 600'000 customers in the Eastern part of the U.S and a LNG storage facility needed to alleviate chronic process seal failures and waning confidence in machine reliability. Sulzer solved this issue by retrofitting a MRL compressor train with upgraded process seals and a new, modernized digital control system. A big success for them, positive results of the project included reducing startup time by 80%, reducing downtime by 90% and restoring customer confidence in their machinery. The project was designed and executed over a one-year period, without impacting normal seasonal operation of the MRL compressor train.



Facility with compressor house in back building and storage tank in foreground

“ *The increased customer confidence in the operation of the compressor train after Sulzer completed the project was remarkable.* ”

Alex Scanlon, project engineer

The challenge

A customer operating an LNG (liquefied natural gas) storage facility with outdated liquification compressor controls was experiencing regular power outages forcing emergency shutdowns. Frequent process seal damage and a difficult, lengthy startup procedure had eroded customer confidence in the MRL. Sulzer was asked to provide a complete solution to maximize up-time, simplify operation and minimize consequences of frequent emergency shutdowns. The major issues discovered by Sulzer were:

- Oil-flooded process seals frequently damaged
- Failed oil seals contaminated refrigerant loop
- Difficult, lengthy compressor train startup procedure
- Low customer confidence in the unit

The Sulzer difference

- Collaborative advantage providing cost-effective, customized and overall turnkey solutions
- Organized and efficient with strong project management
- Great flexibility and expertise





The solution

Sulzer offered a turnkey package to overhaul the machine train, modernize the seals and to provide digital update to machinery protection and monitoring control system.

Overhaul all machinery components included:

- Manufacturing a new rotor shaft to incorporate dry gas seals.
- Conducting rotor dynamic analysis and at-speed balance to support seal change.
- Cleaning and painting of machine skid after installing updated systems on skid.
- Performing a high-velocity lube oil flush and lube oil tank cleaning.

Retrofitting the compressor with robust non-contact dry gas seals and associated hardware to:

- Improve seal life expectancy, reduce maintenance cost and downtime.
- Eliminate seal and lube oil contamination into MRL loop.
- Eliminate seal oil traps, de-gasifier tank, oil leak points and waste oil.
- Provide engineering support for integration of plant and DGS system including startup gas, separation air and venting.

Modernize controls and instrumentation to a digital system and update control logic to improve startup and shutdown control to:

- Replace analog HMI and controls with digital HMI display with operational data and local machine control.
- Improve start and stop sequencing, alarm and shutdown annunciation.
- Install automated surge control.
- Upgrade bearing temperature, radial vibration and thrust position monitoring
Implement surge control logic.

Install lube oil accumulator to protect oil lubricated components during shutdown to:

- Supply and install accumulator system design.
- Upgrade lube oil tank level transmitter to digital unit.

Customer benefit

The Sulzer collaborative advantage improves the quality and reliability of service and retrofits. Customers not only expect overall turnkey solutions, but also high-quality service and solutions customized to their needs. In this case, the overhaul and retrofit was executed during the normal winter downtime, eliminating lost production conventionally experienced during an outage. By installing upgraded process seals and a digital control system Sulzer was able to reduce startup time by 80%, downtime by 90%, and restore customer confidence in their machinery. Sulzer demonstrated to the customer the company's commitment to ensuring superior customer satisfaction and peace-of-mind.

Sulzer service partners

- Sulzer Turbo Services Houston Inc., La Porte, TX
- Sulzer Electro-Mechanical Services (US) Inc., Pasadena, TX
- Reciprocating Technology, Houston, TX
- Cobey, Buffalo, NY
- John Crane, Tulsa, OK

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Applicable markets

LNG, natural gas