THERMINOL®
Heat transfer fluids by Eastman

Enhancing efficiency and environmental impact for gas compressor project

Eastman helps increase capacity and reduce energy consumption at Egyptian compression station.

Problem

Italian firm Turboden S.p.A., a Mitsubishi Heavy Industries Group company, developed a waste heat recovery system for a high-efficiency gas compressor station (GCS) in Egypt. As part of the project, Turboden built the largest high-temperature organic Rankine cycle (ORC) system ever made. The system needed a heat transfer fluid that worked well at high temperatures as well as with design and technical support to get the unprecedented project running.

Eastman was chosen to be the thermal oil supplier because of its 60 years of heat transfer fluid experience. This new 28-megawatt electric ORC system converted the system's waste heat into fuel-free power, reducing the carbon footprint of the end user.

Analysis

Using a high-quality fluid is crucial to maximize ORC system efficiency because a lower quality fluid would slow the system down and lower the power output. In an ORC system, thermal oil collects excess heat and transfers it to warm up the working fluid. As the working fluid expands, vapor is created and spins the turbines to generate electricity. Such a system typically operates at temperatures ranging from 305°–315°C (581°–599°F).

To ensure reliable operation, the system needed a synthetic thermal oil with exceptional temperature stability and a high heat transfer coefficient. These properties enabled efficient energy conversion and power generation. System efficiency could be optimized by maintaining stable fluid performance.

The system also needed a fluid that would not corrode pipes, pumps and other components to minimize maintenance requirements and potential downtime.

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Solution

Eastman collaborated throughout the system design process. One key advantage was the use of Eastman Therminol® 66 heat transfer fluid, which exhibits superior performance during start-up and operation. Its low viscosity enabled a better heat transfer coefficient compared to mineral oil, resulting in improved efficiency. The aromatic nature of Therminol 66 also facilitates better cleaning of the system, offering a superior solvent effect.

The exceptional heat transfer capabilities of Therminol 66 ensure smooth system operation without fluid degradation. This contributes to system reliability and longevity. The unique formulation of Therminol 66 also contributes to a better heat transfer coefficient, energy optimization and better pressure drop (due to lower viscosity). Therminol 66 is currently used in more than 300 ORC-related systems.

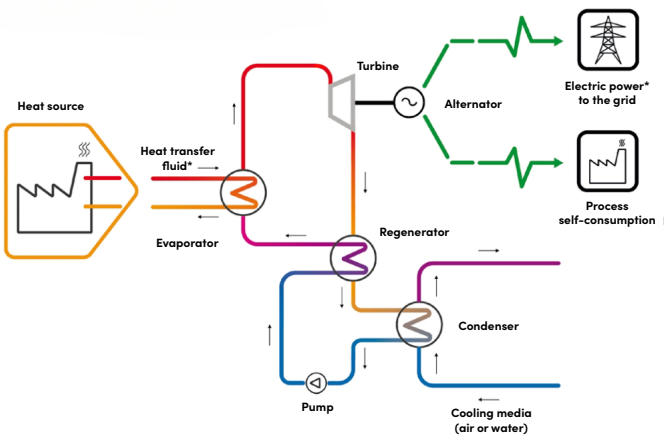
The waste heat recovery unit at the Egyptian facility feeds two electrically driven compressors to increase the natural gas pumping capacity to 652 million standard cubic feet per day and put out 192 GWh of electricity per year without using fuel or water. This new waste heat recovery system helps save 65 million cubic meters of natural gas annually and reduces CO_2 emissions by 120,000 tons each year.

Eastman continues to provide technical expertise and insights; this support is guided by its Fluid Genius™ artificial intelligence monitoring (fluidgenius.net). This advanced software application provides fluid analysis and predictive analytics. It helps ensure any issues or challenges are addressed promptly, further enhancing system performance.

Outcome

Through Eastman's collaboration and the use of Therminol 66, the gas compressor project achieved remarkable results. The system's enhanced efficiency and waste heat recovery capabilities resulted in increased capacity, reduced energy consumption and a significant reduction in carbon emissions. Eastman's solutions contributed to the project's success and displayed their commitment to sustainable and innovative solutions for the energy industry.

For support or more information, contact Eastman. Our team is committed to providing service and expertise to optimize any heat transfer system.



Indicates where heat transfer fluid is located in the ORC process. ORC process units can produce electricity and/or mechanical power.

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