Enhancements make company's compressors better suited for fuel gas boosting. By **DJ Slater**

Sundyne gives centrifugal compressors a boost

Fuel gas boosting isn't a novelty for Sundyne's centrifugal compressors, which have been a part of this specialty since 1976. Given the recent push for renewable energy in the power generation sector, Sundyne plans to keep its name and its compressors in this space for generations to come.

The company has made enhancements to its "fit-for-purpose" centrifugal compressors used as fuel gas boosters for turbines generating electricity at refineries, chemical plants and other industrial facilities.

"The heart of Sundyne fuel gas boosting packages relies on the original LMC/BMC and LF-2000 compressor units," said Grégory Junot, Sundyne's global compressor product line manager. "These compressors are designed for heavy duty services, compliant with the most stringent API and oil and gas standards."

The heart of the matter

The three compressors used as the backbone for fuel gas boosting all have distinct features that make them applicable for a variety of purposes. The line-mounted compressors (LMC) feature a single-stage integrally geared design suited for mole sieve dehydration, demethanizer regeneration, waste gas, hydrogen recycling and specialty chemicals.

The base-mounted compressor (BMC) adheres to API 617 standards and uses a horizontal, single-stage integrally geared design for midstream, hydrocarbon, processing and chemical manufacturing applications. The BMC works best with skid packaging and can run continuously for five years, according to Sundyne.

The LMC and BMC each feature a maximum motor size of 550 hp (410 kW), flows up to 3550 acfm (6000 m^3/h), maximum pressure of 1450 psi (100 bar), a maximum speed of 34,200 rpm and a temperature range between -200° to 500°F (-130° to 260°C).

The LF 2000 multi-stage compressor features up to six stages of centrifugal compression on a single gearbox. Commonly used in midstream, hydrocarbon processing and chemical manufacturing applications, the LF 2000 provides vibration-free operation and zero emissions with the ability to run continuously for five to seven years without maintenance or an overhaul.

Sundyne compressors boost gas from pipeline pressures to the levels required by turbines.

Inlet guide vanes (IGVs) increase efficiency by pre-swirling gas flow entering the impeller, which reduces the amount of work needed from the main driver.

A 75% smaller footprint than volumetric compressor technology is ideally suited for smaller co-gen facilities where space is limited.

The LF 2000 has a maximum motor size of 10,000 hp (7500 kW), flows up to 10,000 acfm (17,000 m^3/h), maximum pressure of 5000 psi (350 bar), a maximum speed of 42,000 rpm and a temperature range that mirrors the LMC and BMC compressors.

Boosting enhancements

Fuel gas boosting become a natural role for Sundyne's centrifugal compressors early in its history. After building the first integrally geared vertical compressor for Union Carbide in 1965, Sundyne's compact design become popular for applications that required compressors with a smaller footprint, among other features, the company said.

Fuel gas boosting entered the frame in 1976 for Sundyne, who installed an LMC-311P to boost fuel gas to an onboard ship turbine, Junot said. From that time on, more companies looked to Sundyne compressors for this purpose.

Co-generation power plants require gas pressures in the range of 250 to 750 psig (17.2 to 51.7 bar) to operate turbines optimally. Interstate gas pipelines transport gas at different pressures, ranging from 30 to 125 psig (2 to 8.6). With Sundyne's centrifugal compressors, these plants can boost incoming gas pressures to levels required by turbines. The fuel gas booster serves as an essential piece of equipment for co-generation plants, Sundyne said, adding that if the fuel gas compressor fails, the entire power plant stops.

Enhancements to these Sundyne compressors include a high-speed digital control system, which integrates all the compressor control functionality into a single system (surge protection, load-sharing capabilities, compressor switching and discharge pressure control). The control system can be configured to control compressors in multiple configurations, including variable inlet guide vanes, suction throttling, variable speed and gas recirculation.

"The Sundyne control system manages to steadily supply the fuel gas at pressures needed for optimal gas turbine operation under all load conditions within 1% precision," Junot said.

Sundyne's dry gas seal configuration provides operators with a fully controlled gas emissions system, eliminating the need for oil-based operation and the potential for fuel contamination. This is important for fuel gas boosting applications because oil content needs to be less than 1 ppm to ensure optimal gas combustion in the turbine, Sundyne said. The compressors are 75% smaller than volumetric compressor technology.

Sundyne fully-integrated compressor trains also include auxiliary systems such as air/water-cooled gas heat exchangers, nitrogen generators, valve skids and all the associated monitors and controllers.

Additional improvements

Sundyne made additional improvements to its equipment in the name of efficiency and aiding the fuel gas boosting segment. The company increased the power range of its multi-stage integrally geared compressors up to 7.5 MW to provide the proper capacity for larger turbine sizes, Junot said.

Another improvement comes from Sundyne's compressor impellers, which can now produce the same flow as previous iterations using less power. The new impellers can be retrofitted onto existing BMC, LMC and LF compressors already in the field (some for decades) to improve their operating efficiency up to 20%, Junot said.

"The upgrade can be done in a matter of days during a standard turnaround," he said. "It does not require teams of workers, welding or concrete work – and the upgrade does not require modifying piping configurations." CT2