

Offshore sector logs first labyrinth piston compressor order

The first Laby-GI compressor, which Burckhardt developed mainly as a diesel engine fuel gas compressor, will handle FSRU boiloff gas

When Burckhardt Compression announced earlier this year that it had secured an order to provide one of its Laby-GI compressors for Golar LNG's *Golar Freeze* floating storage and regasification unit (FSRU) in Dubai, it heralded a new LNG application for its GI labyrinth piston compressor. It was also the first order for the device.

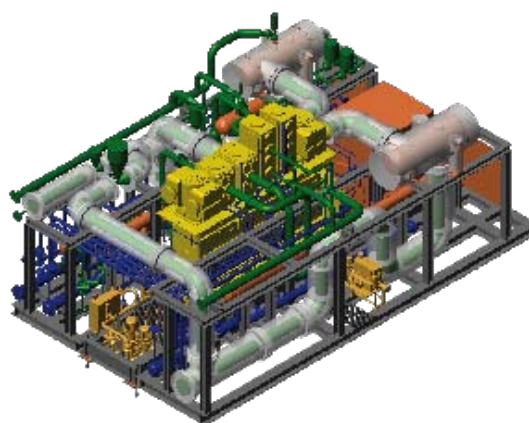
The Laby-GI compressor for *Golar Freeze*, which will be delivered by Burckhardt Compression during the third quarter of 2009, will be used as a boiloff gas (BOG) compressor on the FSRU when it goes into service in the Dubai port of Jebel Ali in 2010. *Golar Freeze* is a 125,000m³ LNG carrier currently engaged in the transport of LNG but the vessel is due to be converted into an FSRU for charter to the Dubai Supply Authority and service at Jebel Ali.

Golar Freeze has been chartered for a period of 10 years, with a five-year option, and will be moored at a purpose-built jetty at Jebel Ali. The vessel will be able to process up to 4 billion m³ of gas per year and peak loads will occur during the hot, six-month summer season in the emirate.

"The Laby-GI compressor has a unique labyrinth sealing system on the piston and piston rod gland that allows oil-free and contact-free compression," comments Norbert Schilling, product manager for Burckhardt Compression. "This makes the device eminently suitable for the compression of LNG BOG at suction temperatures down to -170°C. The gastight compressor housing eliminates gas emissions and losses to the environment."

The principal application for which the Laby-GI has been developed is as a fuel gas compressor for use in the injection of natural gas into the ME-GI dual-fuel two-stroke diesel engine developed by MAN Diesel to propel LNG carriers.

MAN is currently supplying traditional two-stroke diesel engines for a number of large LNGCs



The Laby-GI compressor plant can be provided on three skids: the suction side skid, compressor skid and lube system/discharge side skid

to be used in the transport of LNG from Qatar. These engines burn heavy fuel oil only and the BOG from the cargo tanks on the ships is treated by shipboard reliquefaction plants and returned to the tanks as LNG.

However, since these engines were ordered, the price of oil has risen sharply, to the extent that propulsion system economics have changed and MAN has pushed ahead with the development of the ME-GI version of its two-stroke diesels which will be able to utilise BOG as fuel. The use of LNG cargo boiloff gas will also help meet the increasingly strict environmental controls being introduced to help minimise harmful exhaust emissions from ship engines. The Laby-GI compressor has been custom-engineered and optimised to supply the ME-GI dual-fuel propulsion system that MAN Diesel is now marketing.

"We have now worked with MAN Diesel for several years on developing this project and the end-result is a relatively simple compressor system backed by sophisticated control arrangements to ensure that operating and maintenance loads placed on the crew are kept as low as possible,"

explains Mr Schilling. “Using the Laby-GI as a BOG compressor on an FSRU is an additional application for this equipment which benefits from the many technical and commercial advantages realised for the compressor in the development of the LNG carrier dual-fuel diesel engine application.

“Running MAN Diesel’s ME-GI dual-fuel diesel engine in tandem with our Laby-GI fuel gas compressor can provide the lowest levels of carbon dioxide emissions amongst the various LNGC propulsion systems. Also, the ability to burn heavy fuel oil and LNG BOG in almost any ratio provides a high degree of fuel flexibility.

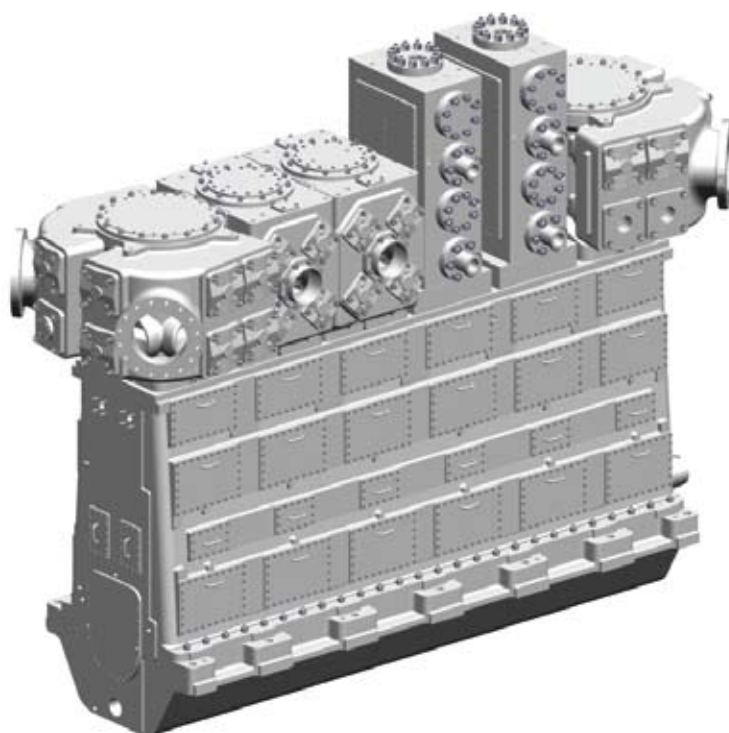
“In addition to these benefits Burckhardt Compression is also able to offer additional flexibility for the gas itself. The Laby-GI compressor can be operated in parallel to a partial or full reliquefaction plant. This offers the opportunity to use the BOG for propulsion and reliquefy excessive BOG or to reliquefy all the BOG on those occasions when the propulsion system does not require energy, such as when the ship is at anchor. This flexibility is likely to become increasingly attractive as the LNG spot market develops and ships move between different terminals and trade routes more often than in the past.”

Designed specifically for LNG ships, the Laby-GI is a vertical, crosshead compressor which is fully balanced, without free forces and moments, thanks to its unique six- crank arrangement. According to Burckhardt Compression, the labyrinth sealing system, which has been utilised and proven on several dozen shoreside LNG receiving terminals worldwide, offers a number of advantages over conventional

sealing designs. These include an increased lifetime and reduced wear due to the contact-free and non-lubricated nature of the piston and piston rod gland operation. However, the vertical piston guiding system itself is lubricated for precise alignment and long life and arranged in such a way as to avoid wear caused by weight forces.

“In addition, quick start-ups are ensured because our compressor requires no pre-cooling and the gas needs no pre-heating,” continues Norbert Schilling. “The ability to exercise control over the gas volume

being injected in the range from 0 to 100 per cent provides maximum fuel flexibility while our units are skid-mounted for quick and easy installation. Furthermore, our equipment is free from vibration because emerging forces and moments caused by moved masses are eliminated. Finally, because the Laby-GI is the only gastight compressor



A view of the six-crank main compressor, the core of the Laby-GI labyrinth piston compressor system

available in the LNGC market, the risks of gas losses and pollution are avoided.”

Burckhardt Compression’s product division is complemented by a global service network. The latter division is responsible for equipment installation, compressor valve servicing, complete system overhauls and maintenance contract implementation. In the case of the Laby-GI compressor this after-sales service can also encompass spare parts logistics, technical support, component repair, revamps, training and condition monitoring and diagnostics.

Burckhardt Compression has now developed a complete control system for its Laby-GI compressor and a simulator training package is available covering all aspects of system operation. *LNG*