

# Sealing Technology and Service for the Goliat FPSO

EagleBurgmann equips latest Norwegian oil production facility

By Georg Probst, EagleBurgmann

**T**he Goliat FPSO (floating production and storage off shore unit) is currently the

most modern and largest facility of its kind worldwide. The characteristic cylindrical shape makes it ideal for

the exceedingly hard wintery and icy conditions at the production location in the Barents Sea. The platform



In 2015, the Goliat FPSO was loaded in Ulsan/South Korea for transportation to Norway on the heavy-lift vessel Dockwise Vanguard. (Photo credit: ©ENI Norge)





Different versions of the EagleBurgmann H75 are the predominantly installed types on the Goliat. Pictured here is a H75VK double seal.



PDGS compressor seal for high pressure and low temperature applications.

was developed by the Norwegian Sevan Marine and built by Hyundai Heavy Industry in South Korea. It is operated by Eni Norge, and Statoil Petroleum AS holds a share of 35 percent.

The oil deposit in the Goliat field was already discovered in 2000. The reserves amount to approximately 174,000,000 barrels of oil, which is characterized by its low sulphur content, and additional 282,500,000,000 cubic feet of gas. The two largest oil producing formations are found at depths of 3,600 to 5,900 feet.

#### HISTORY OF GOLIAAT

Construction of Goliat began in 2010. After completion in the spring of 2015, Goliat was transported with the heavy-lift vessel Dockwise Vanguard over 18,000 miles from

the South Korean Ulsan to the north of Norway in sixty days and was positioned 53 miles to the northwest of Hammerfest as the first and northernmost platform. 14 hawsers keep the platform stabilized over the oil field with its eight templates and twenty-two connected sources. The ocean at this point is over 1,300 feet deep.

Goliat has a measured diameter of 328 feet, weighs 64,000 tons, can produce 100,000 barrels of oil per day and temporarily store up to one million barrels. Nearly 120 crew members make up the permanent staff. Two custom-built shuttle tankers, each with a capacity of 850,000 barrels, transport the "Goliat Blend" oil grade to different European ports of destination.

Among other things, the platform has one of the most modern

and reliable oil tanker loading systems. The installed hose reel with a diameter of over 42 feet is the largest ever built device of its kind. The power station set up in Hammerfest supplies Goliat's energy requirement over the worldwide longest submarine power cable with a capacity of up to 75 MW. Together with an efficient energy production on board it was possible to reduce CO<sub>2</sub> emissions by 50 percent.

After various delays to the project, Goliat FPSO finally took up production in March 2016, currently set for fifteen years.

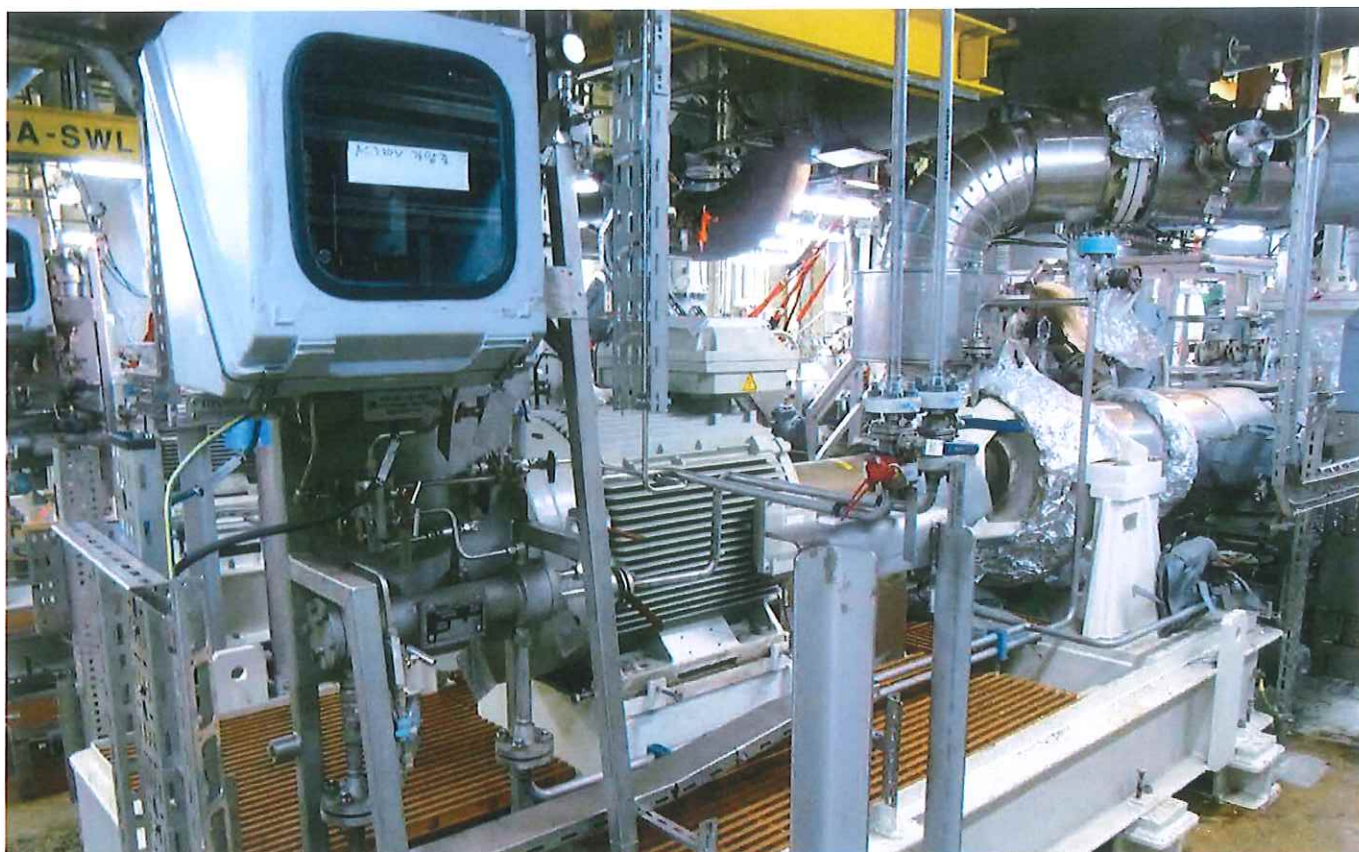
#### PROJECT AWARD FOR EAGLEBURGMANN

The Korean planner Hyundai Heavy Industry was contracted for the construction in 2010. One of the most important requirements was the



Ready for delivery: NORSE-compliant supply units of EagleBurgmann Norway for the Goliat platform.





Finder crude oil transfer pump sealed with H75F-D/90-E3-A1 dual seals, supply in accordance with API Plan 53B.



Finder circulation pump for heat carrying medium sealed with H75F-D/90-E3-A1 double seals, supply in accordance with API Plan 53B.



Finder drinking water pump with single seal H75VN/50-E93-A1, supplied in accordance with API Plan 11.

obligatory application and implementation of the national Norwegian NORSOK standard.

EagleBurgmann was able to contribute valuable know-how here due to its many years of experience from past projects with Norwegian EPC.

As a result, EagleBurgmann Norway assumed a key role in the Goliat project in terms of sealing technology and accepted responsibility for the organization and processing. Contact between EagleBurgmann Korea and Hyundai was established early on, and just a few months later all technical and business details were clarified and

EagleBurgmann was specified and contracted for Goliat.

EagleBurgmann supplied all compressor seals, pump seals and their appropriate supply systems for the entire FPSO. All seals were produced in Germany and the seal supply systems were manufactured at EagleBurgmann Norway in accordance with the NORSOK standard. The sealing technology was already delivered in the years 2011 and 2012.

### EMPLOYED PRODUCTS

In total, nearly eighty mechanical seals of differing types



Installed in the pumps of well-known manufacturers (Finder, Seepex, Amarinth, Netzsch, Clyde Union, Flowserve, Leistritz, Hamworthy, and Marelli) are the following types of seals:

H75VN, H75F-D, H75VKP-D, HRKS, Cartex-DN, Cartex-QN, as well as API-tex single and double seals. All double seals are supplied by EagleBurgmann NORSOK-compliant systems in accordance with API Plan 53B.

In addition, DGS and PDGS gas seals are operating in four Nuovo Pignone compressors. A SeccoMix dry-running agitator seal was supplied for an A&G machine.

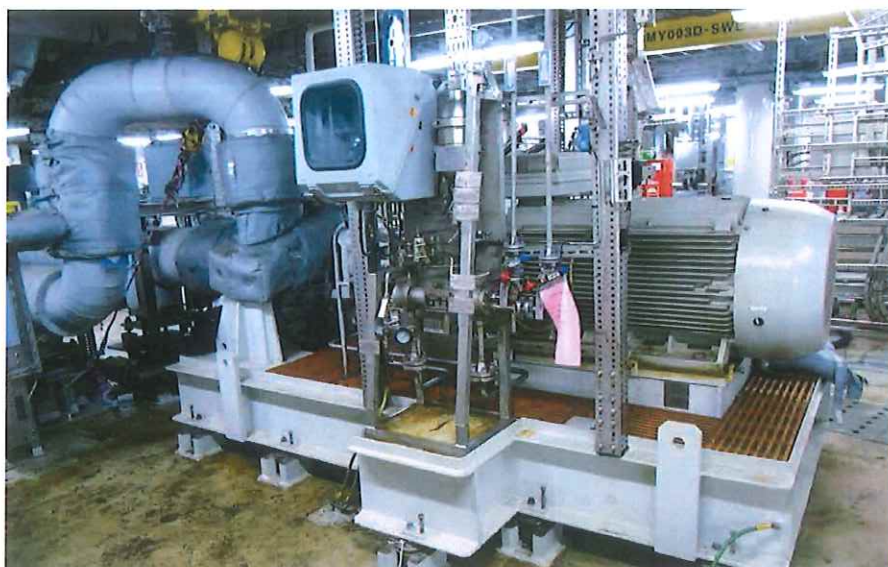
were delivered for the rotating equipment of Goliat. The machines are employed in all areas of the platform, from crude oil production to drinking water supply.

#### SERVICES ON SITE

Because of the good collaboration during the project and construction phase, an outline agreement was concluded in 2014 with Eni Norway for services and spare parts deliveries. The contract runs until 2017 with renewal options up to 2021.

Since June 2015, one to two EagleBurgmann service engineers are continuously on board Goliat for more than 150 man days. They carry out commissioning and starting up of the different systems and machines and take care of maintenance and repair.

The employed seals are managed with the EagleBurgmann TotalSealCare service software "SealCarePro." Repair and service procedures are seamlessly documented and monitored.



Finder cooling medium circulation pump sealed with single seal H75VN/90-E88-A1-OR, supplied in accordance with API Plan 11.



Finder hot water circulation pump. It is sealed with a single seal type H75VN/50-E87-A4-OR. Supply in accordance with API Plan 11.

#### RESULT

EagleBurgmann was able to prove its competence as reliable partner for sealing technology in all phases of the Goliat project:

- International presence (Norway, South Korea)
- Sealing technology know-how and expertise
- Economical solutions for every application
- Technically perfected, standard-compliant products

- Optimal on-site services from experienced personnel ♦

With a pronounced understanding for quality and service as well as customer orientation, EagleBurgmann draws on its knowledge and expertise to provide local support to customers and solve their problems quickly and efficiently. For more information, visit [www.eagleburgmann.us](http://www.eagleburgmann.us).