

PRESS RELEASE

Safe sea transport of liquefied gas thanks to further development of the SAACKE GCU *evo* for LNG tankers and bunker vessels

Combination with surface burner increases flexibility in the engine room / Emission limits are safely undercut using the latest cold flame technology from Bremen

Bremen (Germany), 02.02.2021 - SAACKE Marine Systems is breaking new ground in methane combustion on LNG tankers: After just under a year of development and engineering, the company is presenting its new product - the GCU *evo*. The further development of the classic Gas Combustion Unit consists of a cost-effective combination of the combustion unit with a modified surface burner. The abbreviation *evo* stands for "evolution". "In order to take into account the ever decreasing space available in the engine room of LNG tankers, we have now designed this system solution with significantly smaller dimensions with the same or even improved performance," explains Bernd König, Sales Director Offshore & GCU Systems at SAACKE. In addition to saving space, the new model offers further advantages for marine engineering. For example, emissions are reduced thanks to special cold flame technology and digital remote maintenance can be used. These are important aspects in the globally growing LNG market for shipyards, owners and charterers of LNG tankers and bunker vessels, on which a GCU must be installed as standard for the safe transport of LNG.

Compact stand-alone solution and easy handling

The optimized design not only reduces the required space on board, but also the installation costs and thus the effort for customers when using a SAACKE GCU. In addition, maintenance costs can be reduced due to the lower complexity of the system. No special foundation is required for the GCU *evo* with an output of 5.5 to 63 MW. The system can be mounted directly on the deck as a stand-alone unit with simple installation. There is no need to connect it to other downstream components. "In addition, due to its compact design and functionality, the surface burner offers a short flame and requires a smaller number of blowers. In addition, due to the lower pressure loss on the air side with the surface burner, a smaller motor output is required for the blowers and the power consumption is minimized as a result. All in all, a smaller footprint and height are needed and more space is freed up for other components in the shipyards," explains Bernd König. In contrast to two separate zones for combustion and mixing air for cooling the gases, with the GCU *evo* all the air is sent over the surface burner and only mixed further downstream. Instead of a separate radial blower, only one air blower is required. As a result, lower temperatures (approx. 600 °C) are generated in the combustion chamber and the combustion chamber material (limit

temperature: 1,100 °C) is subjected to significantly less stress. "In terms of space saving as well as technical details, this GCU system is currently unrivalled on the market," says the SAACKE expert.

Durability, remote control and low-emission cold flame technology

The further development does not forego the proven strengths of the classic GCU - such as fail-safe control, electric ignition and the 100 % free-flow solution for combustion of the methane components in the climate-damaging boil-off gas without a compressor and at very low pressure (see below: general excursus on the GCU). In addition, SAACKE relies on the proven durability and robustness of the individual components and the overall system. "After all, all of our more than 110 GCUs in operation since 2003 are still in trouble-free operation," sums up Bernd König. By means of modern remote control, operators can also perform online diagnostics from shore, e.g. for preventive remote analysis. Thanks to the cold flame technology described above, the pollutant limit values $>100 \text{ mg/m}^3$ are also safely achieved or even undercut - with lowest NOx emission values in the range of 60 to 80 mg/m^3 and CO values of 150 mg/m^3 .

Various series-produced performance ranges and test facility in China

While the SAACKE headquarters in Bremen in northern Germany was in charge of engineering and project organisation, a test plant was built at the Chinese site in Qingdao. It can burn 800 kg/h of methane and was used for product development. The GCU, which is ready for series production, is available in different output sizes from 0.4 to 4.5 t/h methane combustion with various size gradations. The scope of supply includes the GCU system including burner, control system, gas train and blower as well as spare parts service. Installation and commissioning are carried out in sections. SAACKE also offers training courses in this context. "Our basic GCU model will also remain in our portfolio, as it also covers output ranges of up to 6.5 t/h of methane for exceptional applications and can burn oil," emphasizes Bernd König.

General excursus - Gas Combustion Unit:

SAACKE is the inventor of the GCU. This technical term has been established in the marine industry since 2003.

LNG tankers are designed for the transport of liquefied natural gas. The liquefied gas is stored in the tanks at a temperature of about -163 °C . Despite the insulation of the cargo tanks to limit the heat input, small amounts of heat always enter the tanks and cause the cargo to vaporize slightly. This so-called boil-off gas is unavoidable, especially when a ship is moving, and must be removed from the tanks to prevent an impermissible increase in pressure. Therefore, the GCUs completely burn the excess boil-off gas, which is harmful to the climate due to its methane components. Traditionally, compressors with a pressure of 5 to 6 bar are used for these processes. However, there is a risk that the compressor will fail and that safety risks will arise due to the rising pressure in the tank. This is why SAACKE has developed the 100 % free-flow solution. In this process, the

boil-off gas is completely combusted without a compressor and at a pressure of 0.15 bar - the gas pressure is thus much lower and the entire system is significantly safer during transport.

SAACKE GmbH specializes in thermal processes and systems for industrial and maritime energy management and is one of the world market leaders in this field. Since its patenting in 2003, SAACKE has sold over 110 gas combustion units. The medium-sized family business was founded in 1931 and employs a total of around 1,200 people, including 450 engineers and technicians. It has production sites in Bremen, Croatia, China and Argentina as well as a worldwide service and sales networks. The headquarters as well as research and development are located in Bremen.

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