Market Update Note

28 February 2020

RENK power take-off systems

RENK power take-off (PTO) systems are reliable and scalable solutions for two-stroke engines. They enable fuel savings and CO_2 emission reductions and improve the EEDI index.

The systems can either be operated in parallel, with one or more gensets to cover peak loads, or as individual sources of power. Furthermore, the maintenance costs of auxiliary generators are reduced thanks to fewer operating hours.

Integrated front-end power system

The integrated front-end power system (IFPS) consists of a front-end mounted PTO system on a two-stroke engine. It features a single-stage gearbox, one or multiple generators with associated frequency converters, and transformers for connecting the system to the ship's grid. The gearbox design is flat and the generator length is short, that is less than 1,600 mm, which typically equals two frames on a ship. The system can deliver from 500 to 2,000 kW power.

Installation of the integrated front-end power system requires only a few simple alterations on the main engine housing and the crankshaft. The IFPS housing design includes a space-saving arrangement, which can be adapted to the tuning wheel. Directly mounted on the engine's front-end, the system needs no additional foundation, thereby reducing installation costs.

The modular concept allows the adaption of multiple generators of the same size. The main advantage is that the system's power rating is scalable from 500 kW to 2,000 kW without the demand for additional axial space in front of the engine.

For this purpose, one to four 3-phased permanent magnetic generators can be arranged. In this example, the system protrudes only 1,250 mm from the connecting surface on the engine front-end cover.

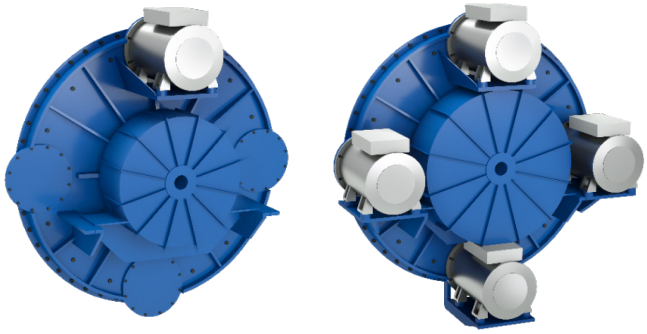

Fig. 1: Modular arrangement of generators

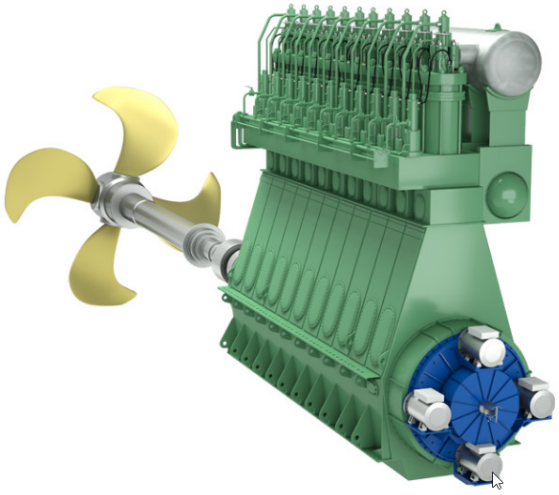

Fig. 2: IFPS mounted on two-stroke propulsion plant

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The IFPS is, as standard, laid out for operation with full output between 80% and 100% of the engine speed at specified MCR as well as with reduced output between 40% and 80%. In the normal operating range, the efficiency of the whole system is approx. 87% (see Table 1). This value covers all losses of the mechanical and electrical components.

Number of generators	1	2	3	4
Mechanical power from engine crankshaft [kW]	575	1150	1725	2300
Electrical power to ship's grid, approx. [kW]	500	1000	1500	2000

Table 1: System power ratings

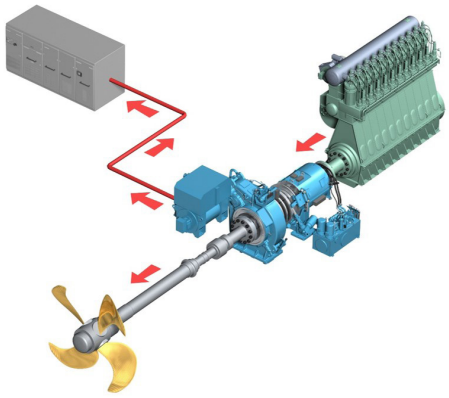

Fig. 3: Power take-off propulsion mode

For a specific ship project, the decision on whether or not an IFPS PTO solution is suitable must be made on the basis of an analysis of the torsional vibrations and the selected propeller, shafting system, and main engine.

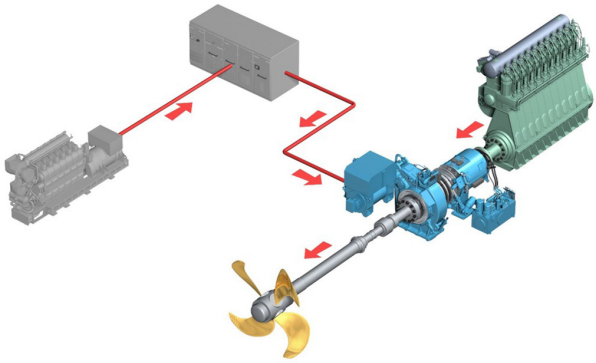

Fig. 4: Power take-in propulsion mode

MARHY system

MARHY is a stand-alone PTO/PTI/PTH-system with a power range of 500 kW to 10,000 kW. It is a reliable hybrid system consisting of well-proven standard components, such as a tunnel gear unit, a propeller shaft clutch, and standard electronics components. The MARHY system provides the following options:

- redundancy for single-screw vessels with the power take-home (PTH) solution, ensuring the vessel manoeuvrability if the main engine malfunctions,
- operation in low-emission zones,
- or it can be used for boosting of the engine power by utilising the power take-in (PTI) solution.

MARHY is a modularised system which is also available without a propeller shaft clutch.

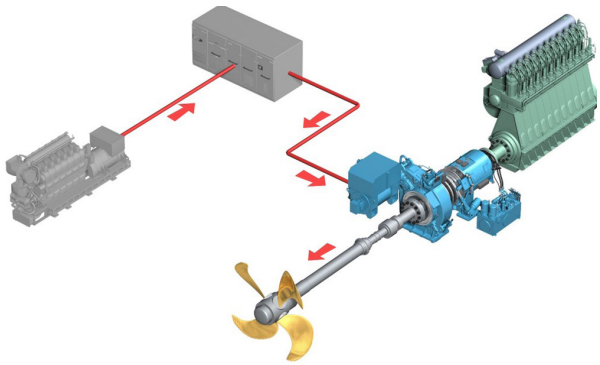

Fig. 5: Power take-home propulsion mode

The 3 propulsion modes available can be summarised as:

- propulsion mode and simultaneous production of electric current, power take-off (PTO).
- propulsion mode and simultaneous power boosting via electric motor, power take-in (PTI).
- electric propulsion mode, power take-home (PTH)

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