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Manoeuvring in sustainable combination operation

Freewheel technology from RINGSPANN simplifies the implementation of hybrid ship propulsion systems

Modern ships and yachts today have hybrid propulsion systems in which diesel or methanol generators and electric motors share the work. A key design function for the efficient interaction of the two units is performed by the complete and cage freewheels from the RINGSPANN portfolio. Read here which series are currently in particularly high demand in marine technology and how they enable flexible and environmentally friendly manoeuvring at sea and in port.

Bad Homburg, April 2024. – At present, it is above all demands for significantly lower nitrogen oxide emissions and higher energy efficiency that are driving the development of hybrid propulsion systems in shipbuilding and yacht construction. The designers of many system integrators, owners and shipyards are therefore pursuing the goal of creating serial or parallel hybrid propulsion systems from the combination of diesel or methanol generators and electric motors. Linked to this is also the idea that the drives are protected, always run at optimum efficiency and can be designed smaller and lighter from the outset. One of the components that plays a key kinematic role in this process is the freewheel. After all, this is what enables reliable, precise and, ultimately, easy to implement interplay in terms of design between the various power units of the hybrid system. A closer look even shows that the use of the right freewheel technology in the powertrain of diesel and electric motors allows up to three different operating modes to be implemented: in the first case, the diesel engine is the main propulsion system, but it rotates an electric motor in generator mode via a freewheel as needed to charge the ship's electrical energy storage systems and supply the on-board electrical system. This offers great advantages for long distances and constant sailing in open waters. In the second case, the electric motor supports the diesel engine via the freewheel, depending on the speed, in order to achieve more power. And in the third case, the freewheel separates the diesel engine from the drivetrain, and only the electric motor works. This is particularly useful when manoeuvring in ports, as strict environmental regulations apply here, and the diesel engine also proves to be less efficient than when sailing constantly on the open sea.

Freewheel technology ensures efficiency and flexibility

Flexible hybrid systems, in which freewheels support all three operating modes, are used, for example, in container ships, passenger ships and car ferries. But modern sailing yachts and catamarans have also long been equipped with hybrid propulsion systems, in which freewheels enable energy-efficient and flexible operation. "Here, for example, a freewheel is placed between the

diesel engine and the drive train, so that an electric motor can be operated as a generator while sailing via the ship's propeller. In this way, the on-board electrical system can be charged – without carrying the diesel engine along or even damaging it," explains Marco Sommer, freewheel designer at RINGSPANN.

RINGSPANN is the world market leader in the field of freewheel technology and equips many well-known shipbuilders and boat builders with various freewheel types from its comprehensive range. At present, it is mainly the complete freewheels of the FB and FBE series as well as the cage freewheels of the SF and SFB series that are preferred by designers of marine technology. "On special request, we have already implemented numerous special solutions for hybrid ship propulsion systems – for example, on the basis of the proven basic freewheels of our FBO series," reports Marco Sommer.

Ready-to-install and optimised service life

The complete freewheels of the FB series are ready-to-install sprag freewheels for nominal torques of up to 160,000 Nm, which can be used for feed and overtaking functions as well as backstops. They are run on ball bearings, sealed and supplied by RINGSPANN oil-filled and ready for installation. Since they are available at the factory with many bore diameters of up to 300 mm, they are quickly available for numerous applications. In addition to the standard versions, the FB series also offers three other types for applications where a particularly long service life is required. "We maximize service life by using special sprag coatings or various types of sprag lift-off, which significantly reduce wear on the sprags," explains Marco Sommer. In the FBE variant, the complete freewheels also have a clutch, so that they can be installed in the drive train of the hybrid system without additional assembly effort.

Cage freewheels in the SF and SFB series are also sprag freewheels, but do not have their own bearings and are preferably installed between the customer's inner and outer rings. They are suitable for nominal torques of up to 93,000 Nm and are available in a standard version and two variants for applications with increased service life requirements. RINGSPANN supplies them primarily for cases in which the function of an overrunning clutch or a backstop is to be integrated directly into a gearbox. "This always occurs in the design of hybrid ship propulsion systems when the coupling of combustion engine and electric motor is resolved via a gearbox; the drives are therefore arranged in parallel and not in series. Due to the installation in the gearbox, the freewheel is also better protected from environmental influences," reports Marco Sommer.

With the high quality of its freewheels, the high availability of life-optimised, ready-to-install complete freewheels – with or without a clutch – and ultimately also with the possibility of implementing special solutions, RINGSPANN offers manufacturers of hybrid drive systems for shipbuilding and boatbuilding considerable added value. At the same time, it gives designers the freedom they need to develop innovative and sustainable concepts of propulsion technology for use in commercial, professional, sports and naval shipping. *ms*

Note for editorial staff: Text and images available at www.pr-box.de!

Captions (4 pictures)

Figure 1: The complete and cage freewheels from the RINGSPANN portfolio play a key constructive role in the implementation of hybrid drive systems for ships and yachts. *Image: AdobeStock_302418134*

Figure 2: As the world market leader in the field of freewheel technology, RINGSPANN supplies many ship and boat builders with various types of freewheels, such as the complete freewheels of the FBE series. *Image: RINGSPANN*

Figure 3: Marco Sommer: "At the request of our customers, we have already implemented numerous special solutions for hybrid ship propulsion." *Image: RINGSPANN*

Figure 4: Cage freewheels from the RINGSPANN SF series are used when the function of an overrunning clutch or backstop is to be integrated into a transmission. This occurs in hybrid drive technology when the combustion engine and electric motor are coupled via a transmission. *Image: RINGSPANN*

((Infobox))

Hybrid drives on the rise

No matter where you look at the moment, the development of climate- and environmentally-friendly drive systems is being driven forward everywhere. In shipbuilding and boatbuilding, hybrid solutions consisting of diesel and electric motors are above all the ones that shipping companies and owners now expect to achieve fuel savings of up to 60 percent. In practice, it has also been shown that tugboats, ferries and yachts with diesel-electric propulsion systems also score points for their very good manoeuvrability and significantly reduced exhaust and noise emissions.

74 words with 573 characters (with spaces)

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