

Power transmission / hybrid technology / machine elements / supplier / design engineering / energy technology / crane construction

Smart switching between motors

Overrunning freewheels from RINGSPANN enable the easy realisation of hybrid systems

With its overrunning freewheels, RINGSPANN offers designers of hybrid drive systems in mechanical engineering and plant construction a clutch coupling solution that is both uncomplicated and reliable. Without elaborate control technology, these installation-ready components are able to control the differences in speed between electric and combustion motors or alternately engage and disengage different motors of a single drivetrain. Read how the manufacturers of cranes, turbines and fans employ RINGSPANN's overrunning freewheels to realise hybrid drive systems.

Bad Homburg, July 2019. – Overrunning freewheels from RINGSPANN are compact and low-maintenance installation components that make it possible to engage and disengage entire machines or individual units of hybrid drivetrains. The engaging takes place with torque transmission in driving operation of the freewheel, the disengaging with torque interruption, meanwhile, in idling operation. Both take place without any additional (and expensive) regulating or control technology, because the overrunning freewheel is a purely mechanical function module. They can be used as a space-saving and safe clutch coupling or to regulate deviating speeds of electric and combustion motors in joint or parallel drivetrains. The use of overrunning freewheels in such hybrid drive systems has become widespread in mechanical engineering and plant construction.

Between turbines and pumps

Energy recovery turbines (ERT), for example, are among the standard units in many hydro and power plant engineering systems. These are single or multi-stage pumps or turbines that aim to optimise the effectiveness and efficiency of the systems. To achieve this, an ERT uses the energy surplus from fluid engineering processes to power a neighbouring system via a shaft connection. This means that instead of subsequently throttling the liquid pressure built up in a process engineering process through a pressure reducing valve – which would be trivial and wasteful – the ERT taps this “stored” energy from the system and provides it for further use. This creates a hybrid drive solution, where a considerable part of the energy that is originally fed in is kept and transferred to a second use. And how does this energy transfer work? With the help of an overrunning freewheel, of course, which couples the output shaft (output) of the energy recovery turbine with the drive shaft (input) of the secondary drive. “The freewheel is assigned with the task of relieving the receiving side – that can be a second motor – since it needs to be driven with less energy”, explains Thomas Heubach, the head of RINGSPANN's freewheels division. In practice, many

designers employ, for example, RINGSPANN's FH or FKHG series housing freewheels with hydrodynamic sprag lift-off or the complete freewheels from the FB series with various sprag types.

Between drive and expander

Another case in which hybrid drive technology serves the aim of energy recycling is the construction of expanders to transform the thermal energy of hot fumes into mechanical force. Such expanders are used among other things in the petrochemical systems of Fluid Catalytic Cracking technology and make it possible to use the thermopower gained to mechanically drive a generator or a regenerator air fan. The expander itself, too, often benefits from the energy fed back because it is used to support its main drive. This significantly improves its energy balance. "In such applications, our overrunning freewheels sit between the hot-air turbine of the expander and its main drive, which, depending on the type of system, can be an electric or combustion motor. As soon as the main drive reaches a higher speed than the expander, the freewheel disengages both units from one another", says RINGSPANN divisional manager Thomas Heubach. To make it as easy as possible for the designers of the expanders, RINGSPANN supplies its overrunning freewheels not just as installation-ready components, but alternatively also as construction sets. Here, the customer can construct the shafts and freewheel elements (inner/outer rings, sprags, bearings etc.) into its assembly group – for example a high-speed gearbox - in a space-optimised manner. "However, this assumes that the respective customer possesses comprehensive expertise in the field of freewheel technology", says Thomas Heubach.

Between main and auxiliary drive

The use of overrunning freewheels from RINGSPANN in drive systems of large fans is widespread – for example in tunnel or mining construction. They can be hybrid solutions or systems with motors of the same type. Frequently, these powerful fans are alternately driven by one, two or even three electric motors. Two drives perform – solo or as a duo depending on the power requirement – the main work, while a third motor is only used for slow operation for repairs or inspections. The task of the overrunning freewheels then consists in engaging and disengaging the motors on the ventilator of the fan automatically and where required. RINGSPANN usually supplies its FH series housing freewheels or also complete solutions – so-called Smart Solutions – consisting of freewheels and overload clutches for such applications.

Another application closely related to the fan application is where overrunning freewheels with a housing again assume the alternate switching on or off of the motors: The hybrid drive systems of induced draft fans. This normally involves electric motors with outputs of 400 kW and 800 kW being used in solo or duo operation in combination with combustion motors. RINGSPANN's housing freewheels are situated between the induced draft fan and the motors and couple the respectively operating drive fully automatically with the fan. "The electromagnetic brakes integrated in the freewheels hereby prevent the still-standing drive from being dragged along", stresses RINGSPANN divisional manager Thomas Heubach.

If, moreover, a slow-speed drive is provided for slow turning to cool off the rotor, an additional overrunning freewheel with type-z centrifugal force lifting-off sprags is used. It engages at a low speed and switches into freewheeling mode as soon as the system reaches its operating speed.

Between diesel and electric

Illustrative examples for the use of overrunning freewheels in hybrid drive systems can also be found in crane and shipbuilding. In mobile, stacking and container cranes you will most commonly find a diesel and an electric motor, which together or alternately drive the crane. Sometimes the diesel engine does the work and the electric drive serves as a generator – in this case, the freewheel couples the drivetrain together. If the electric motor takes control and the diesel takes a break, the freewheel disengages the drivetrain. In shipbuilding, the use of overrunning freewheels enables the switching from diesel drive to electric motor drive in the harbour – quiet, precise and environmentally friendly.

At RINGSPANN, a significant trend has been observed for a long time now towards more hybrid drives in many areas of mechanical engineering and industrial vehicle technology. Divisional manager Thomas Heubach also strongly believes “that hybrid drive technology is a rapidly growing market for our overrunning freewheels. Particularly because it produces extremely smart solutions thanks to the relatively simple mechanics, which are very easy to service, as they make do without any electronics.”

By the way: RINGSPANN’S entire range of freewheels can be found in the company’s current online shop offer at www.ringspann.de . ms

1,040 words with 8,172 characters (with spaces)

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Bilder (6 Motive)

Bild 1: Hybrid drive solution: RINGSPANN overrunning freewheel couples the output shaft of the energy recovery turbine with the drive shaft of the secondary drive. (Image: @CPN/Fotolia.)

Bild 2: The use of overrunning freewheels from RINGSPANN in drive systems of large fans is widespread – for example in tunnel or mining construction. They can be hybrid solutions or systems with motors of the same type. (Image: @eaumstocker/Fotolia)

Bild 3: RINGSPANN Division Manager Thomas Heubach: "Thanks to our overrunning freewheels, extremely smart solutions can be realized in the hybrid drive technology – very easy to maintain because they work without any electronics." (Images: RINGSPANN)

Bild 4: For use in energy recovery turbines (ERT), many designers, for example, use the RINGSPANN housing freewheels of the FH series with hydrodynamic sprag lift-off. (Images: RINGSPANN)

Bild 5: Complete freewheels of the FB series from RINGSPANN for use in hybrid drive systems. (Images: RINGSPANN)

Bild 6: Illustrative examples of the use of RINGSPANN overhaul freewheels in hybrid drive systems can also be found in crane and shipbuilding. In mobile and container cranes, it is usually a diesel engine and an electric motor that drive the crane together or alternately. (Images: @bannafarsai/Fotolia)

((Infobox))

Switching, coupling, controlling

RINGSPANN is recognised as an international market leader in the freewheels sector and currently supplies around 6,000 customers worldwide with these mechanical elements for the realisation of backstops, overrunning and indexing freewheels in drive engineering. Freewheels basically consist of an inner and an outer ring with clamping elements in between. In the one direction of rotation, there is no contact between the inner and outer ring (idle); in the opposite direction however, the clamping elements ensure a frictional connection between the inner and outer ring (driving operation).

RINGSPANN's overrunning freewheels can be used in industrial drive engineering for switching, coupling and speed regulation.

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