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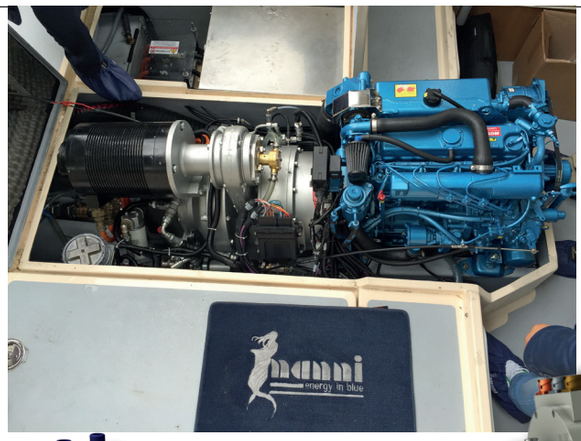
The pilot launch used by Transfluid to demonstrate the perfect operation of its hybrid module.

Hybrid propulsion, with internal combustion engines to guarantee range and electric motors to limit pollution, including noise pollution, after a rapid expansion in the car sector have established a decisive foothold also in the marine sector, starting from professional applications and then moving into the yachting market.

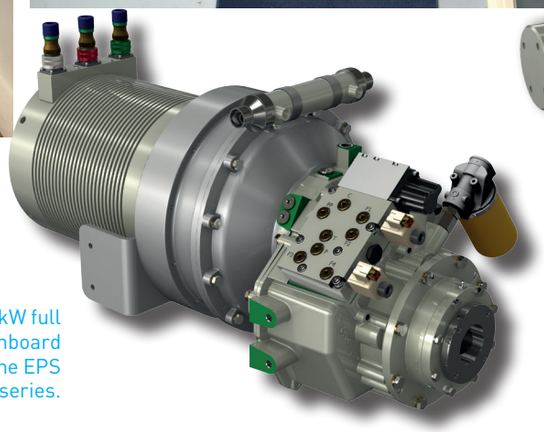
# TECHNOLOGICAL TRENDS: HYBRID AND ELECTRIC

In the yachting sector there is an undeniable trend towards pure electrics, perhaps supported by a generator to keep the batteries always charged. Electric motors find their ideal place in the sailing sector where, at least in theory, wind is the primary source of propulsion with the motor used in emergencies, as support in calm weather and for manoeuvres in port. The sailing sector is proposing original products to mass production boatyards (we are referring in particular to Hanse with its E-Motion Rudder, but also to other innovative ideas soon to be launched by other producers). Nautech intends to follow constantly the developments in this sector which is in great ferment. We begin here presenting the test boat used by Transfluid for the installation and demonstration to customers of a hybrid propulsion unit. This historic Italian company, founded back in 1957, is a point of reference in the industrial and naval transmissions sector, thanks also to the support of an avant-garde design office. Its catalogue ranges from hydrodynamic couplings to speed controls, brakes, clutches, speed changes, power distributors, elastic joints and electric machines.

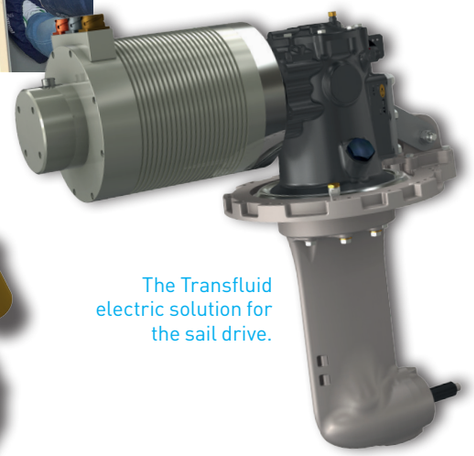
The command station of the launch with the Flexball control lever.




The 20 kW HTM700 model coupled with the Nanni Diesel. The electric motor is black and on the left.



The 75 kW full electric inboard motor of the EPS series.



The Transfluid electric solution for the sail drive.

## Hybrid propulsion

The Transfluid hybrid system offers three working modes: pure electric propulsion, internal combustion, which can use the electric motor as a generator to recharge batteries and the "booster" function which makes it possible during acceleration and manoeuvres to add the power of the electric motor to that of the internal combustion engine, which can thus be dimensioned in an optimal way. The company offers various modules, designed to offer a simple and above all standard solution that guarantees the performance demanded. On the test boat, a pilot launch of about 7 m, a kind widespread among fishing enthusiasts, Transfluid installed a 20 kW HTM700 module coupled with a standard Nanni Diesel engine. The same model is offered also on other yachts, notably those supplied to the German yard Bavaria which, after carrying out stringent tests for several months, eight hours a day, offers it to customers who want hybrid system as an optional. The module is designed to be coupled with any internal combustion engine with an SAE drum and flywheel and any kind of transmission system using the SAE standard. On the side towards the internal combustion engine is installed and an elastic joint and the hydraulically or pneumatically controlled main clutch which, once uncoupled by its solenoid valve, removes the internal combustion engine from the rest of the transmission; once it is free, the electric motor can be used to propel the vessel. When the clutch is released, in the internal combustion mode, the electric motor can be used as a generator to recharge the batteries. Operating together the internal combustion engine and the electric motor there is the booster function, which increases the power available from the entire system. Thanks to the electronic management developed by Transfluid, power supply is optimised depending on the operating profile selected; a colour display installed on the bridge displays and controls all the system parameters, integrated in a single CAN-bus network, with most of the functions operating automatically. On the pilot launch are also tested all the innovations the design office is constantly working on to optimise the system and make its installation, management and use even simpler than it is already.

## Electric propulsion

Thanks to the technical director's 30 years of specific experience in electric motors, Transfluid has developed and built a large range of electric motors with permanent magnets and has already begun marketing them. The head of the Marine division, Gianluigi Taroni, says: "we are operating in electrical propulsion always with the philosophy of in-house production. Thanks to the electronic engineers in our design office we are completely independent for all kinds of software, both operational and for performance prediction calculations." In addition to complete products, Transfluid offers a system that makes it possible to maintain the "Sail Drive" already installed on the vessel and replace the internal combustion engine with an electric one, with a power range from 8 to 35 kW. This is an ideal solution for boats already in the water, above all sailing boats. There is no need to worry about interventions on the boat to install a new drive. In addition, the possibility of customising specifications through software makes it possible to adapt the product to the kind of vessel. The entire system is produced in-house by the company, except for the batteries with LiFePO4 chemistry (supplied by the Italian Kaitek) and the "Frequency Drive", while the control lever has been specially developed by Flexball with specific software and hardware designed in collaboration with Transfluid.