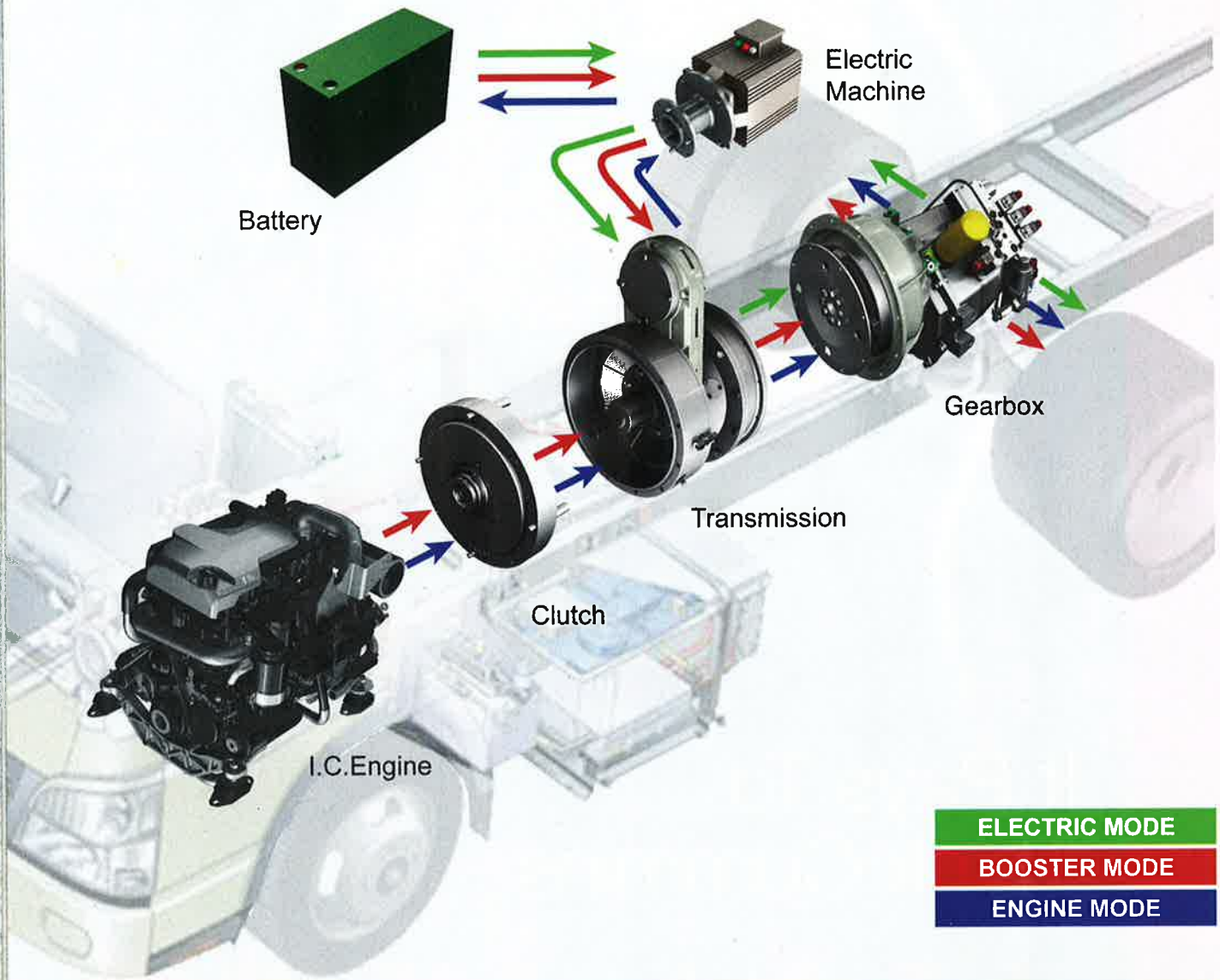


POWERTRAIN



ELECTRIC MODE

BOOSTER MODE

ENGINE MODE

HYBRID DRIVETRAIN

Transfluid system designed for industrial, off-highway and marine applications

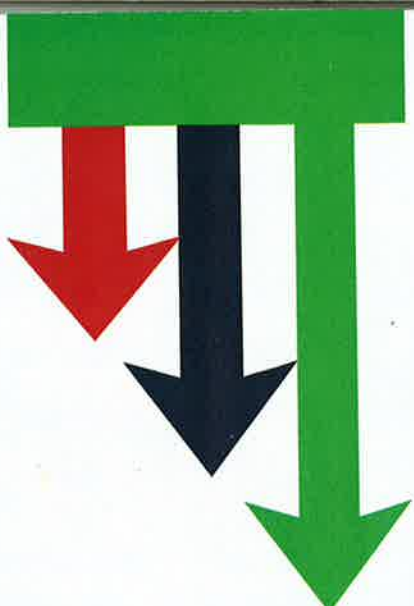
BY ROBERTA PRANDI

Hybrid traction is a well-known concept today, especially in on-highway and small commercial vehicles, whose manufacturers have invested in hybrid systems to fight air and noise pollution. Industrial and off-highway vehicles

lag a bit behind in the adoption of this drive concept.

Ugo Pavesi, managing director of Transfluid, an Italian manufacturer of transmissions and other powertrain components, said the main reason *continued on page 22*

Transfluid's HM series hybrid system can operate in three different driver-selectable modes. Electric mode is intended for quiet running without exhaust emissions. In engine mode, the electric machine recharges the batteries. Booster mode allows the electric motor to help the engine, which can allow for engine downsizing, the company said.



for this delay is the wide variety of driveline types. This makes it difficult to design a standard solution from an engineering and quality point of view, which would allow for reasonable volumes for series production.

However, Pavesi said that Transfluid is ready to introduce a hybrid solution that could solve that problem in the low- to medium-power range for a number of applications, such as industrial and municipal vehicles, light-duty commercial vehicles, airport ground support machines and marine vessels. Because Transfluid already manufactures a wide range of power transmissions, electric motors and generators, Pavesi said the company decided to capitalize on its experience in industrial applications.

The HM hybrid module series — composed of the HM560, HM2000 and HM3350 types — was designed to offer a simple and standard hybrid powertrain solution. In the development phase, Transfluid cooperated with leading manufacturers of batteries and motor controllers.

"The HM module series has a very simple configuration, designed to be coupled to any internal combustion engine up to 620 kW (831 hp) — provided it is equipped with an SAE housing and flywheel — as well as to any kind of transmission having the same SAE standard," Pavesi said.

Available from 27 to 201 hp output, the HM series works either as a motor or generator and can be installed in parallel to the transmission shaft in

different positions to find the best location inside the engine compartment.

"What is required is a little space between the engine and the mechanical or hydrostatic transmission," Pavesi said. "For example, the HM560 type has a length of just 305 mm (12 in.) and can be utilized with combustion engines up to 115 kW (154 hp) output power."

Pavesi said that with these characteristics, the HM modules could be used for retrofitting existing systems or for the design of new vehicles. The parallel installation in the drivetrain allows it to be serviced without affecting traction or propulsion, he said.

The HM modules work with a hydraulic or pneumatic clutch on the input side. Once this clutch is disengaged through an electric valve, the engine is disconnected from the rest of the drivetrain and the electric motor can power the driveline. When the clutch is engaged, the engine powers the drivetrain and the electric motor becomes a generator to recharge the batteries.

The whole system is managed by Transfluid's proprietary MPCB-R5 electronic controller, which communicates with all components via CANbus.

According to Pavesi, the hybrid system operates in three different driver-selectable modes: pure electric propulsion, for driving without exhaust emissions and in silence; combustion engine propulsion, using the electric machine to recharge the batteries; and booster mode, where the electric motor helps the engine during acceleration and which also allows for engine downsizing.

Transfluid can also offer its HTV700 complete hybrid drivetrain system, which along with the HM 560 hybrid module includes a powershift automatic transmission with an electrically actuated hydraulic selector to operate the hydraulic clutches and a built-in, proprietary "soft-shift" device, the company said.

The hybrid drivetrain system is completed by an SAE multidisc clutch system, a solenoid clutch control valve and a two- or four-wheel-drive

drop box that offers a wide range of reduction ratios, Transfluid said.

One SAE B power take-off is also available, and the brake system is composed of a spring-loaded, hydraulically opened, wet disc parking and emergency brake and brake control solenoid valve.

"In terms of powershift transmissions, Transfluid offers the Rangermatic and Revermatic types," Pavesi said. "Both can be controlled by the Transfluid MPCB-R5 electronic controller for automating gear shifting, and for diagnostic purposes, that also controls the hybrid system."

The Rangermatic is a multispeed powershift transmission designed for off-highway and industrial applications, available in two or three speeds forward and one or two speeds reverse. It consists of a double geartrain actuated by self-contained hydraulic clutches. It connects to the engine through a variety of hydrodynamic single-stage torque converters, selected to optimize the performance of the driven machine, Transfluid said. Additionally, it eliminates the mechanical connection between the engine and the driven machine, allowing smooth power transfer, according to the company.

The Revermatic is a single-speed powershift transmission designed for applications requiring quick directional reversing and smooth clutch engagement, the company said. It consists of a hydraulically activated gear unit as well as forward and reverse multiple-disc clutch assemblies mounted on the lay shaft and input shafts, respectively. The transmission input shaft is connected to the engine flywheel through a single-stage torque converter, which is selected in accordance to the engine rating and required transmission vehicle performance, Transfluid said. As with the Rangermatic transmission, the torque converter eliminates the mechanical connection between engine and driven machine. **dp**

Ciesel Weblink

www.transfluid.eu