

New transmission strategy

Eliminating transmission components instead of adding new ones is key to reducing consumption and emissions

▶▶ Driveline innovations are mostly minor improvements of mature technology, which makes breakthroughs increasingly rare. To cope with today's environmental challenges, Mazaro director Filip De Mazière believes a fundamentally different way of transmitting power is necessary to create real impact. With 20 years as the chief design engineer for two global transmission manufacturers designing DCTs, ATs and off-highway powershifts, he has a good insight into the limitations of the leading drivelines.

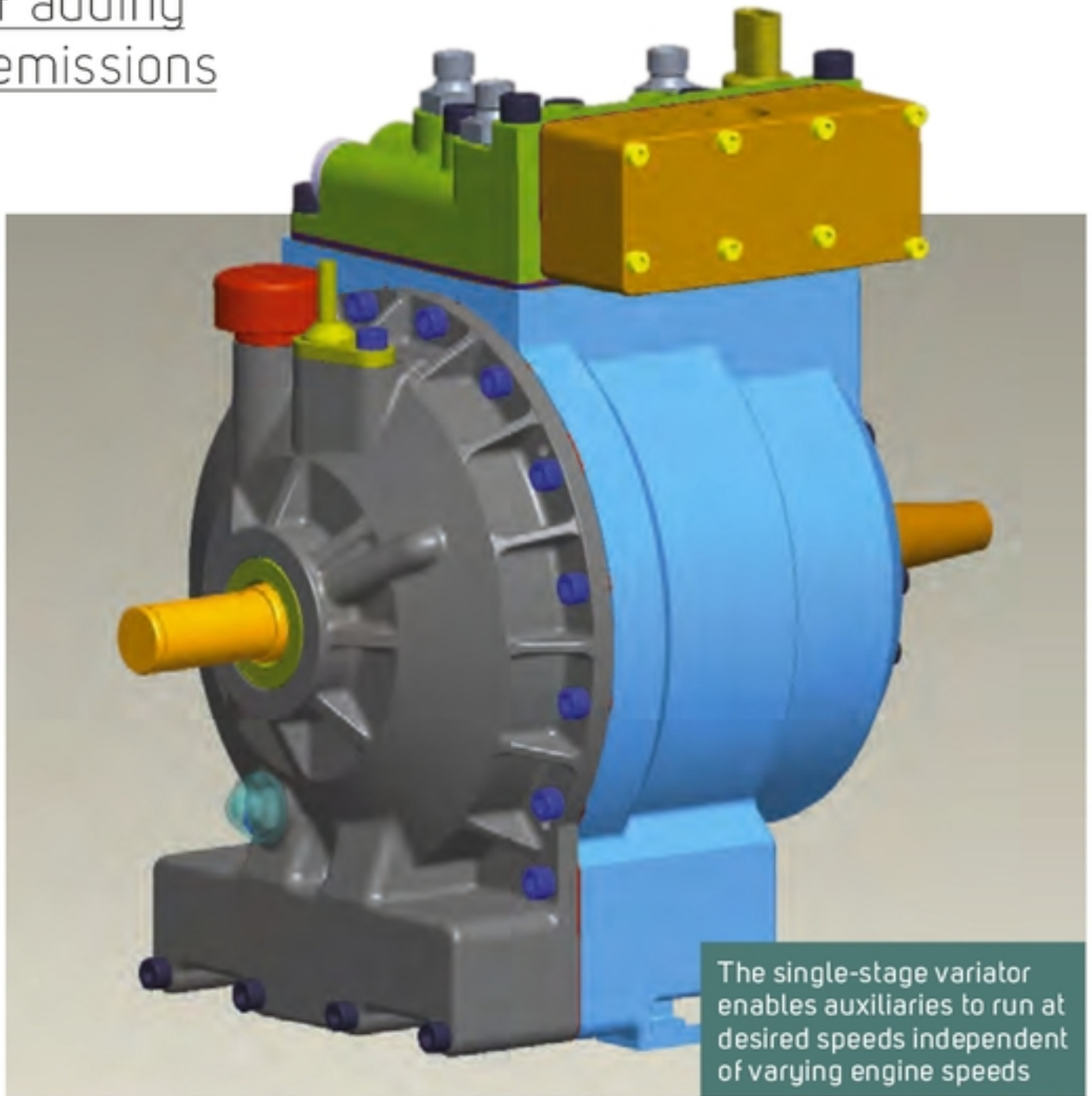
Trying to come up with a new way of transmitting power from the engine, De Mazière started with a blank page and the intention of leaving out all energy-burning components such as slipping clutches, torque converters, high-power hydraulics, piston rings, synchronizers and belts. He also wanted to reduce the numbers of delicate sensors and solenoids to a minimum and come up with a gearless system to avoid shifting. The central idea was to design a more efficient transmission that would to keep the engine on a particular curve at all times, be it

lowest levels of fuel consumption, lowest NOx, SOx, CO₂, or whatever combination was ultimately desired.

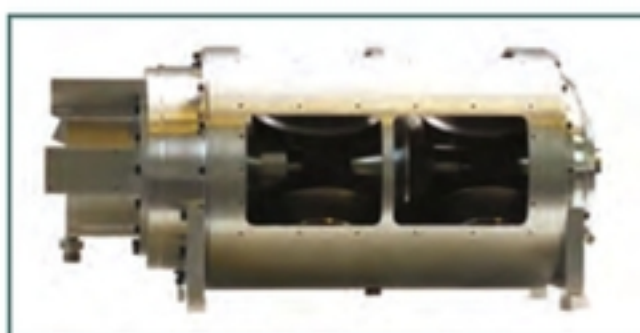
A new solution

Several years of crucial in-house engineering and research with tribological centers and main component suppliers led to the reversible variable transmission (RVT), an advanced stepless transmission system. The main difference with current CVTs is that the typical design of the RVT's traction surfaces avoids drilling motion, transmitting power in a mathematically pure rolling mode without macro-slip.

All CVTs need high clamping forces to transmit power: belt CVTs obtain these forces by using high-power hydraulics, but that lowers efficiency. This is not the case with the RVT's hydraulic system, which is designed without piston rings and needs only 25W on average in an NEDC. In contrast to other stepless systems, the RVT is suitable not only for mid-range vehicles, but also for high torque in buses, trucks and heavy-duty machinery. Material-handling



The single-stage variator enables auxiliaries to run at desired speeds independent of varying engine speeds



Second-generation RVT prototype offers 520Nm maximum torque

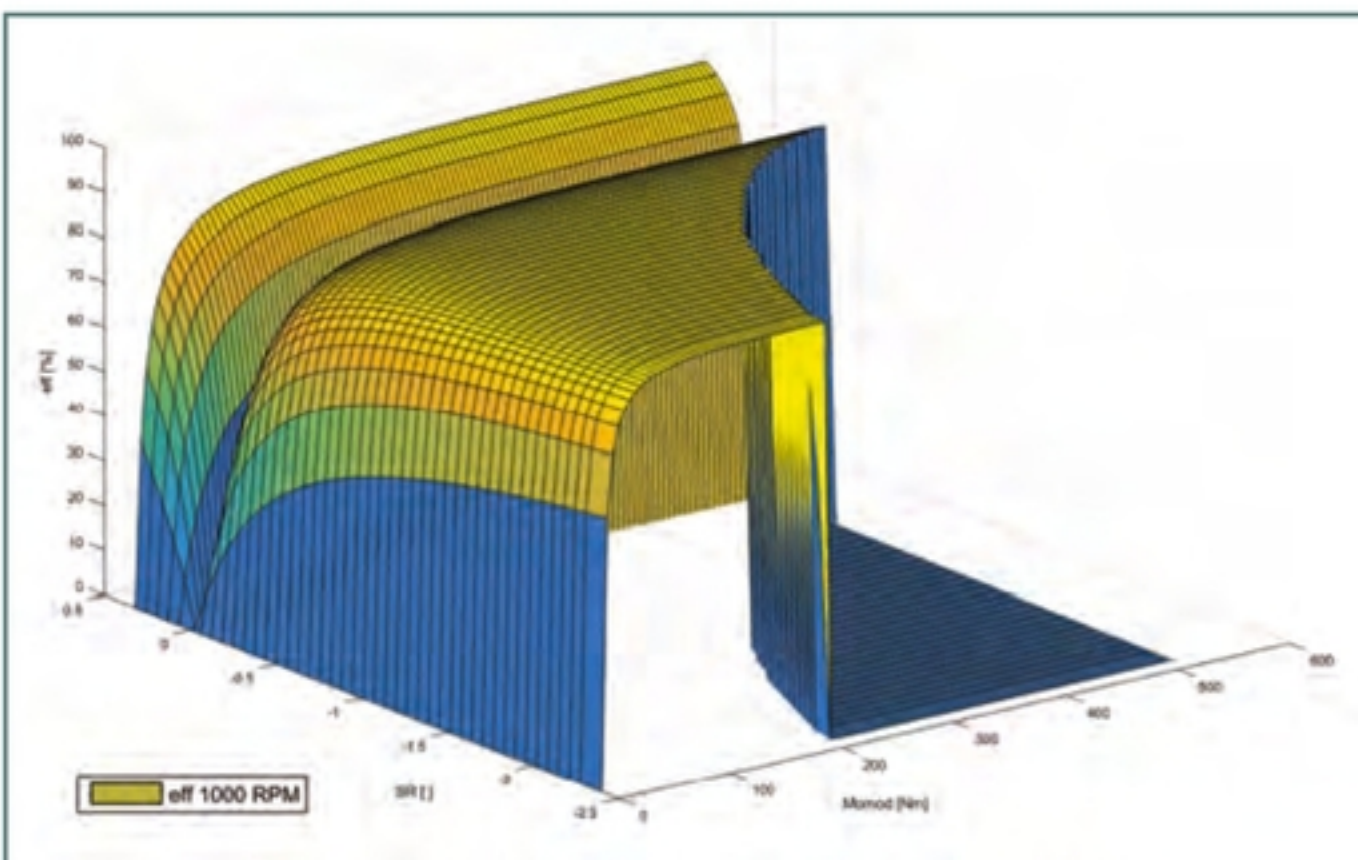
Critical savings

These elements will all lead to quite substantial savings on emissions, fuel and running costs in today's heavy-duty vehicles, trucks, buses, material-handling equipment and passenger cars. The savings will depend on the type of vehicle, but those for a city bus driving a SORT cycle, to take an example, can be expected to reach 21% compared with a 6-speed automatic.

From the RVT technology, a single-stage variator was derived, with a 4 ratio spread and 96.9% efficiency, as well as a double-stage variator sporting a 12.2 ratio spread, with the additional benefit that very often costly frequency converters are made redundant. Mazaro is currently setting up industrial partnerships for the production and distribution of its various RVT transmission models. ©

equipment driven by a reversible variable transmission becomes much more maneuverable and efficient thanks to the absence of a torque converter and clutches.

The spread of the RVT is not only infinite; its highest ratio can be compared to an imaginary 13- or 14-speed transmission, being 40-75% wider than current top gears. Although all IVTs have internal power recirculation, the high efficiency of the variator's principle keeps total efficiency considerably higher than current IVTs and even CVTs. Also, its lean and compact design, the absence of expensive materials and special lubricants, and standard machining, make the RVT attractive cost-wise.



Calculated efficiency of first prototype, proven on test bench: 90.7% in common operation field (peak 93.8%). The next prototype's expected efficiency is 94%

FREE READER INQUIRY SERVICE

To learn about Mazaro, visit:

www.ukipme.com/info/tr

INQUIRY NO. 509