

# Smartbox® uses integrated flexible couplings of Hytrel®

*A redesigned, integrated flexible coupling of Hytrel® brings Motovario's latest Smartbox® range of helical bevel gearboxes cost and space savings, better part integration and improved vibration damping.*

By Antonio Nebel, DuPont Engineering Polymers, Italy

Outstanding efficiency gains in terms of space saving, part integration, vibration damping and cost all result from a redesigned, integrated flexible coupling for gearboxes made of DuPont™ Hytrel® thermoplastic polyester elastomer, and developed jointly by systems supplier Motovario of Modena (and moulder TPA Plast of Vicenza, both of Italy) and DuPont.

The integrated coupling is incorporated in Motovario's new Smartbox® range of helical bevel gearboxes.

Motovario selected Hytrel® for its new flexible couplings, which provide precision and alignment between the output and drive shafts of high-speed motors within the gearbox, because of the thermoplastic polyester elastomer's excellent vibration and noise damping effects and its outstanding elastic recovery properties. In addition, the constant mechanical properties of Hytrel® - for example tensile strength and elongation - under a wide temperature range (minus 30 to plus 120 degrees C) is important because the company's gearboxes are used in a wide range of indoor and outdoor variable speed industrial applications, from elevators to printing presses.

Substantial space saving is achieved by Motovario's innovative design, which inverts the couplings' traditional star shape so that the points are turned inwards. In switching from rubber, traditionally used for gearbox flexible couplings, to Hytrel®, Motovario gained the design freedom it needed to injection-mould the parts in this complex new geometry, which has walls that are variously thicker and thinner than the previous design.



*Integrated flexible couplings of Hytrel® for Motovario's latest Smartbox® range of helical bevel gearboxes.*

Motovario Design Engineer Rodolfo Arigoni explained: "Although flexible couplings have been available for some years, they were always seen as an ancillary part to the gearbox and were therefore never integrated into the overall system design until now. However, our customers immediately realized the space saving and damping advantages that our new integrated design could offer."

The processing advantages of DuPont's thermoplastic elastomer over rubber and other thermoset plastics formed another factor in Motovario's selection of Hytrel®. Because it can be injection moulded on standard moulding machines, DuPont's thermoplastic polyester elastomer is easier and more cost-effective to process than rubber. Unlike rubber and thermosets, it is also recyclable.

Arigoni added: "It was not easy for us to make the transformation from being a company wholly focused on traditional metal and rubber solutions to start using engineering polymers. However, working

with TPA Plast and DuPont helped us transform our new concept into a fully functional, commercial product. An increasing number of our gearboxes are now sold with built-in flexible couplings of Hytrel® which are produced by our company in-house so that we can oversee quality control and optimize production efficiencies."

TPA Plast and DuPont worked with Motovario for a year to perfect the new flexible coupling and provided finite element analysis and other material and design support.

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