Powertrain

ZF's new nine-speed automatic to replace CVTs in 2013 Chryslers

ZF has escalated the raging transmission-ratio war with its January announcement of a new nine-speed transaxle in development for front-drive passenger cars.

Production of the all-new nine-speed unit, development of which began in early 2009, is scheduled for 2012, according to the company's Executive Vice President, Dr. Michael Paul, who confirmed earlier reports that some MY2013 **Chrysler** models will be the first vehicle applications. In mid-2010, Chrysler and **Fiat** Chairman Sergio Marchionne noted Chrysler's interest in a nine-speed automatic.

It is expected to initially replace all of **JATCO**'s continuously variable transmission business in Chrysler's North American C/D segment vehicles, according to powertrain industry analysts.

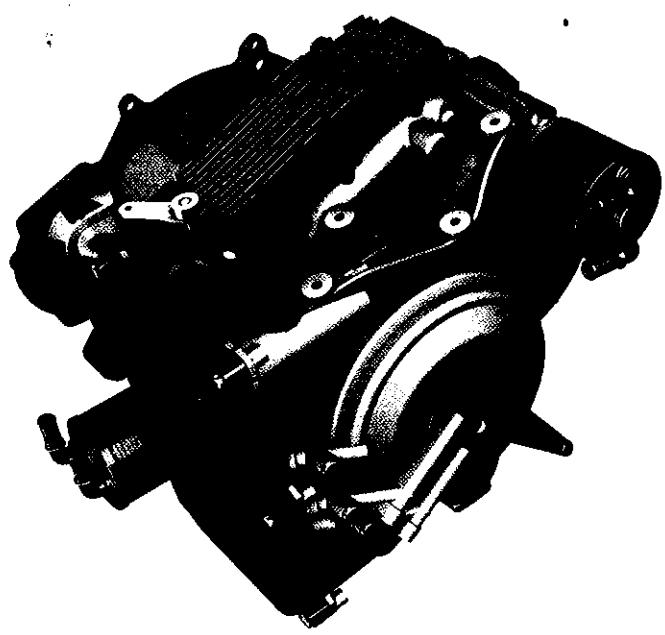
"The number of transmission ratios is not stopping in the industry," observed Casey Selecman, Transportation Project Manager at **The Martec Group**. He said OEMs' move to a greater number of gears "is not a marketing game. Traditionally lower gear ratios are getting taller; it's a trend which offers improved launch torque, stronger tip-in feel to the driver, and greater value."

Selecman believes the extremely stringent fuel-economy regulations expected in 2016-2025 will cause average engine power outputs to level off across the industry, after years of growth. This will increase OEMs' adoption of transmissions with more than the six forward ratios that are becoming typical.

According to reports in mid-2010, **Mercedes-Benz** is also developing a nine-speed automatic for large-displacement engines in rear-drive applications.

The new ZF transmission will be built for "global customers" at the company's new Greenville, SC, plant, Paul said. He did not reveal many specifics about the new unit, including its model designation, during a media briefing at the North American International Auto Show.

Paul did say that compared with typical six-speed planetary-type, fwd automatics, ZF's new nine-speed is "the optimum design for front-wheel-drive transverse-engine applications" and is capable of delivering "two-digit" improvement in vehicle fuel efficiency. The transaxle's overall package dimensions and weight are expected to be very similar to current six-speed fwd units, Paul said. Input-torque capacity will be 400 N·m (295 lb·ft).



The new nine-speed fwd automatic's overall packaging and mass will be similar to competitive six-speed units, said ZF executives. Its ratio spread is expected to be 6.4; input torque capability is 400 N·m.

Rapid, "imperceptible" ratio changes will be a hallmark c the new nine-speed, Paul promised. While he would only ac mit to the new automatic having "a few clutches" and a ratio spread of "more than 6" during media questioning, a veterar powertrain industry engineer familiar with ZF's plans told *AE* the new nine-speed's ratio spread will be "about 6.4."

He noted that because "only two of the eight forward gears will have dragging clutches," its internal efficiency will be vastly superior to incumbent six-speed units.

According to analysts, Chrysler's move away from CVTs points to their classic limitations—limited input torque capability, high internal parasitics, peculiar shift quality and NVH (the "slipping-clutch" feel under acceleration), and ratio spreads typically in the 4.2-6 range—compared with the latest planetary-type step-ratio automatics.

The Chrysler deal is expected to dramatically increase ZF already growing business with the Italian-American automak er. Last year Chrysler announced plans to license ZF's 8-HP eight-speed automatic for RWD applications. Those transmi sions will be built at the Kokomo, IN, transmission plant.

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