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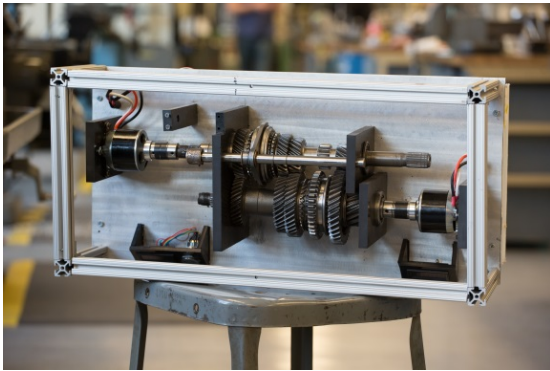
Dan Dorsch

Massachusetts Institute of Technology (Cambridge, Mass.)

\$15,000 Lemelson-MIT “Drive it!” Graduate Winner

The First High-Performance, Lightweight Clutchless Hybrid Transmission

The Challenge: Currently, hybrid vehicles in the marketplace fall into one of two categories. The first includes cars designed with a focus on efficiency and emissions, where overall performance, system weight and size are secondary (e.g., Toyota Prius). The second includes cars designed with performance as the primary objective, typically including one to three electric motors that offer high acceleration and an increase in total horsepower (e.g., Porsche 918). Both categories have strengths and weaknesses, but there is currently no design available that does not compromise on either efficiency or performance.



The Solution: A lightweight clutchless hybrid transmission that brings the best of the current hybrid architectures into one high performance, energy efficient vehicle. Dan is able to eliminate one of the largest sources of inefficiency in the transmission by removing the clutch, which can also reduce overall weight and transmission size.

When the driver begins to shift gears in a manual transmission by releasing the throttle and stepping on the clutch, you can feel an acceleration lag. In Dan’s design, one electric motor is used to fill this acceleration lag, leading to a seamless shift to the next gear. Since the clutch is removed, there is no mechanical means to speed up the next gear before engaging it. A second motor is used to quickly speed match the gears during the shift. Additionally, city driving can be achieved using

the electric motor alone, leading to greatly improved emissions.

Application and Commercialization: Dan has partnered with a leading performance car company to develop his invention. Their interest lies in finding a means to match or improve the performance of their products while reducing emissions. The U.S. Corporate Average Fuel Economy requirements have recently become stricter, and car manufacturers are greatly incentivized to increase efficiency. Dan firmly believes that his new architecture can benefit many car manufacturers. This invention was designed with both efficiency and performance in mind; alterations can also be made for increased efficiency and reduced cost. This will enable a new style of improved hybrid vehicles.