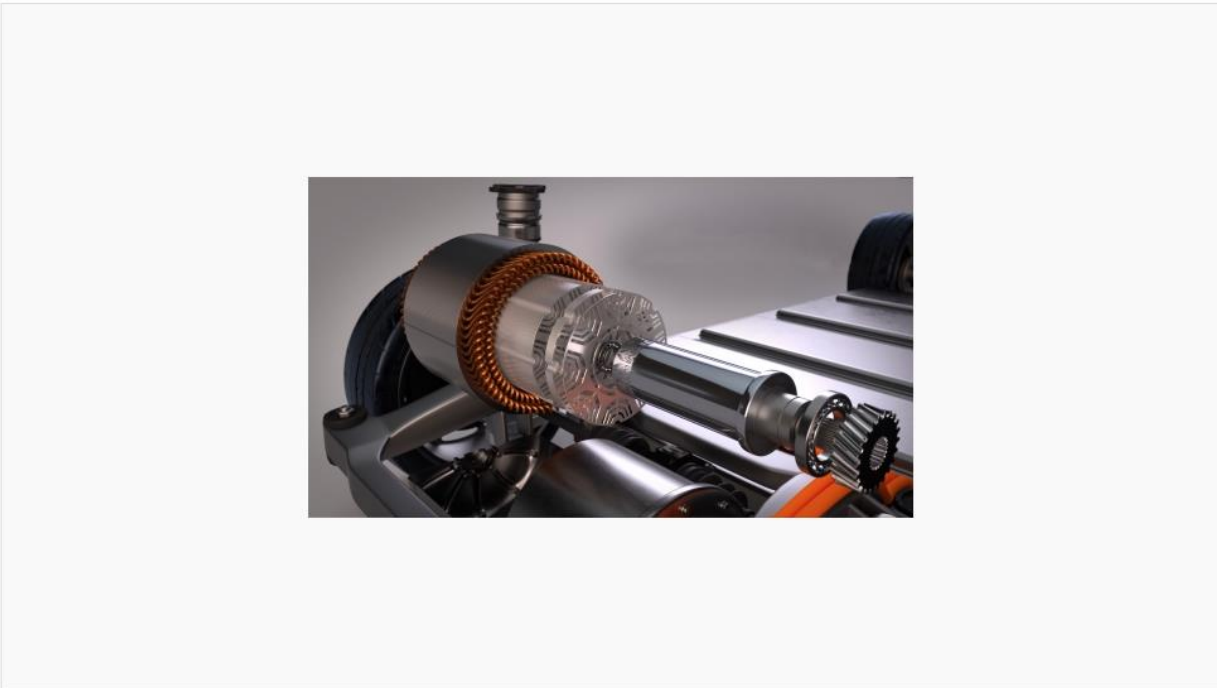


Rare Earth Metals Supply: The Next Microchip Crisis?

Tula's DMD Technology Offers EV Automakers an Alternative



Tula's DMD™ Dynamic Motor Drive paired with synchronous reluctance motors (pictured here) could help lower EV production costs. (Photo: Business Wire)



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SAN JOSE, Calif.--([BUSINESS WIRE](#))--With the heightened scrutiny of automotive contributions to climate change, automakers' full attention is focused on electric vehicles (EVs). The electrification of transportation will help reduce reliance on fossil fuels, eliminate tailpipe emissions and help mitigate climate change. EVs, however, have a challenge: rare earth metals in their motors.

“EV manufacturers can implement an economical solution while avoiding the challenges of rare earth metals by combining synchronous reluctance motors with DMD. Our solution could lead to broader consumer adoption of EVs by lowering costs.”

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Rare earth metals are not rare in nature, but rarely are they concentrated in amounts that make extraction and processing economically feasible. Demand for rare earth metals is increasing in conjunction with the transition to an electrified future. The anticipated supply-demand imbalance, supply-chain management issues and escalating costs are causing automakers to look for other options.

Tula Technology, Inc., a leader in propulsion efficiency, recently authored a whitepaper titled “[Rare Earth Materials and their Impact on the Future of Electric Motors](#),” that highlights the challenges associated with rare earth metals used in EV motors and offers practical alternatives.

Tula’s Dynamic Motor Drive (DMD™), a patented DMD pulse density strategy, avoids rare earth metals in EV motors by deploying synchronous reluctance motors (SynRMs), which typically do not utilize rare earth metals. The unique control algorithms implemented through DMD improve the efficiency of SynRMs, positioning them as a viable alternative to the permanent magnet motors used in the vast majority of EVs today.

“The limited supply of rare earths, coupled with growth in demand, has resulted in price increases that are likely to continue. Beyond pricing, rare earth dependence is increasing supply chain risk, and it could easily become the next microchip crisis for the automotive industry,” said R. Scott Bailey, president and CEO of Tula. “EV manufacturers can implement an economical solution while avoiding the challenges of rare earth metals by combining synchronous reluctance motors with DMD. Our solution could lead to broader consumer adoption of EVs by lowering costs.”

DMD provides the greatest benefit for off-grid applications like EVs where battery capacity or range are concerns. The benefits of DMD also can be substantial wherever motors and generators are used, such as home appliances, industrial motors or wind power generators.

Advancing the conversation and awareness around EV technologies, Tula engineers recently presented “Optimizing Electric Motor Controls with Dynamic Motor Drive” at the 2021 Aachen Colloquium on Sustainable Mobility, an annual conference held in Aachen, Germany, as well as the Aachen China Colloquium. Both conferences attract

automotive experts and researchers from around the world to exchange ideas on future mobility.

For more information on Dynamic Motor Drive, visit tulatech.com/dmd.

About Tula Technology, Inc.

Silicon Valley-based Tula Technology provides innovative award-winning software controls to optimize propulsion efficiency and emissions across the mobility spectrum, including gasoline-powered, diesel, alternative fuel, hybrid, and electric vehicles. Tula's culture of innovation has resulted in breakthrough technologies and a robust global patent portfolio of more than 380 patents issued and pending. Tula Technology is a privately held company backed by Sequoia Capital, Sigma Partners, Khosla Ventures, GM Ventures, BorgWarner and Franklin Templeton. More information is available at www.tulatech.com.

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