

# **Design of a hyper-high-speed Powertrain for EV to achieve maximum ranges**

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## **Abstract**

A clear trend in designing and developing drivetrains for EVs driven by high speed electrical motors is nowadays recognizable in the automotive industry. The global aim is to increase as much as possible the power density and in parallel save costs and increase the system's efficiency. [Sed17]

Within the joint project "Speed2E", a drivetrain prototype capable of input speeds of up to 30,000 rpm was developed and successfully tested. In particular, the powertrain behavior in terms of efficiency and NVH was investigated, in order to prove the advantages of high-speed concepts [Gwi16b, Gwi17]. In the follow-on joint project "Speed4E", the idea of increasing the power density through high motor speed is pursued even further. Especially the impact on dynamics, efficiency and costs when increasing speed up to 50,000 rpm will be investigated. Moreover, a highly-integrated drivetrain along with efficiency optimization will be strived in parallel. Aim of this paper is to present the ideated concept and to give an insight on the designed hyper-high-speed gearbox.

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