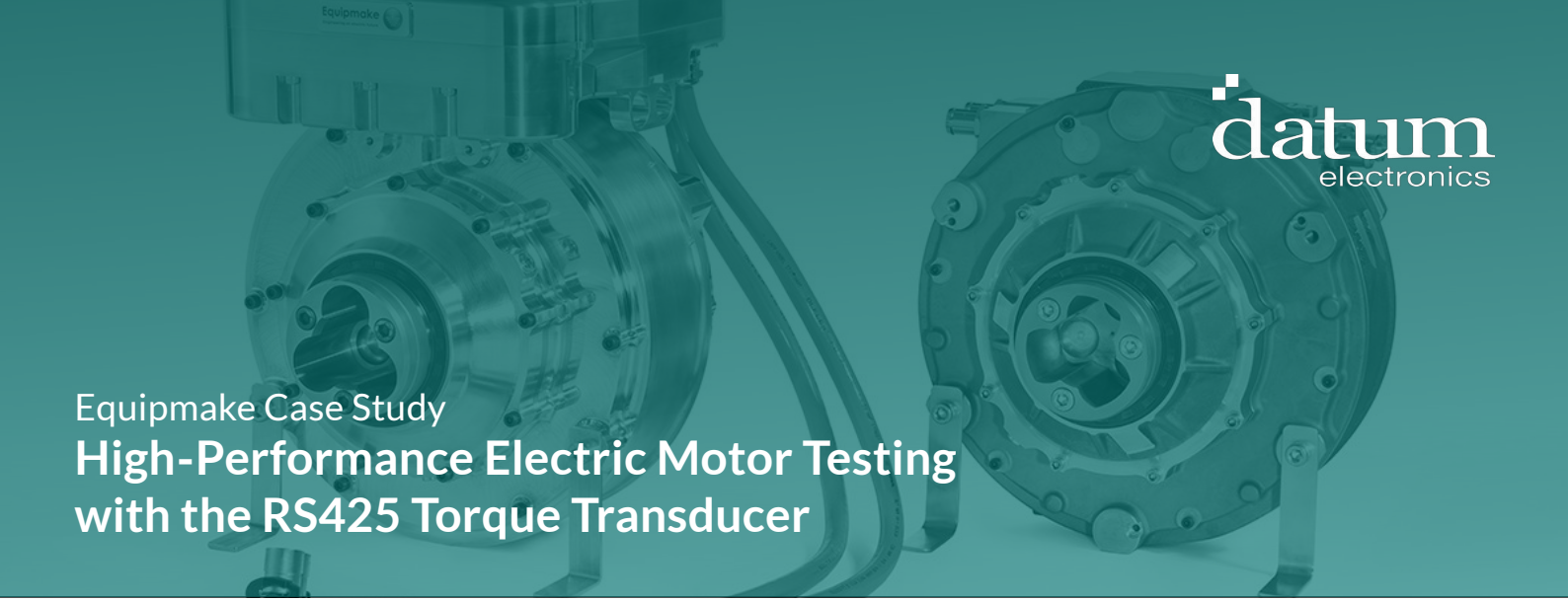


Equipmake Case Study

High-Performance Electric Motor Testing with the RS425 Torque Transducer

The Client: **Equipmake**

Datum were approached by **Equipmake,** a UK-based engineering company specialising in electric motors, powertrains, and specialist vehicles, such as compact, high-performance sports cars.

Founded by Ian Foley, formerly Head of R&D at Lotus F1 and founder of Williams Hybrid Power, Equipmake works across modelling, simulation, mechanical and electromagnetic design, prototyping, and test, enabling development work to be completed and validated within constrained timescales.

Developing high-speed, high power-density motors exposes the limitations of load-cell-based torque measurement, driving the need for a more accurate and repeatable approach.

The Challenge

Equipmake were developing a highly power-dense permanent magnet electric motor as part of their AMPERE research programme, targeting significant improvements in power-to-weight ratio over conventional designs. As development progressed, accurate characterisation of mechanical performance became increasingly important, particularly during high-speed and transient testing, where motor and driveline designs operate across a wide range of torque and rotational speed.

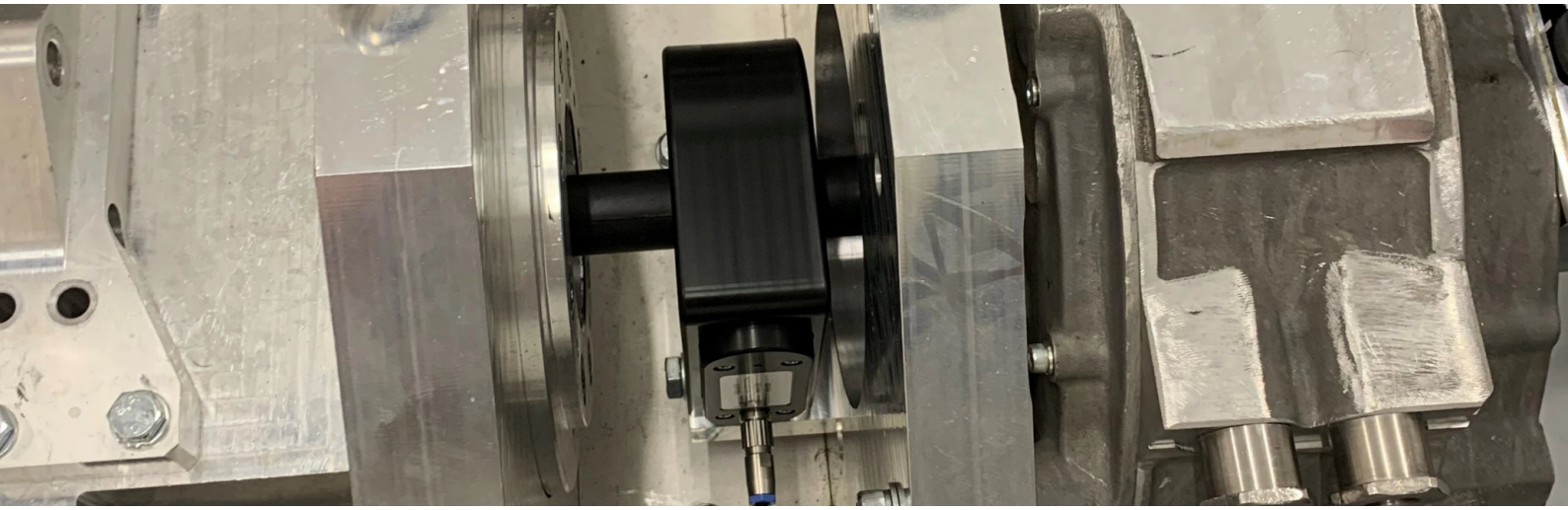
Motor torque is the single most critical variable that characterises instantaneous mechanical performance. Previously, Equipmake used load cells to measure force at a fixed moment arm. In practice, this approach resulted in variable zero offset between tests, required frequent recalibration, and introduced error from the non-symmetrical mass of the motor mounted to the test rig.

To measure only the torque transmitted through the driveshaft by the test motor, Equipmake decided to invest in a dedicated torque sensor solution that would provide stable, repeatable measurements without the need for constant recalibration. By eliminating the influence of motor weight and bearing friction, they would gain a more accurate reading of the motor's output.

The Solution

Following a review of the project, we identified that a custom **RS425 Contactless Torque Transducer** was the most appropriate tool for the job. The Datum RS425's compact build and separate rotor–stator construction allowed the sensor to be installed within the available space, while eliminating bearing friction – vital for high-speed, high-torque motor testing.

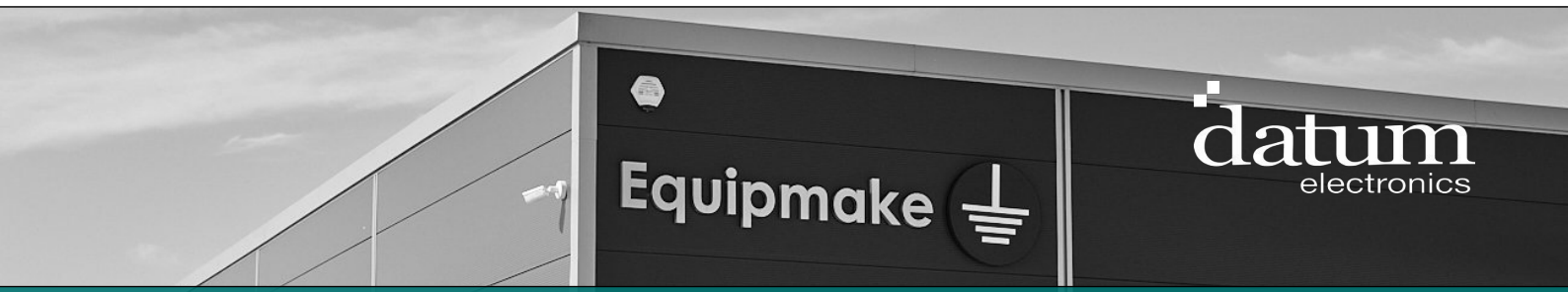
The sensor design also enabled the use of a free-issued shaft from Equipmake's existing driveline. This allowed the transducer to be fitted without cutting the shaft or introducing an inline assembly, avoiding additional components that could increase time, cost, mass, and introduce further sources of error. This approach also simplified removal and re-installation as the test programme progressed.



The Outcome

The solution provided Equipmake with stable, repeatable torque data across a range of test conditions. By switching from load-cell-based measurements to contactless torque sensors, they eliminated the need for frequent re-zeroing and reduced the influence of additional loads introduced by the rig itself.

The Datum RS425 enabled accurate measurement directly at the motor output, while an additional **M425 Torque Transducer** was used to measure torque downstream of the gearbox. This configuration allowed Equipmake to characterise drive losses and mechanical behaviour more effectively during development and optimisation activities.

Equipmake were able to focus on analysing motor performance with greater confidence in the underlying torque data, supporting ongoing development work without introducing additional complexity into the test process.

Learn more about Equipmake and their electric motors at equipmake.com.