

## Clutch Noise Assessment Rig

Mecelec Design Ltd has designed and built a test rig for a blue-chip vehicle manufacturer which recreates the conditions known to cause undesirable clutch noise; the objective being to eliminate this noise in future vehicle models.

It drives each clutch (using an inverter-driven motor) through a range of speed and load conditions, and simultaneously carries out high-speed data acquisition from a number of transducers fitted to the clutch and gearbox assemblies.

This leads to a better understanding of the causes of the noise.

The test rig incorporates a number of systems and technologies which work together to achieve this:

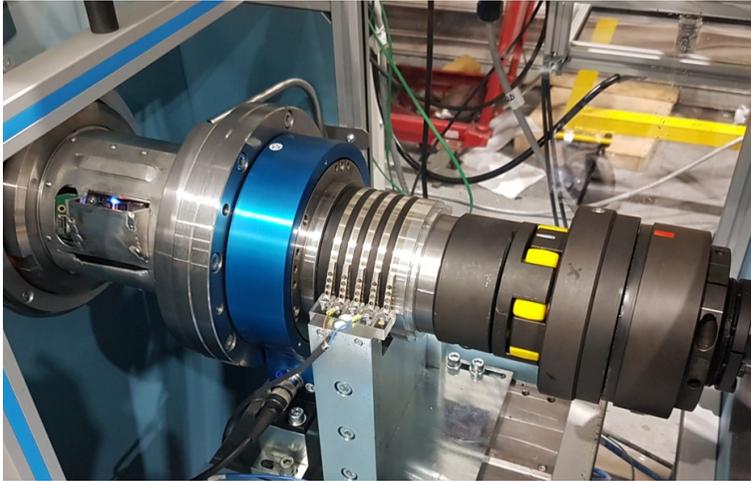
- A PID-controlled electric positioner to 'slip' the clutch at the desired torque
- Hydraulic components to effect the clutch actuation
- Pneumatic actuators which work with the positioner and provide cooling to the clutch
- PLC-based control of motor controller, positioner controller and other rig functions
- User-friendly software written in Labview provides rig control via the Operator's desk
- High speed data acquisition via NI equipment in a separate electrical cabinet
- Wireless streaming of data acquired at high bandwidth from rotating parts
- Saving of all test data to generic and proprietary file formats for offline analysis

Mecelec Design Ltd carried out the installation and hard-wiring of the test rig and electrical cabinet into a test cell at the customer's premises.



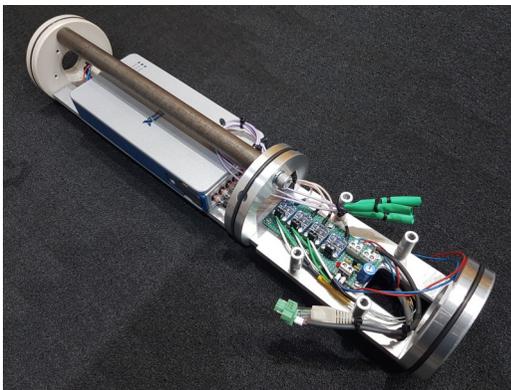
### Technical Data

Air Supply	6 Bar
Electrical Power Supply	415V+E ; 160A
Controls Voltage	24VDC
Control System	Siemens S7 1200
Operator Interface	Custom Labview software
Cycle Time	N/A



Driveshaft assembly incorporates multiple transducers, data acquisition equipment, a Wi-Fi transmitter, a slip-ring assembly and an over-torque coupling.

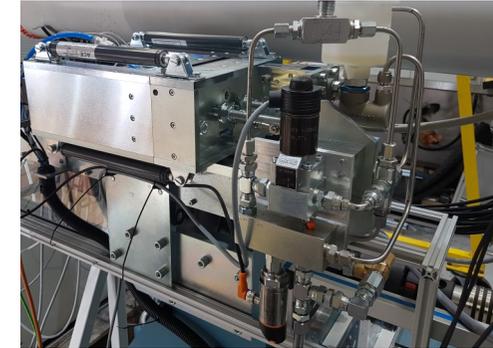
The assembly of rotating parts is fully balanced to ensure smooth running and not introduce vibration into the unit under test.



An acoustic enclosure is accessed via large sliding doors, giving excellent access for the loading and unloading of clutch and gearbox assemblies.

A dedicated measurement microphone of the highest quality, located within the enclosure, records noise during test.

All door and guards are interlocked.



Actuator tooling and hydraulic components.

A separate electrical cabinet contains electrical supply equipment, PLC and data acquisition hardware, safety relays and motor and positioner controllers.



A remote panel provides additional safety and control features for the Operator, located away from the rig in an adjacent control room.