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Reducing Noise in Automatic Transmission

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Reducing Noise in Automatic Transmission

**Objective**
The objective of this project is to produce a cost-effective device for evaluating the friction behavior of automotive lubricants and friction plate materials in a pilot-scale clutch system.

**Background**
To improve fuel efficiency, transmissions can run at higher torque and lower speed. Currently, this causes excess noise, vibration, and harshness (NVH) in the system. Lubricants and plate materials must be modified to reduce NVH at high torque.

**Improvements**
- Automatic, computer-controlled data collection
- Accurate measurement capabilities for torque and speed
- Record the entire process instead of a single torque value
- Faster, simpler tests

**Results**
The data obtained from the initial testing of the improved device effectively shows more noise at higher torque values for four different plates.

**Figure 1:** Plot showing higher motor efficiency at higher torque. (Devlin, M. et al., SAE Technical Paper 2016)

**Figure 2:** Demonstration of NVH occurring at higher torque.

**Figure 3:** Clutch friction plates showing (a) grooved and (b) smooth versions.

**Figure 4:** Zoomed view of clutch friction plates showing (a) grooved and (b) smooth versions.

**Figure 5:** Data flow in improved device.

**Figure 6:** Cross-sectional view of clutch testing device.

**Figure 7:** Torque sensor assembly.

**Figure 8:** All sensor data collected versus time.