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# Reducing Noise in Automatic Transmission

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# Reducing Noise in Automatic Transmission

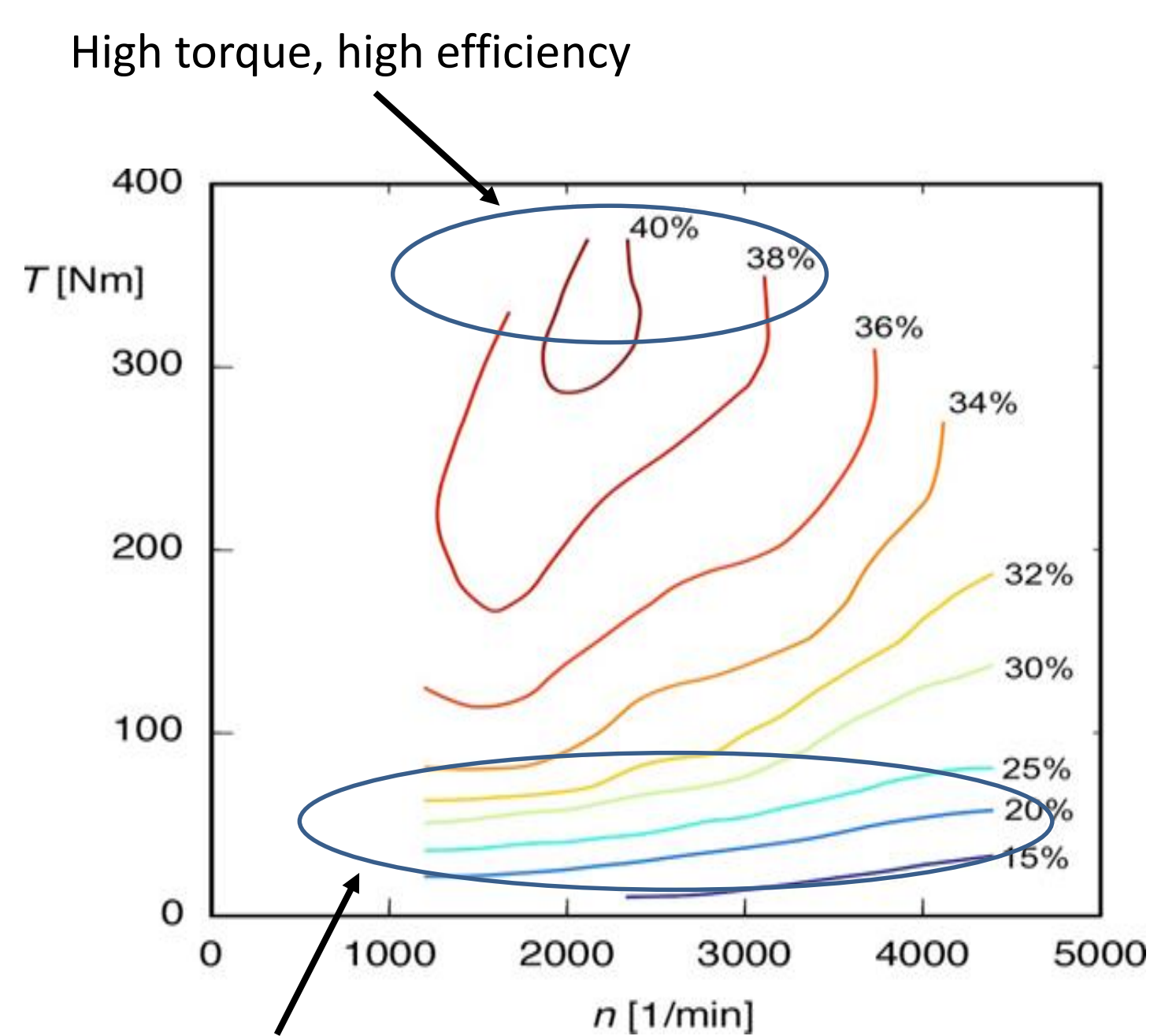
MNE 517 | **Team members:** Connor Golden-Weathers, Riley Hall, Matthew Bosco, Felix Pyatigorskiy | **Faculty adviser:** Hooman Tafreshi, Ph.D  
**Sponsor:** Afton Chemical Corporation | **Sponsor adviser:** Mark Devlin, Ph.D

## Objective

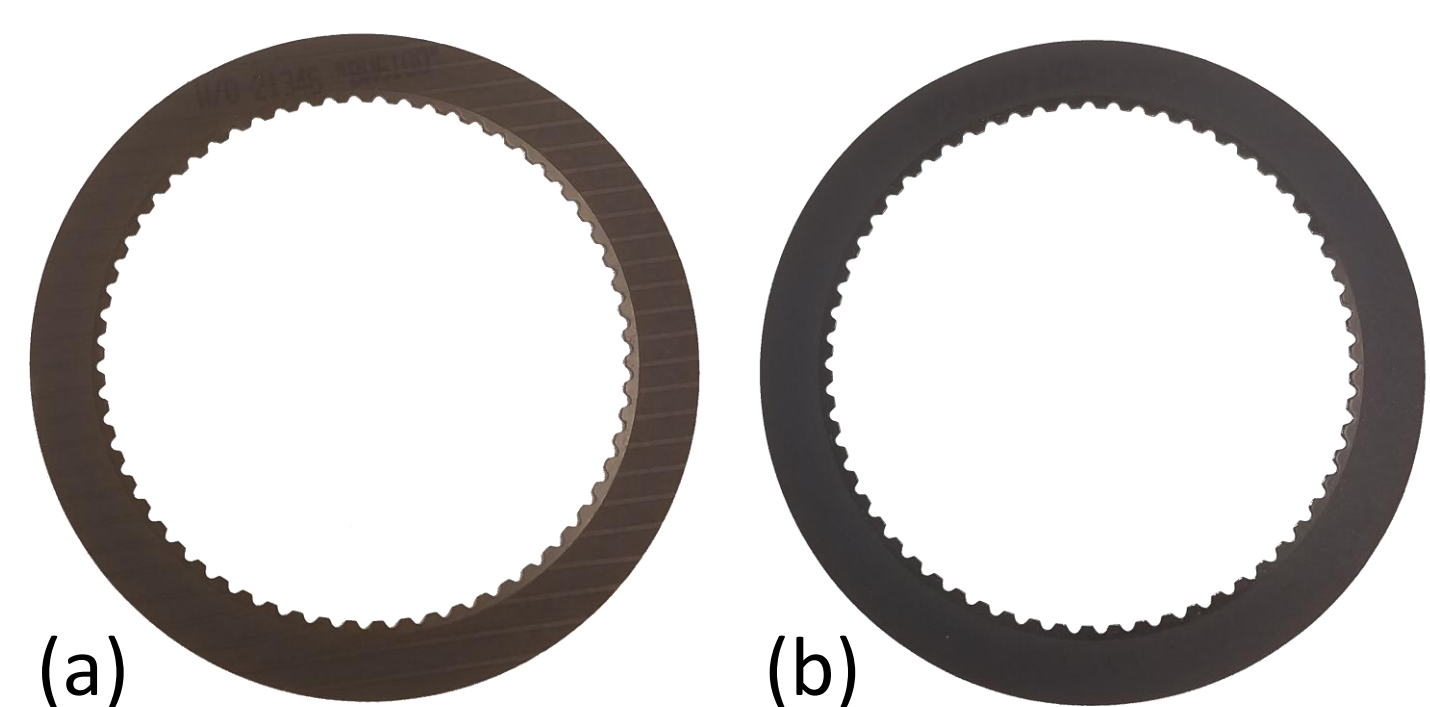
The objective of this project is to produce a cost-effective device for evaluating the friction behavior of automotive lubricants and friction plate materials in a pilot-scale clutch system.

## Background

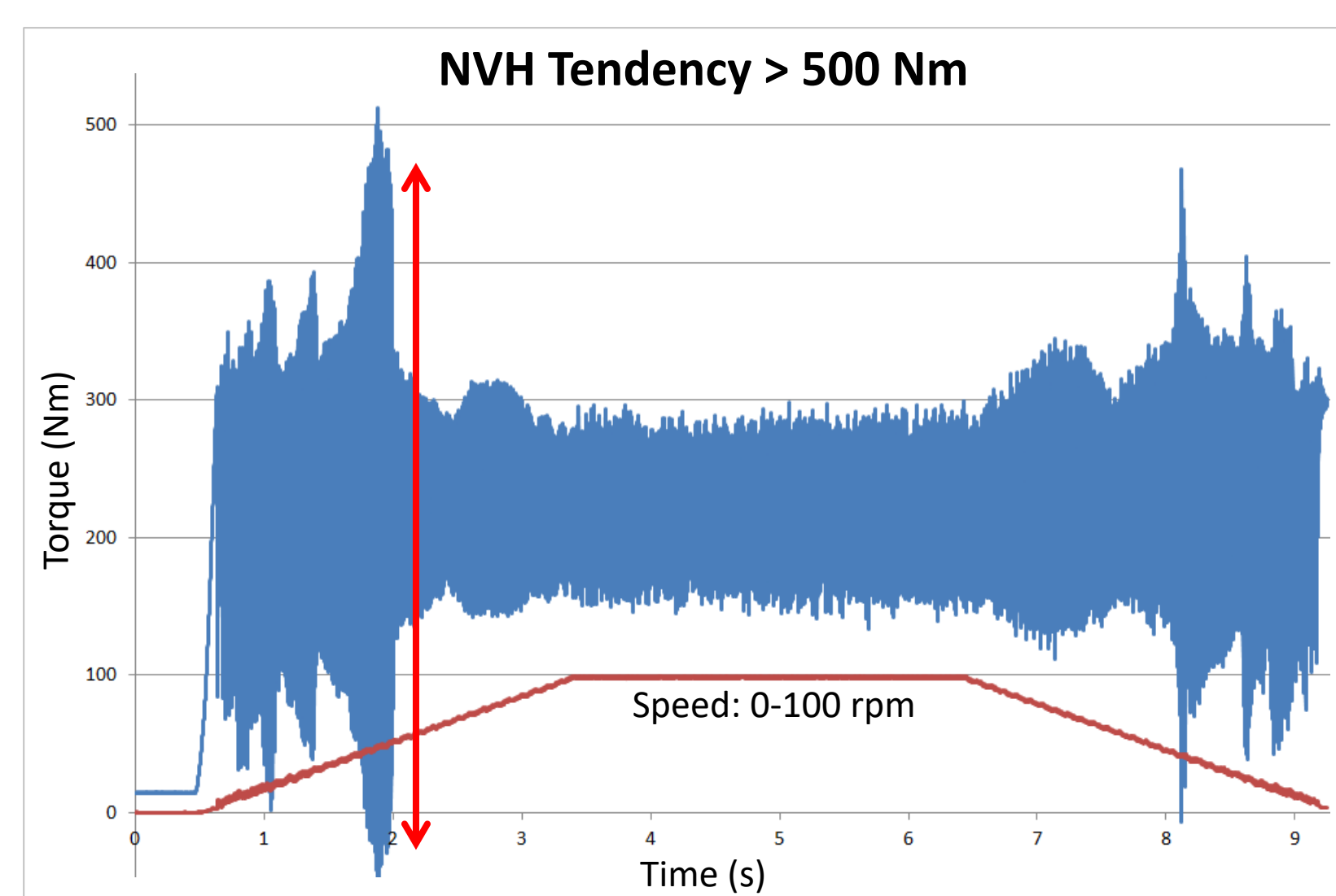
To improve fuel efficiency, transmissions can run at higher torque and lower speed. Currently, this causes excess noise, vibration, and harshness (NVH) in the system. Lubricants and plate materials must be modified to reduce NVH at high torque.



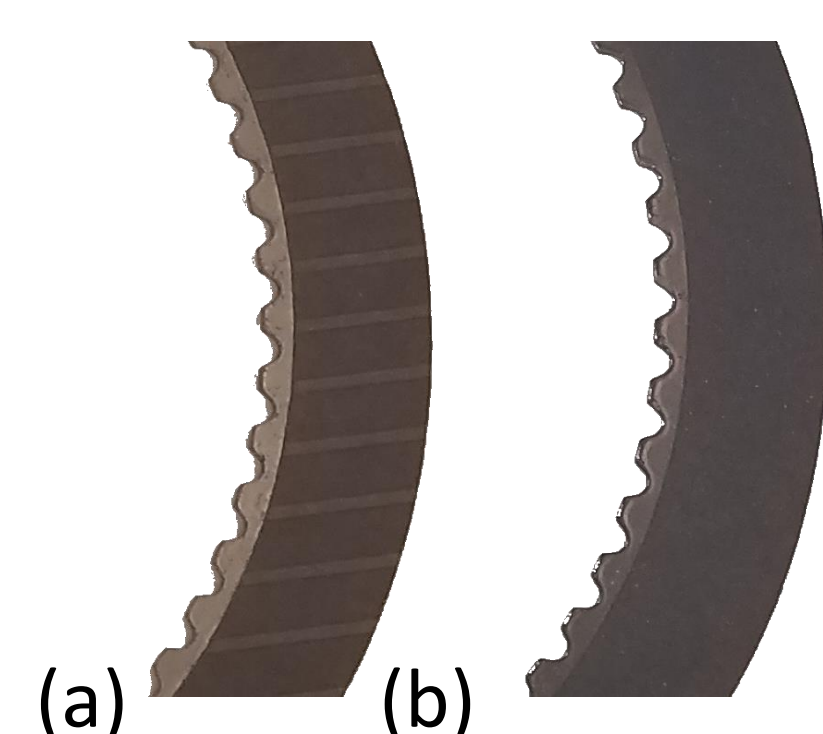
**Figure 1:** Plot showing higher motor efficiency at higher torque. (Devlin, M. et al., SAE Technical Paper 2016)



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



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



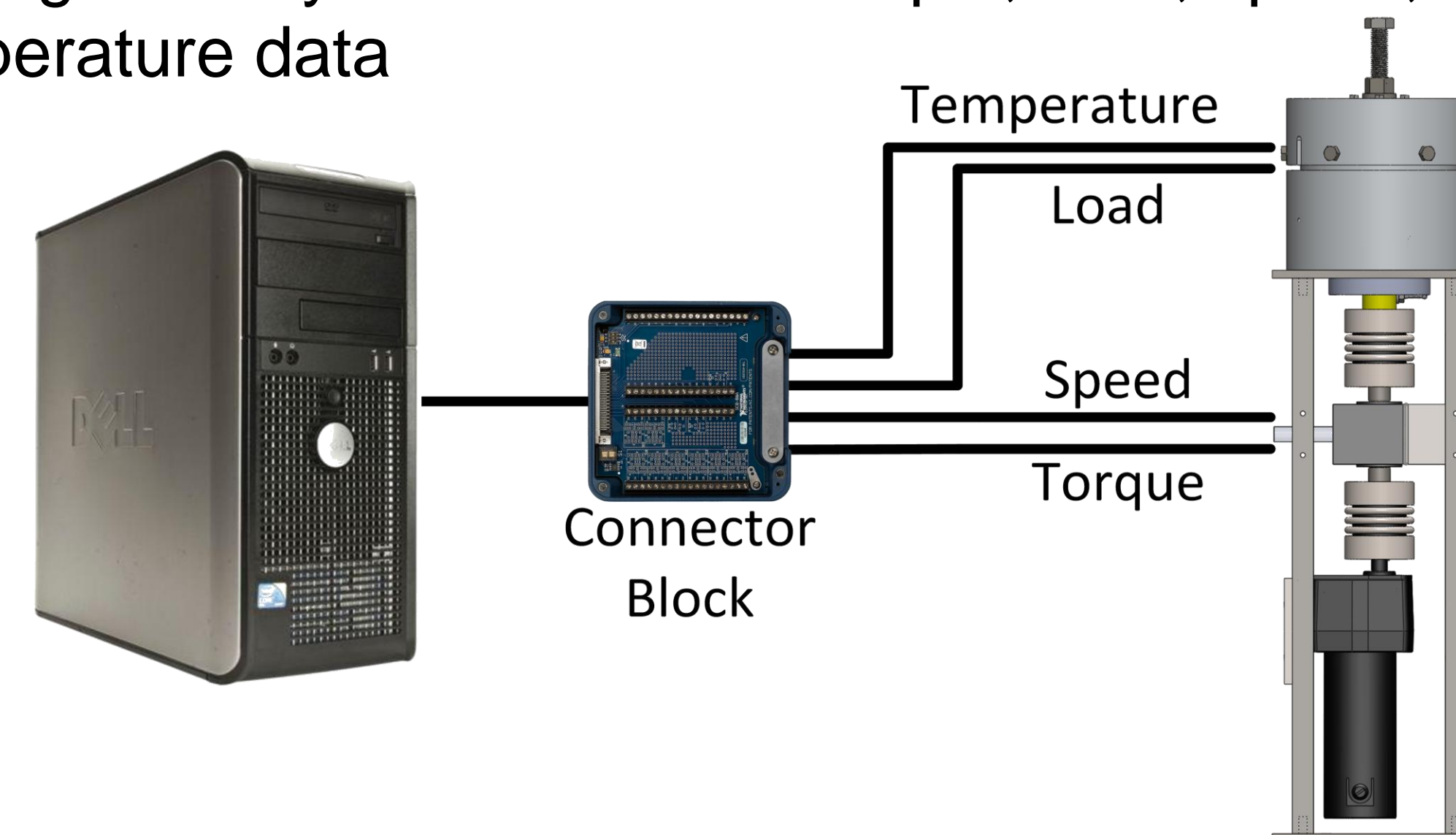
**Figure 4:** Zoomed view of clutch friction plates showing (a) grooved and (b) smooth versions.

## Improvements

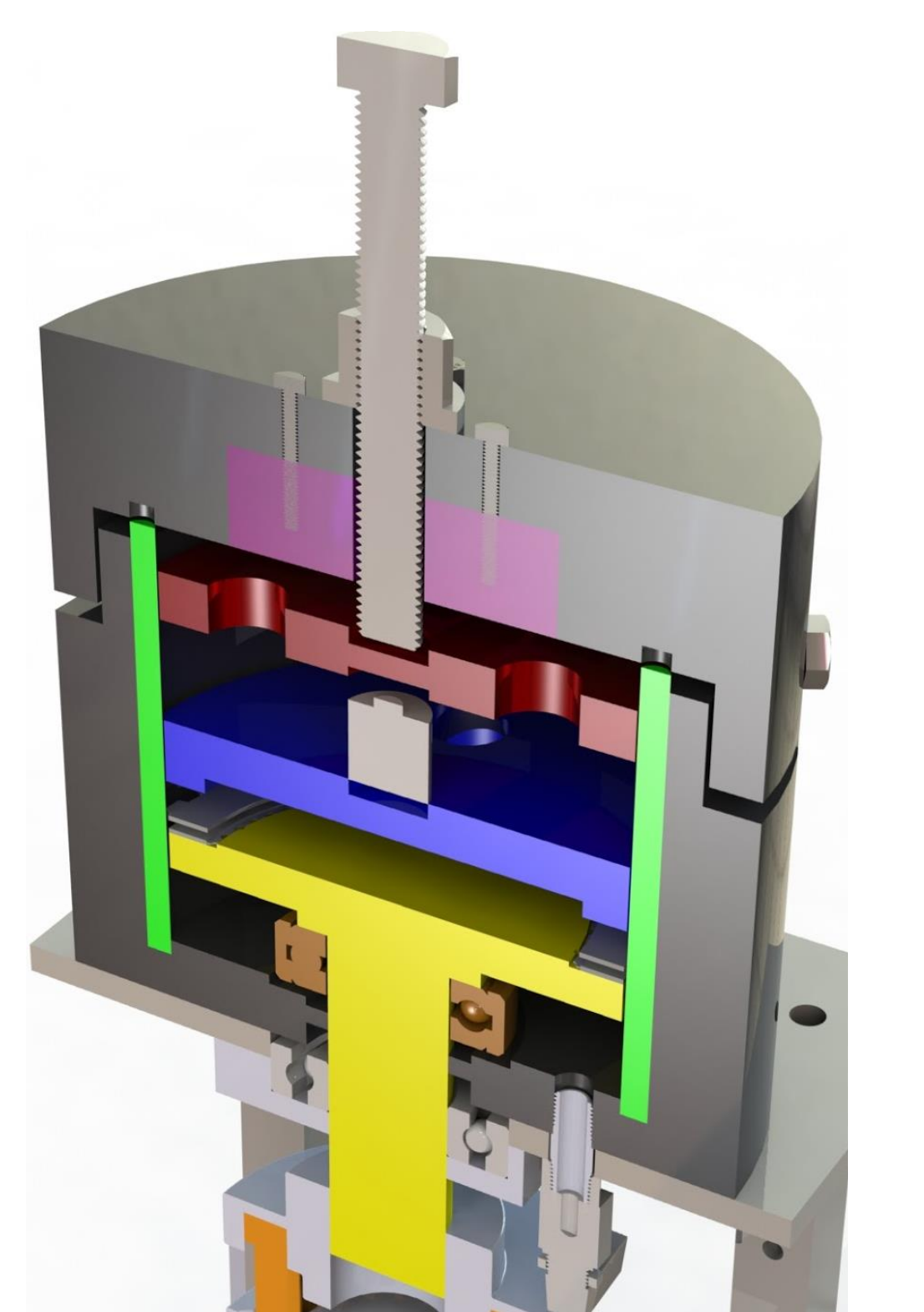
- Automatic, computer-controlled data collection
- Accurate measurement capabilities for torque and speed
- Record the entire process instead of a single torque value
- Faster, simpler tests

## Design

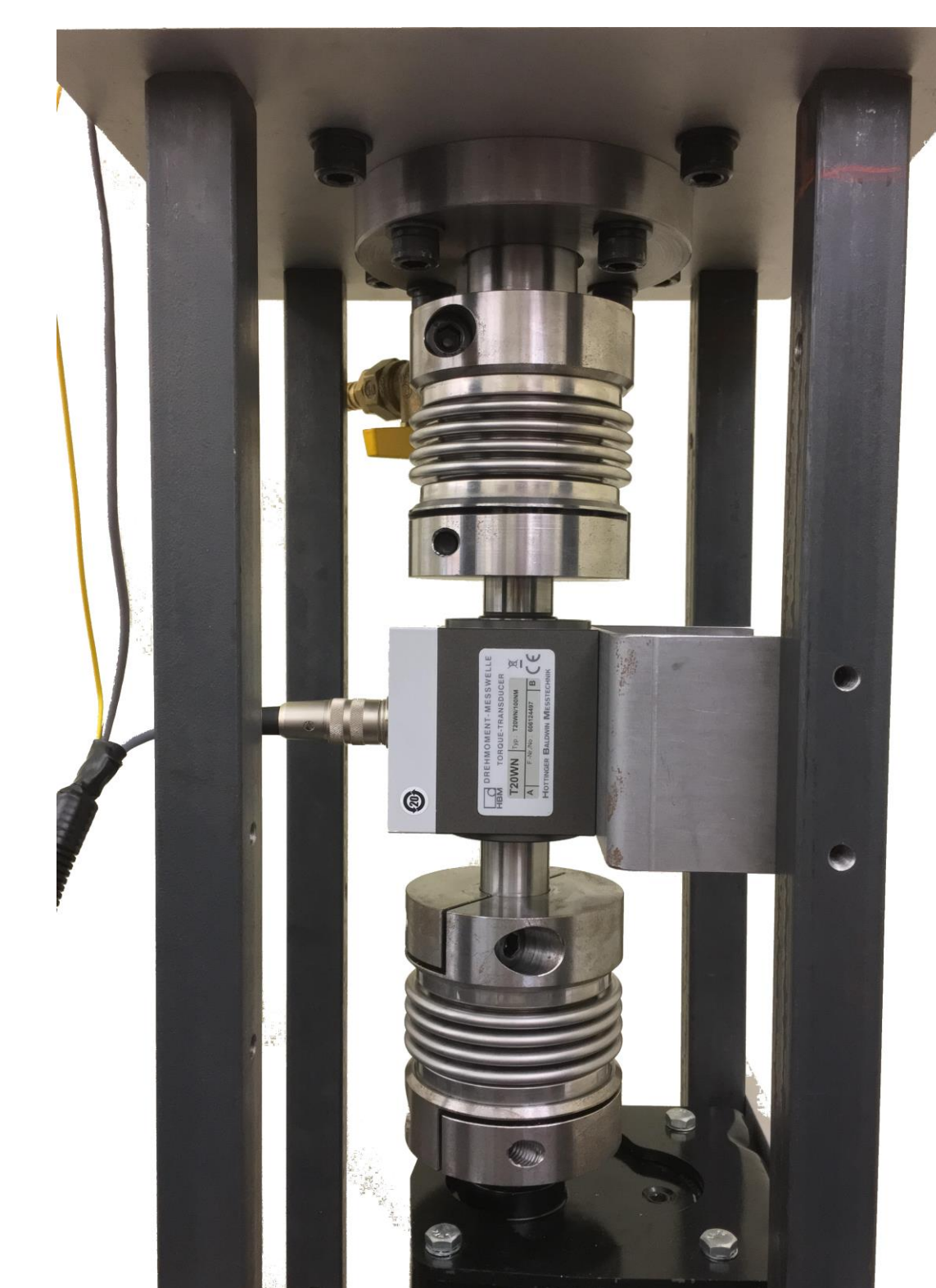
- Torque transducer with speed measurement
- Analog DAQ system to collect torque, load, speed, and temperature data



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



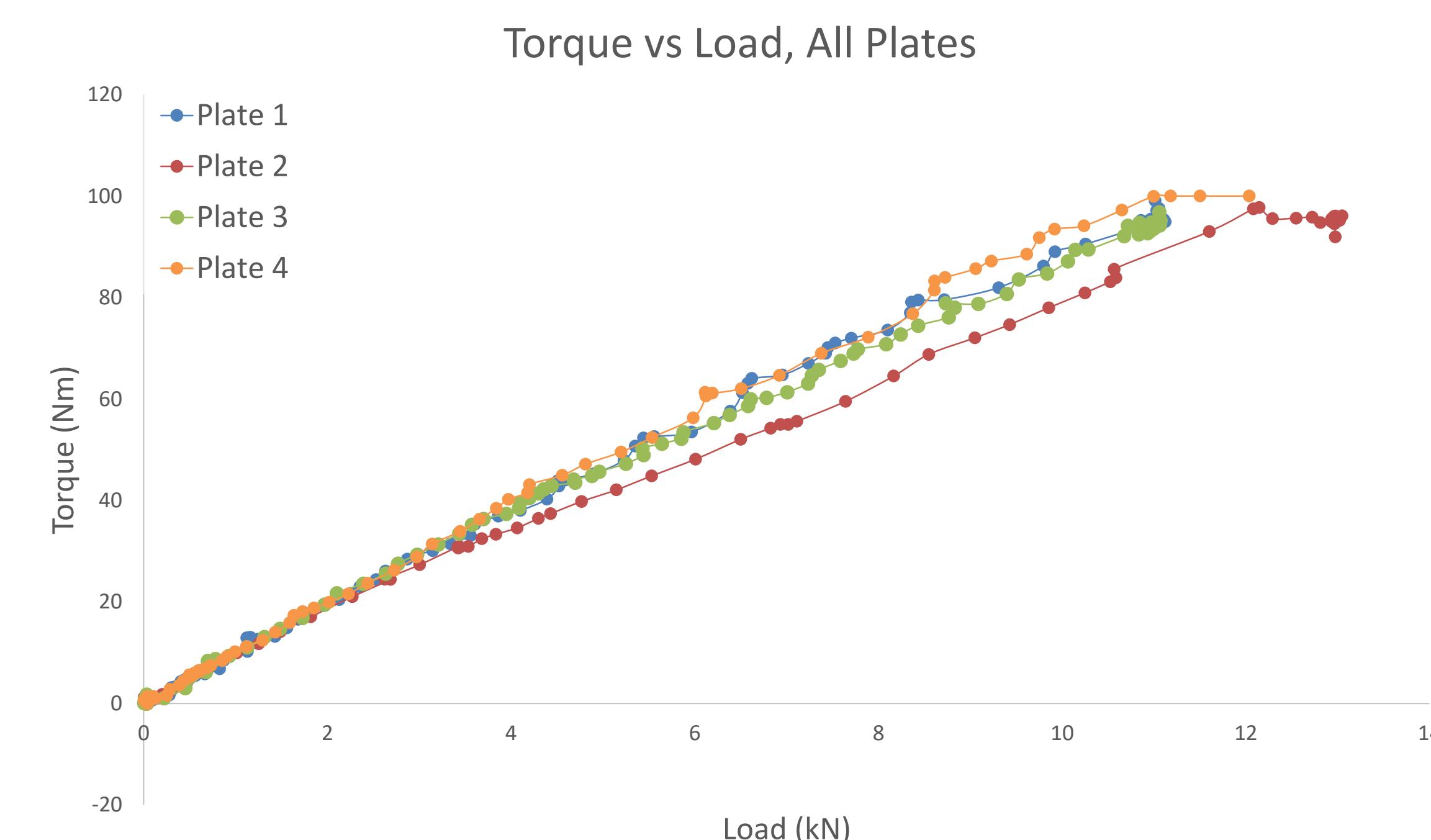
**Figure 6:** Cross-sectional view of clutch testing device.



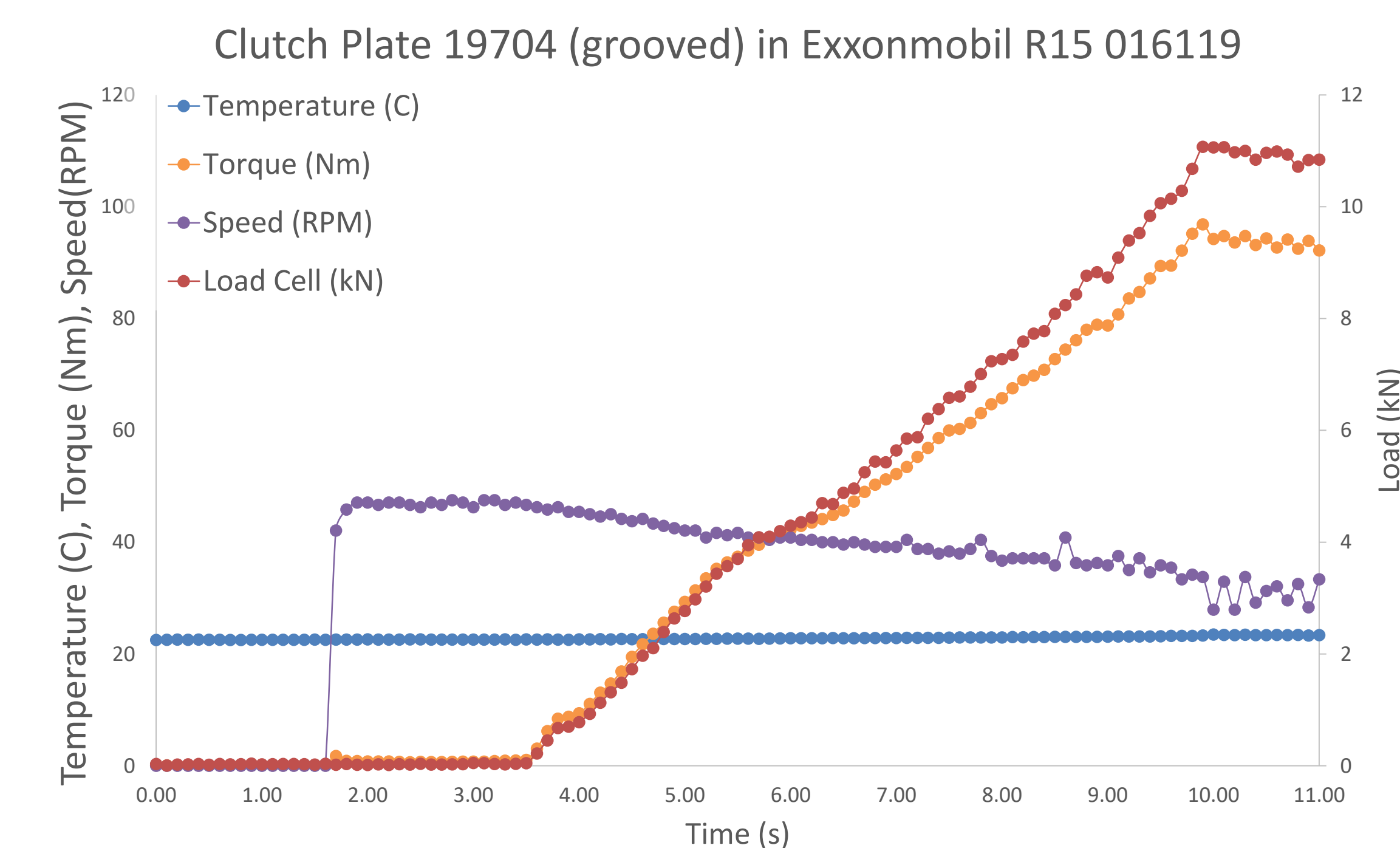
**Figure 7:** Torque sensor assembly.

## 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 7:** Comparison between torque from different clutch plates.



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