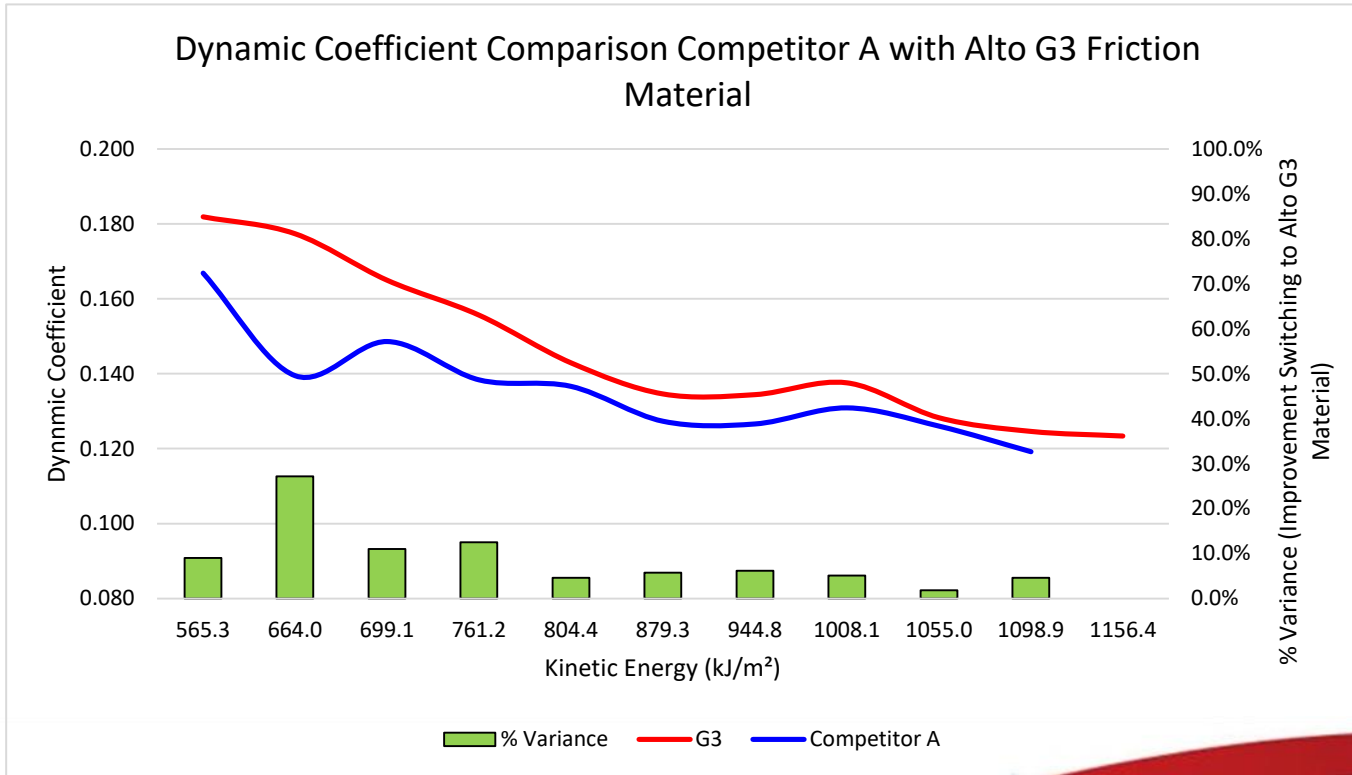


# Alto G3 Friction Material Test Criteria

- SAE Test Procedures: J2490  $\mu$ PVT, J2487 3,600 RPM Step Level, and J2488 6,000 RPM Step Level Testing, used to quantify the friction performance.
- Reviewed Parameters:
  - Dynamic Coefficient of Friction – Torque Capacity
  - Endpoint to Midpoint Torque Ratio – Shift Feel Characteristics (~1 or less)
  - Friction Material Wear (degradation as a function of Kinetic Energy)



# G3 Dynamic Coefficient

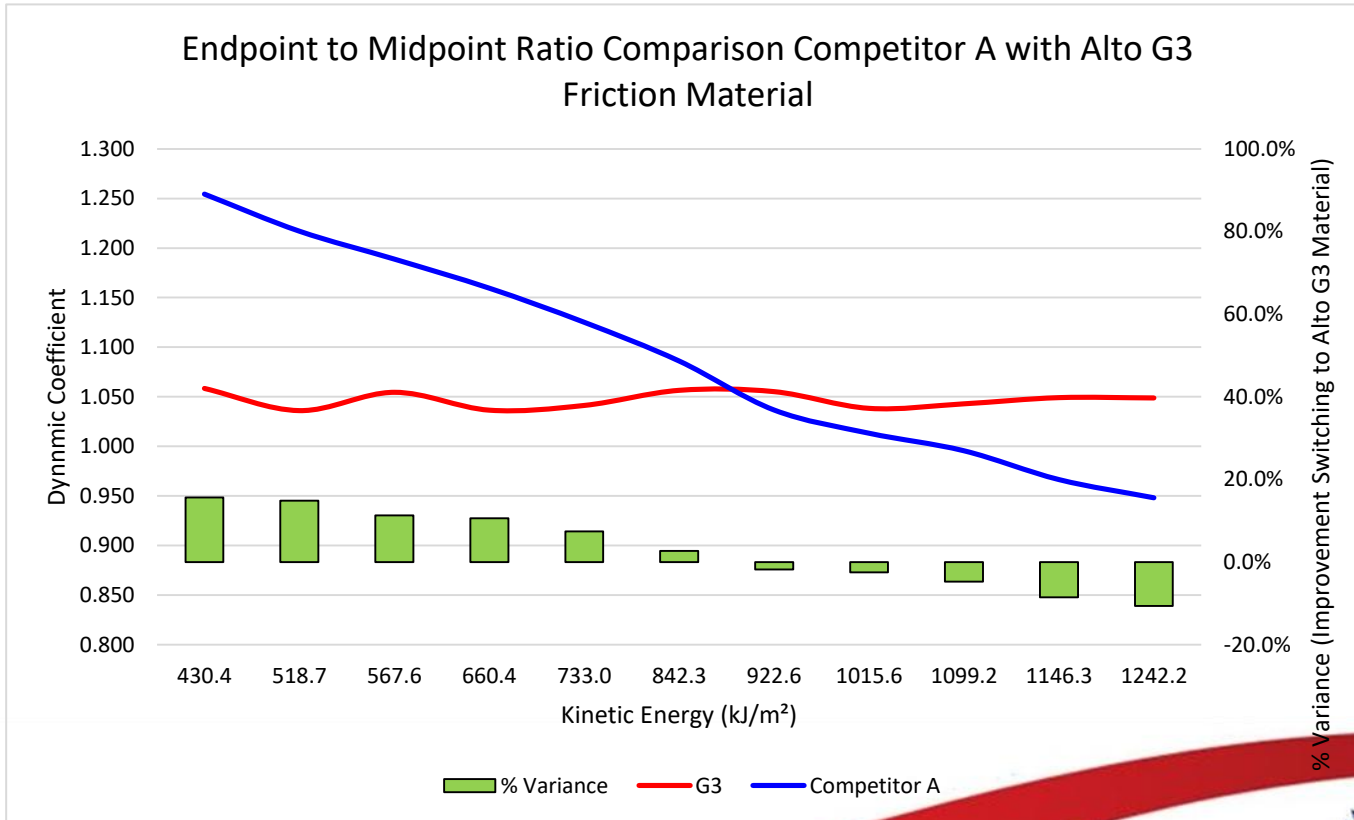


# G3 Dynamic Coefficient Results

- Alto G3 gives a higher dynamic coefficient throughout a large range of shift energies.
- The percent increases in coefficients are noted by the green bars at the specified energy levels.
- Alto's G3 friction material carries/transmits more torque across a broad range of energies.



# G3 End to Mid Torque Ratio



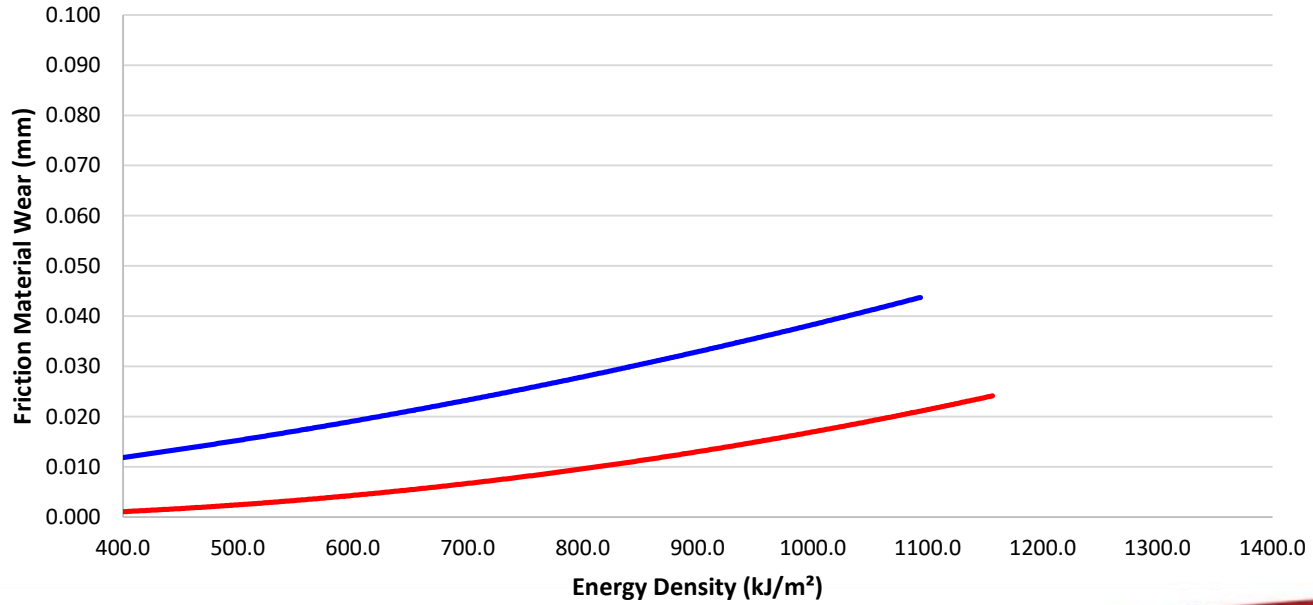
# G3 End to Mid Torque Ratio Results

- Alto G3 gives a more stable shift feel. Under heavy load, towing, or aggressive driving G3 provides a consistent smooth shift feel.
- The percent increases are noted by the green bars at the specified energy levels. Increased percentages are not favorable for shift feel.



# G3 Durability

Energy Comparison Between Competitor A and Alto G3 Friction Material



— Competitor A 1307 — G3 1308



# Results – Durability

- Horizontal (x) axis specifies the energy and the vertical (y) axis is friction material thickness loss.
- Alto G3 has less wear across all energy levels.
- Alto G3 has almost 50 % less wear.



# **Alto G3 Friction Material Results Summary**

- Higher torque capacity
- Improved shift feel, less noise, lower vibration (NVH)
- Consistent performance despite vehicle use (heavy load, towing, etc.) and driver style
- Higher Energy capacity
- Reduced clutch burn out

**Alto G3 is a superior material.**

