Parker Lord Force Feedback Device (FFD)

The next evolution in Steer-by-Wire (SbW) feedback

The converging trends of electrification and autonomy are driving OEMs to increasingly adopt Steer-by-Wire (SbW) systems in their vehicle product roadmaps. With SbW systems there is no mechanical connection between the steering wheel and road wheels, which has challenged OEMs in providing the operator with a high-quality steering feel. When combined with shrinking, and often aging, labor forces, providing a premium operator experience is paramount for OEMs and their end customers. The Parker Lord FFD enables highly responsive SbW systems, enhancing operator confidence. Further, our FFD provides an exceptional, low-effort, steering performance which boosts operator comfort and provides additional design flexibility to the OEM. The combined effects of enhanced operator confidence and comfort ultimately lead to increased productivity, improving the ultimate goal of both OEMs and end users alike, the bottom line.

Features & Benefits:

- **Active -** By combining our Tactile Feedback Device (TFD) technology with an electric motor, our new FFD provides the best of both worlds – offering smooth tactile feedback as well as active operator feedback features. The motor portion of our FFD enables these additional features through the ability to generate assistive torque in addition to the resistive torque provided by the TFD element. Specifically, the assistive torque provided by the motor facilitates features such as return to center, wheel buzz, and autonomous command following. Plus, due to the TFD and motor units working in harmony with one another, more effective steering torque can be a packed into a smaller space envelope.
- **Programable -** The ability to customize steering feedback responsiveness and features through software adjustments enables OEMs to create truly unique operator experiences – tailored to each machine type and end use application.
- **Safe -** Building upon the legacy of Parker Lord TFD's, our FFD is available with SIL2. Fail operational, dual isolated channels (2 sensors per channel) provides safety redundancy.
- **Smooth -** The TFD portion of our device provides feedback through our proven magnetically responsive (MR) technology. With torque feedback independent of speed and temperature, a wide variety of applications can benefit from the smooth and quiet steering feel.

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Relative qualitative comparison of cost and performance of common Steer-by-Wire (SbW) Feedback Devices

	Competition			Parker Lord	
	Sensor Bearing Only	Sensor + Friction Brake	Sensor + Stepper Motor	Tactile Feedback Device (TFD)	Force Feedback Device (FFD)
Proportional Torque Feedback	--	-	+	+++	+++
Feedback Control Fidelity & Smoothness	--	-	-	++	+++
Temperature Sensitive	-	-	++	+++	+++
Low Power Requirements	+++	++	-	++	+++
Device Size	+++	++	-	++	+++
Low Implementation Cost	++	++	-	+	++
Active Feedback	--	--	++	-	+++
Return to Center	--	--	++	-	+++
Advanced Features (rumble etc.)	--	--	++	-	+++

Not available (--), poor or limited (-), good (+), better (++), best in class (+++)

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Parker Lord
Engineered Materials Group
111 Lord Drive
Cary, NC 27511-7923
USA

Customer Support Center (In United States & Canada)
+1 877 ASK LORD (275 5673)
www.parker.com
Email: ParkerLordSupport@Parker.com

Parker | Lord

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