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# Position sensing advances

**M**uch has been written about the adoption and benefits of electrohydraulic systems in off-highway vehicles, and an equal amount of attention has been given to the sensor technologies needed to effectively complete those systems. In many cases, these sensors are inherently “behind the scenes,” both technologically and economically. All the same, the advancements in both technology and economics are helping to transform off-highway vehicles—and the pace of change is accelerating.

In the early 1970s the foundations of what is now **MTS Sensors** began with the development of magnetostrictive technology and its application in industrial position-sensing applications. These sensors are still known as Tempsonics, and although the fundamental principle of the sensing technology has not changed, the materials science, electronics design, and manufacturing methods have evolved dramatically.

In the mid 1990s, design engineers working for off-highway OEMs were increasingly looking for sensor technologies that could provide position feedback. Noncontact linear sensors were an obvious solution—except that the applications in the mobile world demanded higher operating temperatures, better EMC protection, higher shock and vibration performance, and fully integrated sensors inside the cylinder. In addition, the new cylinders were different and the price needed to be a lot lower. By the end of the decade, the first true sensors designed for mobile applications were finding their way into engineering field tests, and the evolution continued.

Technologically, the Tempsonics sensors designed for mobile hydraulics applications are now sufficiently advanced to meet or exceed the demanding environmental and sensing performance requirements of most mobile applications.

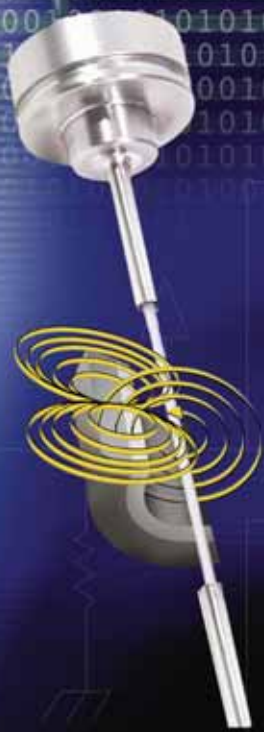
Engineers implementing closed-loop position control now have all the software, electronics, sensing technology, and hydraulic systems needed to accomplish off-highway applications that were not possible less than a decade ago. These first-generation mobile sensors were designed for installation completely inside the hydraulic cylinder, thus providing an extremely rugged and reliable solution in the harsh world of off-highway vehicles.

But like all businesses, the adoption of technology will not happen until the system costs drop to the point where the value added is clear and justifiable, and much of the attention in recent years has gone towards driving cost out of the equation. The benefits of design iteration, investment in manufacturing technology, and the knowledge that comes with accumulated production volume are clear—as costs, and thus prices to customers, drop precipitously.

Engineering prototypes of completely programmable sensors with built-in diagnostics are currently being tested in the off-highway industry. Electronics are being redesigned and reduced in size yet again, allowing for future integration of field bus systems in fully embedded designs. With each iteration, cost is driven down, allowing more applications to realistically use the technology.

To date, developing and implementing a completely redundant position sensor has been impractical due to cost and size constraints, but this will likely change.

What about wireless communications, Ethernet interfaces, direct Web access to sensor data, high-speed optical interfaces, and any other “futuristic” ideas? The truth of the matter is that much, if not all, of these things are achievable, but it is equally true that future applications will be determined by the needs of the market, just as those needs have brought us to where we are today. **OHE**



*Tempsonics position sensor.*