

MAXIMIZING Machine Efficiency with Hybrid Valve Technology

Hybrid valve technologies can help off-highway OEMs realize their equipment's potential by mixing modularity, precision and adaptability.

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The increasing complexity of off-highway machinery and the evolving landscape demand hydraulic systems that deliver optimal performance, energy efficiency and precision. Hybrid valve technology represents a revolutionary advancement for original equipment manufacturers (OEMs) looking to optimize their equipment's potential. By blending the modularity of cartridge valves with the precision and adaptability of sectional valves, hybrid valves provide unmatched precision, energy savings and operational versatility.

Design Synergy: Function vs. Application

Across multiple industries, each machine has unique hydraulic requirements, and hybrid valves offer greater versatility to meet those demands compared to traditional valves.

Cartridge valves offer significant flexibility in hydraulic system design due to their modular nature. Their modular design allows users to customize systems by adding or replacing individual valves without needing to modify the entire valve assembly.

This makes cartridge valves especially valuable in mobile equipment like excavators and plow trucks, where uptime is critical. Their compact design and easy serviceability also make them ideal for lower-flow applications, such as downforce control in seed planters to ensure consistent planting depth and improve crop yields, as well as in 3-way solutions for compact machines requiring precise control and space-efficient designs.

Sectional valves are comprised of several interconnected sections or "modules," each controlling a specific hydraulic function. Their biggest advantage is users can pack all this functionality into a compact package. Sections can be bolted together in a modular fashion, allowing customization and expansion. Sectional valves are designed to handle higher flow rates and higher pressures, making them well-suited for demanding applications where advanced functionality is required, such as controlling high flow steering circuits in mobile equipment like wheel loaders, where precision is crucial for safe operation.

Cartridge valves and sectional valves

are primarily hydraulic based, lacking the direct integration of electronic control. While they can provide high flow and reliable control, it can be challenging for them to adapt to changing system conditions in real time without external sensors or control units.

Hybrid Valve Solutions: Bringing The Best Of Both Worlds

Hybrid valve solutions combine the best core functions of cartridge valves with sectional valves and integrate multiple hydraulic functions and electronic controls into a single valve assembly. Fewer components and simplified integration reduce the complexity of the hydraulic systems, leading to easier installation and troubleshooting and less potential for system failure. Hybrid valve solutions also optimize space utilization in compact equipment, enabling high functionality without increasing the system's footprint.

While cartridge valves and sectional valves are effective for specific applications, hybrid valve solutions provide the best of both worlds, offering improved functionality, efficiency and adaptability for complex hydraulic systems in mobile equipment. In industries like construction or agriculture, where machine designs can vary greatly based on the specific task, hybrid valves can be designed to optimize performance, such as dynamically controlling fan speed based on engine temperature and reducing fuel consumption.

By combining the capabilities of hydraulic valves and advanced electronic control into one solution, hybrid valves maximize the benefits of cartridge and sectional valve designs to improve energy efficiency and performance in mobile and industrial applications.

Hybrid Valve Design Innovations

Hybrid valve technology addresses the unique requirements of various applications by combining distinct advantages of different valve designs. These systems feature an integrated electro-hydraulic architecture that enables seamless interaction between