

Directional valve offers best of both worlds

By Ken Korane | May 18, 2018

The new DPX-HS hydraulic directional valves from Walvoil, Reggio Emilia, Italy, are designed specifically for mini and midi excavator applications. Today, these types of machines typically rely on one of two possible hydraulic control techniques.

One uses load-sensing valves in combination with a load-sensing pump to provide precise control with calibrated and independent speed for each function. Thanks to its ease of use, it represents the best technology for non-professional operators and for the rental market. On the downside, however, machine reactivity and control smoothness can be less than optimum, especially on specific and delicate machine functions like slewing.

The second control technology uses open-center valves in combination with fixed-pump systems. It represents a simpler and more cost-effective design that offers excellent force sensibility and fast control, but requires high operator skills.

According to Walvoil officials, years of experience with both traditional technologies has led to this evolutionary development to better match the market's requirements. The new DPX-HS is said to significantly improve performance and ease of use in a cost efficient and compact fashion, in combination with two-pump (variable and fixed) systems.

The DPX-HS valve mates load-sensing/flow-sharing sections (specifically for boom operation) and open-center sections (specifically for slewing and secondary functions). The simultaneous use of two hydraulic technologies lets users benefit by drawing the main advantages from both. Boom



Walvoil DPX-HS directional valves combine open-center and load-sensing control.

operations are simple, intuitive, and totally independent from each other. Slewing functions are unaffected by the simultaneous use of the boom, and maintain independent control with smooth and soft starting and braking typical of open-center systems.

In addition, on mini-excavators where three or four simultaneous operations are common, it is easy to run into the problem of flow saturation. It results when the operator demands more oil flow than the pump can deliver. In such instances, because all spools have the same pressure drop across the metering areas, all flows are reduced proportionally. This lets the operator maintain control of all functions, although at lower speeds. The DPX-HS circuit can also autonomously share the fixed pump flow to boost boom operation.

The valve has a stackable design so many different configurations are possible. Users can take advantage of this construction, according to Walvoil, to perfectly match the needs of each specific machine. Any typical control is applicable to each section: from manual/lever actuation, to low-pressure pilot actuation, to electrohydraulic actuation in a compact and reliable design. Additional features like special hydraulic integrated circuits can be installed in the complete valve. All common excavator actions like travel control, regenerative arm, and lowering control can be implemented on the valve.

Because open-center technology is typically less expensive than load sensing, the possibility of changing some functions from load sensing to open center brings a general cost efficiency that can also be particularly desirable in some configurations. For instance, when sizing and designing the machine, it is possible to downsize the variable pump thanks to the contribution of the fixed pump and, in turn, reduce the total cost. And the two-pressure-step system given by the dedicated relief valve allows a better match with engine characteristics, thus resulting in careful power and consumption management.

Overall, the DPX-HS circuit can take advantage of the output of the two pumps, which results in fast and precise operations and higher productivity. Both professional and rental market operators can take the advantage of this solution. The slewing smoothness and independent control can drastically reduce operator fatigue, by better managing acceleration and deceleration phases. That also inherently improves safety.

DPX-HS valves currently come in three sizes with inlet flow ratings from 21 to 61 gpm, maximum pressures to 5,100 psi and ambient temperature ratings from -40° to 140°F. The system is available on 1 to 3 ton and 2 to 6 ton mini excavators, and 5 to 9 ton midi excavators. Different prototypes have been tested on hydraulic benches as well as on machines demonstrating the advantages of the combined technologies. Different projects with major OEM will begin shortly.

The range of Walvoil products includes not only main control valves, but also joysticks (both electronic and hydraulic), dedicated handles, feeding units, electronic controls, pumps and motors

and hydraulic integrated circuits. This complete system approach, according to the company, allows a better interaction between components and, as a result, improved machine performance.