

Counterbalance valve eliminates stalling

Sun Hydraulics Corporation

Where the operator controls the feed rate in a cutting circuit, as found in trenching chains, drills, grade trimming wheels or saws, he will typically try to adjust the rate to prevent stall. A problem with this solution is that when the cutting is easy, productivity is lost. The simple circuit shown in Figure 1 may be a better solution in which stalling is eliminated and optimum feed speed maintained.

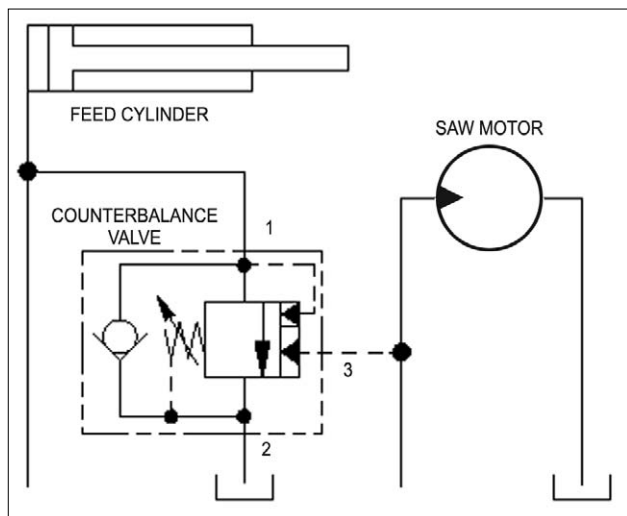


Figure 1. Incorporating a counterbalance valve in a cutting circuit can eliminate stalling and improve productivity.

Operating principle

A counterbalance valve is a direct-acting, pilot-assisted relief valve. Pilot assist at port 3 lowers the effective setting of the relief valve at a rate determined by the pilot ratio. Port 3 of the counterbalance senses the pressure at the cutting device or saw. Port 1 connects to the feed circuit and port 2 goes to tank.

When the pressure required to drive the saw starts to climb too high, the effective setting of the counterbalance is lowered. Feed force will be modulated by relieving the feed circuit to tank, thus preventing the cutting device from stalling.

Design notes

This circuit is all about pressure control as opposed to flow control. Pressure control allows large changes in flow with small

changes in pressure. The determining factor in this circuit is the pressure at the cutting device. Don't get too caught up in numbers. There are at least three performance curves involved and trying to predict exactly what will happen is difficult, if not impossible.

In order to serve this purpose, the counterbalance valve has to have enough capacity to handle the flow of the feed circuit. The counterbalance valve will probably need a low pilot ratio and a high setting.

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