

## Full Range Control Position Error Reduction

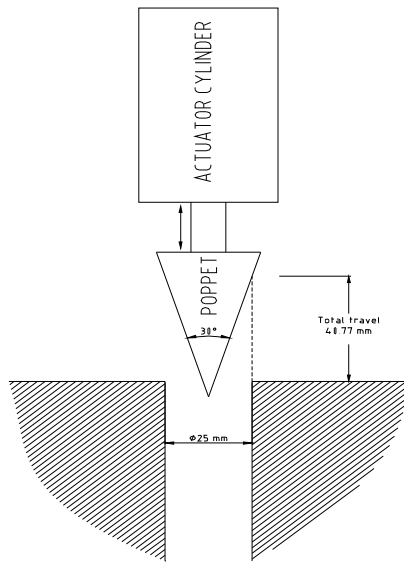
**Expro Engineering** valve actuators are able to provide accurate control of valve metering orifice in full valve travel range by reducing absolute position errors when the valve travel gradually reaches the valve close position.

Control valves actuated by most industrial standard actuators are subjected to large relative control position errors when a small metering orifice area is needed. The major reason is the actuators can only provide finite, near constant position errors.

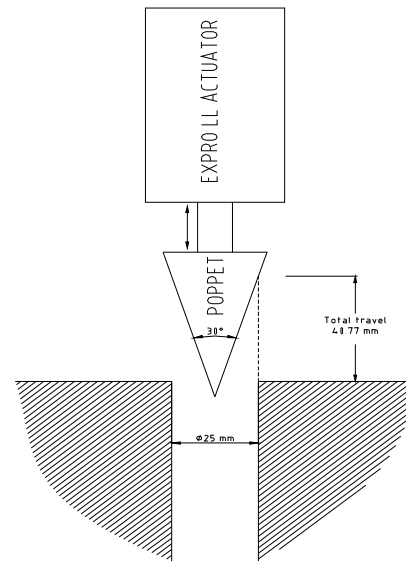
For example, a poppet valve with a conical 30° angle poppet and a sharp edge seat is actuated by a standard hydraulic cylinder actuator with 0.5 mm position error, the valve inside diameter is 25 mm, the valve travel is 40.77 mm. When the valve is full open, the relative position error is  $0.5 \text{ mm}/40.77 \text{ mm} \times 100\% = 1.2\%$ ; the metering orifice is  $490.9 \text{ mm}^2$  and the relative metering orifice error is 0.38%. When the valve travel is 2.48 mm from full close position, the relative position error is  $0.5 \text{ mm}/2.48 \text{ mm} \times 100\% = 20.2\%$ ; the metering orifice is  $49.2 \text{ mm}^2$  and the relative metering orifice error is 19.6%. When the valve travel is 1.00 mm from full close position, the relative position error is  $0.5 \text{ mm}/1.00 \text{ mm} \times 100\% = 50\%$ ; the metering orifice is  $20.1 \text{ mm}^2$  and the relative metering orifice error is 49.5%. See the red curves in figures 3 and 4.

If the same poppet valve is actuated by a standard **Expro LL** actuator with an input hydraulic cylinder of 0.5 mm position error, when the valve is full open, the relative position error is  $0.487 \text{ mm}/40.77 \text{ mm} \times 100\% = 1.2\%$ ; the metering orifice is  $490.9 \text{ mm}^2$  and the relative metering orifice error is 0.37%. When the valve travel is 2.48 mm from full close position, the relative position error is  $0.094 \text{ mm}/2.48 \text{ mm} \times 100\% = 3.8\%$ ; the metering orifice is  $49.2 \text{ mm}^2$  and the relative metering orifice error is 3.7%. When the valve travel is 1.00 mm from full close position, the relative position error is  $0.059 \text{ mm}/1.00 \text{ mm} \times 100\% = 5.9\%$ ; the metering orifice is  $20.1 \text{ mm}^2$  and the relative metering orifice error is 5.9%. See the blue curves in figure 3 and 4.

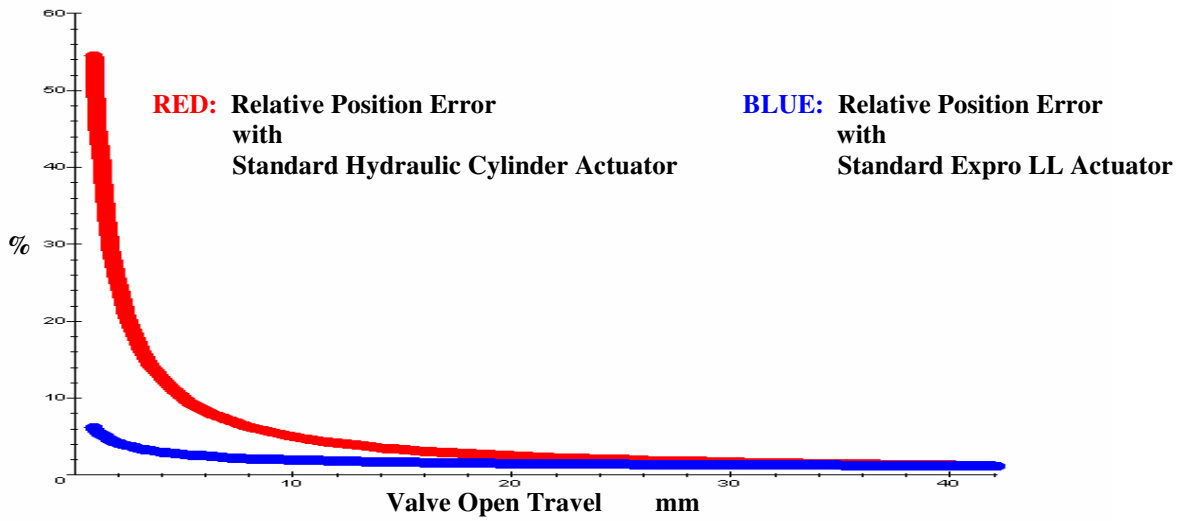
The advantage of using **Expro Engineering** valve actuators to regulate flow is obvious. They increase accuracy and rangeability.



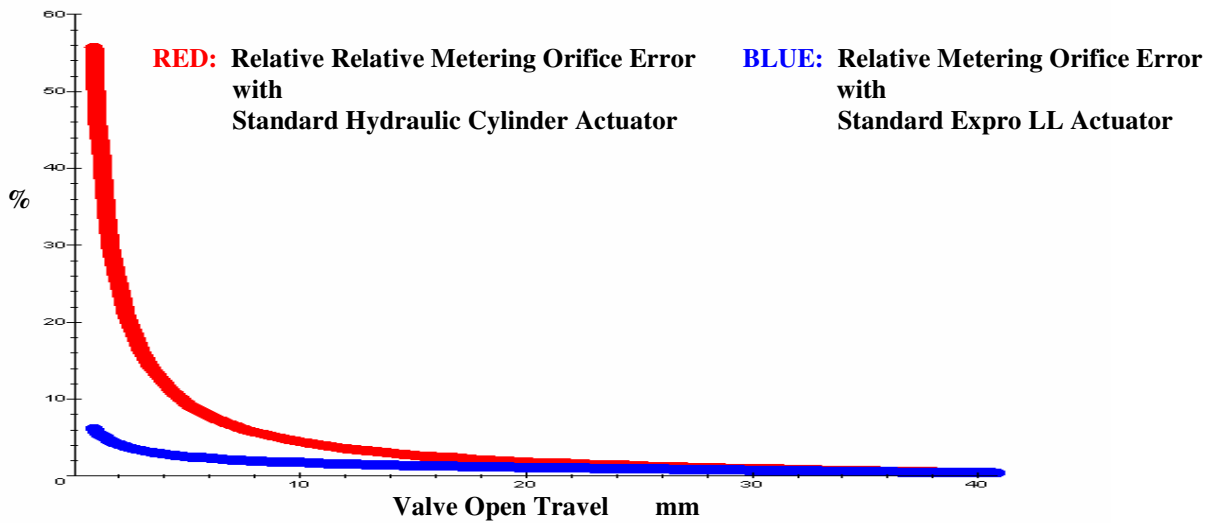
**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**