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POSITION CONTROL OPTIONS FOR SCISSORS LIFTS

A White Paper

When it comes to position control for scissors lifts, there are many approaches that can be taken. Choices range from the very simple to the very complicated and just about anywhere in-between. Of course intended use and requirements of the application often dictate the approach used. Starting from the simplest method and moving to the more complicated, I will explain briefly how these various options work.

One of the most simple position control options is the basic limit switch. It can be mounted easily and usually has an actuating arm that is adjustable for this type of application. Generally this switch is easy to adjust and provides reasonably accurate and repeatable performance. The wiring is not complicated and other electrical hardware is not needed. Limit switches are usually used for setting upper travel or lower travel limits. If an intermediate position is needed an additional limit switch can be used. This limit switch is usually set up for actuating at the desired location coming from one direction only, either going up or coming down. Part of the reason is there is a delay between when the switch activates and when it resets (called hysteresis). When actuating from two directions, hysteresis doubles and is then magnified by the length of the arm. When raising the unit, the switch is actuated as the arm swings up but when lowering, the switch is actuated as the arm swings down. There is a significant difference in platform position in this case, even with a switch that has a relatively short arm.

Similar to a limit switch, a proximity switch (sometimes called a proximity sensor) can be used for providing a way to signal when the scissors lift platform is at the desired position. Usually a proximity switch senses a steel target. Once set up, the accuracy and repeatability are very good. The down side is that most proximity switches cannot carry very much of an electrical load so a relay or PLC is required to act on the signal. Similar to the limit switch, the proximity switch also has to contend with hysteresis but the difference in platform position is less when sensing from both directions.

Photo eyes are another common method for sensing position. Besides the photo eye itself additional electrical hardware is also required. In addition an appropriate reflector is required for this sensor to work. And as with the other solution devices before it, hysteresis is present.

Stepping up into the realm of continuous position feedback, the next in complexity is the angle sensor. By measuring the rotation of the scissors lift's legs, the lift's platform position can be determined. Of course additional electrical hardware is a must. In the case of Advance Lifts' Angle Sensor Positioning Control System (patent pending) a PLC is what is used. This is a custom system that is not easily retrofitted to existing equipment in the field, but it can provide moderately accurate and repeatable performance throughout the lift's range of motion.

At the next tier of sophistication, accuracy is increased further. Here either a draw wire transducer or a linear displacement transducer (LDT) is used as the position feedback device. The reading can be direct or indirect and final position is provided by a PLC. In this case, reading where the lift platform is located is not enough. The speed of the unit is also a factor in accurately controlling position. The accuracy and repeatability of this system is very good for a standard scissors lift. This type of system is excellent for sheet feeding or palletizing applications.

With the basics discussed above, special cases of position control can also be provided. Synchronizing two lifts to move up and down together accurately and consistently with varying loads can be a challenge. By using transducers, speed control and programming, synchronizing two to four scissors lifts for special applications has been accomplished. The load does not have to be evenly spread between the units for the system to work correctly. Accuracy is maintained regardless of the load distribution between the lifts.

Where slightly less accuracy can be tolerated, a hydraulic synchronization system can tie two units together so they act as one and at a fraction of the cost of a transducer system. This system has the same features as the one above.

Position control systems can get even more complicated than the ones described here. And as complexity increases so does the cost. Such systems can easily exceed the cost of the lift to be controlled. The systems described above range from inexpensive to moderately expensive. In all cases they are factory installed for a clean look and optimal performance.

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