



Active Leveling Control Technology with Hydraulic Presses

In an attempt to offset decreasing margins and increased competition, today's manufacturers are driven to consolidate processes, minimize operator error and reduce material scrap. In order to thrive in these conditions, manufacturers must push for a greater emphasis in technology. One of the most popular advances in hydraulic press technology is the utilization of Active Leveling Control. ALC counteracts the negative effects of off-center loading, significant breakthrough shock with high strength steels and reverse shock loading associated with the use of nitrogen in dies.

1. What is Active Leveling Control?

Active Leveling Control (ALC) utilizes closed-loop control for each corner of the press ram, keeping the bed and ram in parallel and reducing shock. Presses equipped with ALC utilize a high speed motion controller, linear transducers and proportional valves to synchronize the press actuators. The 32-bit multi-axis high-speed motion controller provides less than 1 msec control loop time

Active Leveling control for bed-to-ram parallelism is offered in either 2 or 4 axis depending on the application. Two-axis control provides either left to right, or front to rear parallelism. For users requiring both left to right and front to rear parallelism, four-axis control is recommended.

2. How does Active Leveling Control impact off-center loading?

While Off-Center loading may be beneficial, or needed in the manufacturing process, it can cause unwanted issues to arise within the press, dies and overall application. Poor part quality & inconsistency, premature tool wear, and detrimental stress on the press structure are all likely to occur if the press has not been properly designed to handle an unbalanced load.

The most common cause of off-center loading is due to the geometry of the part not being conducive to an even load. Many applications do not apply the load evenly over the press bed and can wreak havoc on a press or tooling. Other challenging Off-Center Loading processes include progressive dies and the desire to consolidate multiple operations (and multiple dies) into a single machine. Many presses, especially those with large beds and/or small tooling, can also be improperly loaded due to operator error, creating additional alignment problems.





A properly engineered ALC system will protect the press structure and tooling while decreasing maintenance costs. Processes that historically could not be unified in a single press are now being efficiently combined and properly executed with the integration of the ALC system. This enables companies to displace multiple presses and save valuable floor space. The ALC technology is paralleled by servo mechanical presses but offers more flexibility at a significantly reduced price.

3. How does Active Leveling Control decrease the effects of breakthrough shock?

The tremendous breakthrough shock associated with blanking advanced high-strength steels causes challenging issues which are minimized by Beckwood's ALC system. The high-speed controller senses the acceleration of the ram during breakthrough and adjusts the axis control valves to restrain the ram all while remaining parallel. This greatly reduces the effects of the breakthrough shock and improves the life of the press and die.

4. How can Active Leveling control be engineered to handle reverse shock loading?

Beckwood's ALC system also features a unique solution for applications using dies with nitrogen springs. Although sometimes critical to the die, nitrogen springs can cause issues that need to be compensated for in the press system. Nitrogen is typically engineered into dies for blank holding, shock control or compensation for load distribution. Traditional springs are dynamic and offer resistance to compression and constant extension force. New nitrogen systems can be engineered with dampening controls to minimize the affects of extension forces once compressed.

In traditional applications, as the press retracts, the up-acting force from the nitrogen springs can cause reverse loading shock in the press. In many applications nitrogen springs are used to balance off-center loads. While this works well in the down motion of the press ram, it can wreak havoc in the retract motion of the ram.

Beckwood's ALC system goes beyond controlling just the down or extend portion of the press cycle and controls the retract portion of the press cycle. The controlled retraction maintains bed to ram parallelism in unbalanced nitrogen systems and allows for smoother decompression by utilizing programmable distance on the upstroke. Once the ram has retracted past the nitrogen stroke, it can be placed safely into a traditional open loop fast-retract mode.

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