

## Ask the Expert

The Ask The Expert column will give readers the opportunity to have their valve concerns addressed, find out the answers to their pressing valve challenges and ask for feedback on application issues. If you have a questions that you need answered, please feel free to contact [s.bradley@kci-world.com](mailto:s.bradley@kci-world.com) with the email subject: Ask The Expert.

If you are an individual with extensive valve expertise that you believe the Valve World readership could benefit from, please contact our Editor-in-Chief to become a future featured Expert.

This month our Expert is Phil Mahoney - Manager of Research & Development, Stationary – A.W. Chesterton.



### Q What is 'Live-Loading' and what does it do?

**A** Compression packing in a valve stuffing box relies on a pretty basic mechanism. Tightening of the packing gland bolts creates an axial force on the packing gland which results in radial expansion of the packing. This expansion of the packing creates the seal between the packing, the stuffing box bore and the moving stem. In addition to the seal created between the packing and the stem and bore, this force also compresses the packing rings together, thus minimizing the possibility of leakage through the packing rings. The ultimate result is a tight seal which keeps the process fluid from escaping the valve while allowing the stem to actuate and valve to control flow. That applied force on the packing is critical to the sealing capability of the valve; the loss of the load created when tightening the gland bolts leads to increased leakage. Live-Loading is basically the application of springs to maintain compression on the packing longer than the current system allows. The stored energy from the springs is much greater than the stored energy from the bolts alone. The springs maintain a more constant stress on the packing set which in turn translates to a tight seal for a longer duration between adjustments.

There are a number of different designs for Live-Loading that you may

see. Some systems are mounted internally in the stuffing box with a coil type spring fitted at the bottom of the stuffing box; this is typically seen where V-ring packing is used and lower compression loads are used/required. For most other applications, the use of stacked sets of disc springs on the packing gland bolts is common (see picture); various designs are used to keep the springs aligned with some able to provide a visual indicator as to whether or not the applied load has changed. In some cases, the disc spring stack may be mounted over the stem with a special gland design preventing the springs from contacting the moving stem, thus preventing damage to the sealing surface; this design reduces the number of springs required per valve overall, but may take more time to install depending on the valve design and is not typically capable of being installed a field retrofit.

### Q What are the benefits and drawbacks to using it?

**A** Compression packing relies on the load applied to the gland to maintain a tight seal. Live-Loading is designed to maintain that load for a longer period, thus reducing overall leakage from the valve as well as the number of gland bolt adjustments required over the packing's service life. The added energy from the springs helps counter the effects of wear/consolidation of the packing that can occur during normal cycling of the valve. It also helps maintain a tight seal in applications that are subject to high vibration and/ or temperature cycling. Temperature cycling can be difficult to handle in valves because of the different thermal expansion & contraction rates between the stem, stuffing box and packing materials; this difference can cause significant decreases in the load on the packing. Yet another useful capability of live-loading that is externally mounted is that it allows the end-user to have a visual indication of changes in load on the packing which can be a benefit for the maintenance team when walking down a system to adjust the valves' packing glands as needed.

### Q Where should I apply this technology?

**A** While Live-loading could certainly be a benefit on many valve applications, the costs and time to implement have to be weighed against those benefits. Live-loading is generally not necessary on on-off valves where cycling is infrequent, or in applications that operate under steady state conditions. It is most often utilized in high cycling valve applications (control valves), in valves with frequent temperature swings (e.g. batch processes) and in safety related applications where the valve has a critical role in operations. It is also an option for valves that are in hard to reach areas where adjustments to the packing glands are difficult to do (i.e. in areas where scaffolding or other means is needed to reach the valve).



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