WORLD CEMENT®

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Twist and Spout

Kevin Peterson, Vortex Global, explores the important features of telescoping loading spouts.

Introduction
Behind only water, concrete is the second most consumed substance in the world. Cement, one of the main ingredients of concrete, is produced worldwide, with China, India, and the US being listed as the top three producers. Production figures for 2017 reveal that China produces 2.4 billion metric tpy, India 270 million metric tpy, and the US 86 million metric tpy.

Currently, there are 104 cement plants located in 34 US states. These plants manufacture and ship product, typically by rail car, to 362 US cement terminals, where the product is loaded into containerised trucks that are destined for their local customer base. One can only imagine just how many plants and terminal facilities exist worldwide.

Typically, a telescoping spout is utilised as part of the cement loading process. When considering the purchase and use of a telescoping loading spout, being cognisant of certain product features can be the difference between utter frustration with failing tools or well-designed equipment that provides reliable operation with favourable life cycle costs.

External sleeve
One of the main advantages of a telescoping spout is the ability to deposit cement directly into the rail car or truck opening, without the worry of cement dust escaping into the atmosphere along the pathway between the holding bin and the transport vehicle. Fixed hoppers, chutes, or socks do not offer this protection.

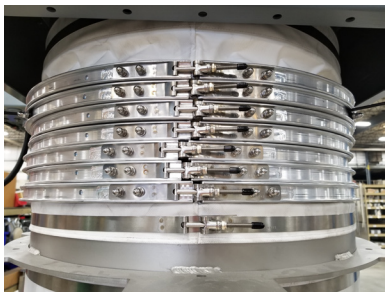
With the telescoping spout, a flexible external sleeve encompasses the material pathway. The sleeve extends and retracts as the spout is correctly positioned above the loading hatch. Sleeves are available in a variety of materials, which are chosen to address the compatibility and service conditions of the product being handled. The sleeve protects both the material from the environment and the environment from the material.

Stacking cones
The cones that the material flows through (within the sleeve) are typically made of various grades of abrasion resistant steel, stainless steel, or polymer. It is important to ensure that they are properly matched to the type of material being handled and its abrasiveness.

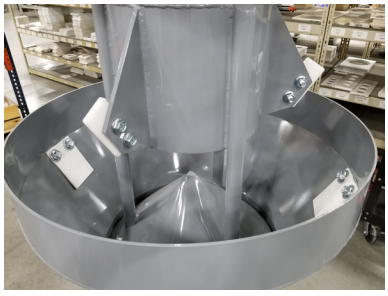
Support rings
Support rings ensure the straight, even stacking of the retracted sleeve. Typically, an inner sleeve ring and an outer sleeve ring will be bound together, trapping the sleeve fabric between them at selected intervals. Many manufacturers drill through the rings and sleeve to bind the rings together with blind rivets. This practice can result in contamination of the product if a rivet should break. Since the sleeve material has been penetrated, it can also facilitate tearing or damage to the sleeve material over time. Plant managers should consider a spout that utilises support rings clamped on the sleeve rather than riveted together.

Self-sealing discharge
A self-sealing discharge can be added to a spout. This is particularly useful in applications where it is desirous to keep fine material within the confines of the spout while it is retracted from the loading hatch of the transport vehicle. As the spout scavenger seats into the open hatch, the interior mechanism of the discharge continues to extend into the interior of the transport vehicle. This action unseats the dispersing cone, allowing material to flow freely through the scavenger. Upon loading completion, the spout is retracted and the seal is once again created.

An extended spout. Both the material and the environment are protected by the external sleeve.



Stacking rings assist in the straight, even stacking of the retracted sleeve. Clamping rings are preferred to riveted support rings.



An interior look at self-sealing discharge.

Cable lifting system
The majority of the telescoping spouts on the market today offer a two or three cable lifting system. With this system, major problems occur if a cable breaks due to excessive wear, or if a cable is damaged due to a transport vehicle moving prior to the spout being retracted. In either case, unexpected downtime is created for both the supplier and the transporter, as the spout cannot be operated until maintenance personnel fix the broken cable.

A four cable spout provides better stability. If one cable was to sustain damage, the spout could still be operated until there is sufficient time to repair the damaged cable. The result is that maintenance can be performed at a more opportune time.

Cable lift pulleys
Cable pulleys are the culprit of many spout maintenance issues. Firstly, the typical lift pulley contains a 'sharp' edge and, as the cable spools in and out of the pulley, that sharp edge creates premature wear to the individual wires of the cable. Over time, the cable will eventually wear through and break. Once this happens, an immediate cable replacement will be required to keep a two or three cable spout in operation. Comparatively, with a four cable hoist system, the spout will remain operational until the broken cable can be replaced.

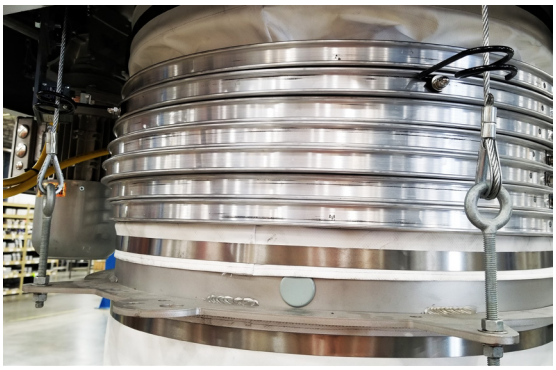
Another common issue with lift pulleys concerns the width of the pulley opening. If the width is not sized exactly to the diameter of the wire cable, the cable will wind onto the pulley instead of overlapping itself, becoming bound between the previous cable wrap and the side of the pulley. This creates additional wear to the cable; more importantly, it also creates slack within the cable (the technical term for which is backlashing) as the spout is lowered and the cable unwinds from the pulley. The slackened cable has a propensity to 'jump' the confines of the pulley before wrapping around the pulley shaft. If this should happen, the loading process must be suspended until the cable is freed from the shaft.

Cable pulleys that are correctly sized and machined with radius edges are essential for optimum spout reliability.

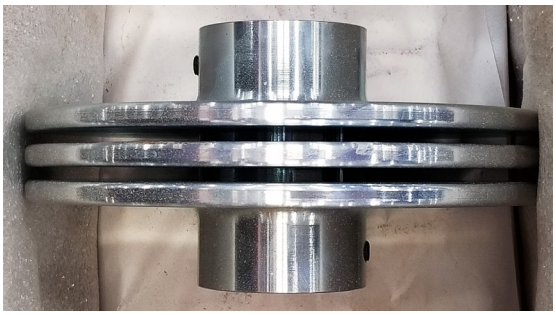
Drive motor
It is important to make sure that the drive motor that operates the hoist system contains a braking system. Without this feature, the lifting cables have a tendency to become slack while the spout is being extended into place. Backlashing can also occur, which causes the cable to 'jump' the pulley and become wrapped around the pulley shaft. Once again, this creates additional maintenance issues.

Some companies offer the motor brake as a standard component, while others consider this to be optional equipment. However, this feature should not be overlooked when considering a new spout or a spout replacement.

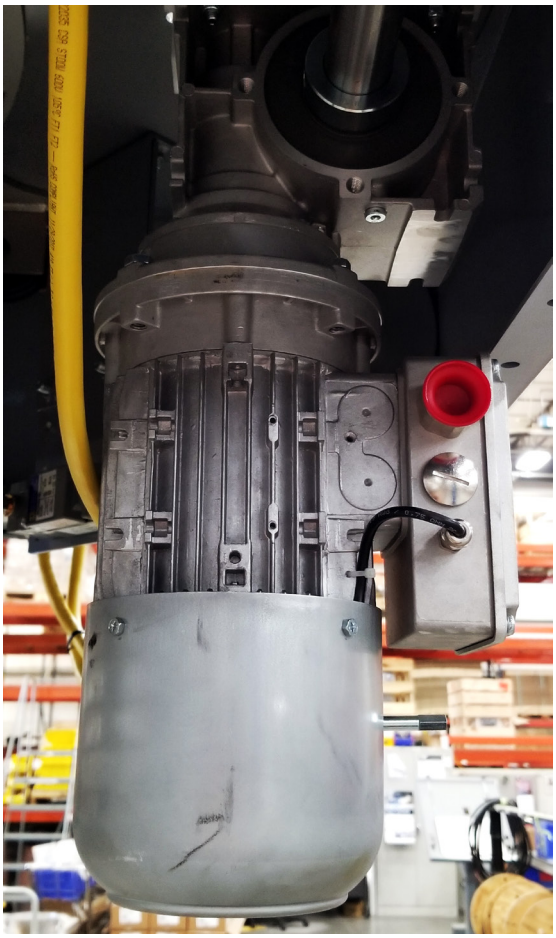
Dust collector vs filter
In addition to environmental concerns, studies have confirmed a correlation between exposure to cement dust and the health of employees involved in the cement industry. Respiratory issues, including asthma, bronchitis, and pneumoconiosis, are linked to cement dust, as well as eye and skin irritation. Not only does cement dust that travels the pathway between a holding bin and the transport vehicle need to be contained, the dust created at the point of entry into the transport vehicle must also be captured and eliminated from the plant environment. This process can be accomplished by means of a dust collector or filter.



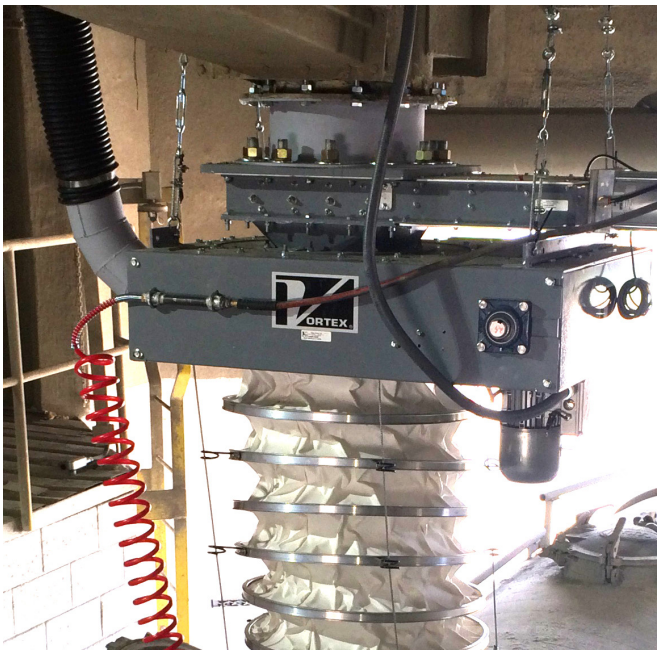
Lifting with four cables, as opposed to the use of just two or three.



Computer numerical control machined pulley with a smooth, radius edge.



Drive motor with integrated brake.



Main frame equipped with an outlet that exhausts dust to a dust collection system.

A dust filter allows captured dust to be re-entrained back into the load.

Most spouts are designed with a clean air centrifugal fan, which is used to create negative air suction. This draws the dust created at the loading point up through the spout (in the open area between the cones and the outer sleeve) to the main frame. The main frame of the spout contains an outlet connection where the dust can be exhausted to a dust collection system and later removed. In this manner, dust created during the loading process is evacuated from the loading area.

Some manufacturers offer a filter system for the dust. Instead of using a dust collector to gather and get rid of the dust, a filter located above the spout temporarily traps the dust drawn upwards through the spout. High-pressure compressed air is periodically used to clean the trapped dust and deposit it back into the material flow stream. The dust is re-entrained back into the load and sold as product, which adds profitability to the process.

Other features

While the elements presented in this article are the 'main features' of telescoping loading spouts, there are also other features available. These include the following:

- Tilt probes – these signal that the vessel is full to the desired level or trigger an automatic raise feature.
- Discharge skirt – flexible strips of rubber that help to contain fugitive dust in an open loading configuration.
- Vibrator – this helps to clean residual dust lodged within the spout before the spout is retracted.
- Pendants – a hand-held device that allows control over the operations of the spout.
- Spout positioner – a separate piece of equipment installed above the telescoping spout. It allows for the positioning of the spout without having to reposition the transport vehicle.

Taking that bit of extra time to review and understand the features of a telescopic loading spout will pay significant dividends in the future.

About the author

Kevin Peterson is the Business Development Director for Vortex's Titan Products Division. He has created and shared many articles that address material handling issues for various industries that deal with the handling of dry bulk materials.