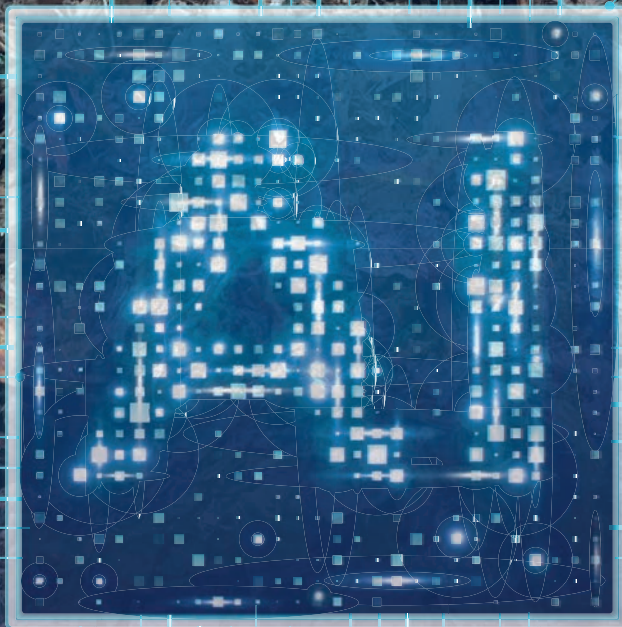


WORLD CEMENT

December 2024



High quality alternative fuels

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LEVELLING UP LOAD-OUT OPERATIONS



John Stanton, DCL, explores how cement plants can maximise efficiency and enhance dust control in load-out operations.

Throughput is a crucial determinant of profitability for cement plants and terminals, and inefficiencies – particularly in loading rate and dust control – can significantly degrade performance. While load-out configurations vary across railcars, trucks, ships, and barges, the core equipment used in these processes remains similar.

Efficient load-out requires a holistic approach, where equipment works in concert to quickly position the loading spout, load the material, and capture and reintegrate dust into the material stream. This creates an optimised load-out solution that leads to improved performance and streamlined operations. This article explores the

importance of integrated load-out system design, emphasising seamless coordination, minimising downtime, enhancing safety, and



DCL truck loading spout and compact filter module.



A barge loading system transfers aerated cement at a high loading rate for efficient bulk handling.

maximising profitability for bulk material handling operations.

Maximising load-out efficiency with integrated loading spouts

Below, a comparison of DCL's enclosed vehicle and open vehicle loading spouts will identify which type best suits different job requirements and how integration within a load-out operation leads to greater efficiency.

Both open and enclosed loading spouts feature an internal stacking mechanism with product control flow cones made from urethane or abrasion-resistant steel. The diameter of the loading spout opening directly impacts the volume of material being loaded. A larger spout is required for barges, ships, or pile loading in order to handle higher product volumes. In contrast, a smaller diameter spout is more appropriate for truck and railcar loading, where lower flow rates are being transferred.

Open and enclosed loading spouts can connect to a freestanding dust collector or an inline filter module with a vent-through design, maintaining a clean loading environment, minimising additional product handling, and creating an integrated load-out system.

Load-out systems for trucks and railcars

Compact loading spouts are invaluable in height-restricted spaces, making them well suited for rail and truck loadouts where available space is limited. DCL's loading spouts can be customised for both open and enclosed truck or train loading applications and are maintenance-friendly. With an average loading rate capacity of 500 tph, they can fill trucks in five minutes or less. The use of a three-cable machined pulley system enhances stability and minimises the risk of misalignment. This setup is often combined with an inline compact filter module (CFM) for dust control, as well as a single or dual-axis positioner. These positioners allow flexible spout positioning directly at any point needed, reducing the need for precise vehicle alignment and improving operational efficiency.

For truck and rail loading applications requiring minimal movement, single- and dual-direction loading positioners offer an efficient solution, allowing 2 – 6 ft of movement along either axis to support a wide range of load-out operations. However, when larger coverage is needed, articulating arm positioners (APA) offer the flexibility to span areas up to 20 ft x 60 ft. These positioners allow operators to move the spout horizontally across multiple locations, making them ideal for loading open trucks and railcars, as well as ships and barges.

Load-out enhancements for high-capacity loading

Open vehicle loading spouts are ideal for loading ships and barges. These spouts are capable of handling dusty materials at loading rates of up to 6000 stph. While enclosed vehicle loading spouts feature a tapered cone discharge to seal into a hatch during loading, open vehicle loading spouts utilise a dust suppression skirt (or deadfall) attachment for effective dust control. Open vehicle loading spouts are designed with an outer flexible sleeve and rubber skirt to effectively contain dust emissions during loading. Each spout has a rugged drive train and a three-cable lifting system for stability. The inner cones control product flow and are available in various materials to meet application needs. Level-sensing probes at the spout discharge monitor the product pile and automatically raise the spout as the pile height increases, ensuring precise and dust free operation. When material must fall a great distance, additional dust suppression is essential. DCL offers two solutions to achieve this goal:

- ▶ The 'DeadFall' is a specialised discharge attachment, housed in a unit featuring suppression rings to lessen product turbulence at the discharge. Product plug relief doors reduce potential plugging situations and act as a safety feature. This design enables efficient handling of various



An articulating arm positioner integrated with a DCL loading spout designed for loading multiple vehicle hatches without requiring repositioning of the truck or railcar.

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material at high loading rates with minimal dust.

- ▶ The 'H-style deadfall' discharge is a modification of the original deadfall design, engineered specifically for handling extremely dusty materials like aerated cement, where open-vehicle loading requires effective dust control. The design incorporates an inner slitted rubber skirt and an outer weighted barrier skirt, both attached to the discharge loading spout. This design enables velocity suppression, with the inner skirt containing material on impact, while the outer skirt provides secondary dust control to capture material drifting from the spout – making the H-style deadfall discharge ideal for open loading.

Seamless dust control integration

The DCL CFM works in tandem with loading spouts, adding an essential layer to create a cohesive load-out system. It is commonly paired with a loading spout for efficient truck and rail car loading. The CFM utilises built-in, inline filtration that captures dust at the source using dust-tight seals and reverse airflow. It is attached to the upper part of the spout and deposits collected dust back into the material being handled. The product flows through a central flow tube and is isolated from the upward dust-entrained airflow.

The CFM can also function as a bin vent in spaces with limited headroom by removing the flow tube. The inline filtration system utilises pleated, smooth, spun-bound filter media. During loading, dust accumulates, forming dust cakes in the pleats of the media. To prevent clogging, brief high-pressure air pulses cause the filter to expand, breaking apart the dust cakes, returning the dust to the material flow, and sending it back down through the spout and into the material pile. This system maintains high levels of filtration performance while minimising waste and eliminating the need to handle the product a second time.

The CFM's exhaust fan is integrated directly into the assembly, removing the need for remote fan placement. This design allows for lower internal air velocities than traditional setups, increasing the filtration media efficiency. At the same time, a pulse jet system continuously cleans the filter elements during operation, ensuring consistent performance and minimal maintenance while maintaining an integrated load-out operation.

The CFM features tool-free filter replacements, using small, easy-to-install cartridges perfect for tight spaces where larger baghouses are impractical. Designed with safety in mind, it includes

convenient thumbscrews for quick access, allowing faster filter changes and inspections without entering confined spaces, all while working in unison with a loading spout.

Enhancing loading efficiency with real-time video integration

To enhance truck loading throughput at cement plants and terminals, DCL developed the vision system, a technology that integrates live video feeds into the loading process. This system enables drivers and operators to precisely align trucks under the spout, improving safety and efficiency. Unlike traditional security camera systems that have video delays, the vision system uses high-speed, real-time video, ensuring smooth and accurate positioning every time. Equipment integrated with the vision system reduces the need for constant repositioning by allowing drivers to align trucks correctly on the first attempt, minimising human error and preventing equipment damage. It also enhances communication between the driver and operator, streamlining the entire process.

In busy cement plants and terminals, avoiding misalignment helps reduce the risk of injury and costly wear on the spout – a crucial element in sustaining productivity and expediting truck throughput in the plant. Vision system-equipped products help safeguard plant efficiency and profitability by minimising downtime and protecting equipment. The vision system's most advanced feature, the DCL patented Smartloader™ enables fully automated, unattended loading, removing the need for manual intervention from drivers and operators – setting a new benchmark in bulk material handling efficiency.

Conclusion

Bulk-loading applications have varied requirements, making a one-size-fits-all solution impractical. Since 1981, DCL has adapted loadout solutions to meet specific needs and achieve reliable results. The solutions above highlight some of the ongoing advancements in the bulk-loading industry. Cost cutting-edge technologies such as these are essential for companies looking to improve efficiency, boost safety, and reduce costs, while driving long-term profitability and streamlining operations. ■

About the author

John Stanton is a Marketing Specialist at DCL Inc. in Charlevoix, MI, where he works to expand DCL's presence and drive growth within the bulk material handling industry. He earned his bachelor's degree from Emerson College.