The Importance of Transloading Efficiency

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As the popularity of transloading continues to grow, operators may consider sliding vane pump and gas compressor technology for low maintenance costs and high energy efficiency.

Transloading is the practice of transferring products between modes of transport, whether from refinery to terminal, terminal to supplier, supplier to storage facility or supplier to end user. The products that are typically transloaded can run the gamut from liquid chemicals and petroleum products, to animal fats and vegetable oils, to raw and semi-finished commodities such as grains and dairy products.

The modes of transport include marine, pipeline, rail, air and truck. Goods, whether raw or finished, rarely travel directly from their source to the end user.

The focus of this article will be the transloading of products or raw materials from railcar to truck. Transloading allows shippers and their customers to enjoy many of the cost benefits of rail transportation without having a rail siding at their door, which can be an expensive proposition, and for many companies, a physical impossibility.

In most instances, a transload facility operator, third-party logistics company or transportation broker facilitates the transloading for both the shipper and the consignee. These companies coordinate truck and rail connections and frequently offer inventory management and facilitate storage and delivery.

The main objective of transloading is to place the goods as close as economically possible to the point of final processing, packaging and consumption. Therefore, transloading can occur at any location at which a truck can pull up to another truck or a train.

In a typical transaction, a bulk shipment moves by rail to a transload facility where it is offloaded with specialized pumping equipment that has the necessary operational characteristics to handle the specific product or material. The bulk product can then be scheduled for delivery in smaller quantities to the consignee for further processing or delivery directly to an end-user.

Some advantages of transloading are:

- Quick response to replenish inventories
- Transportation costs kept to a minimum
- Accelerated turnover and reduced inventory costs

Since transloading requires the handling of the goods at different points in the supply chain, there is an inherent risk of damage or the loss of expensive materials that could potentially harm the environment or personnel. Shipping vessels must also be completely cleared of product during the transloading process.

With all these factors considered, it is imperative that the proper equipment be used during the transloading process. Proper pumps and compressors are needed, especially for the transfer of chemicals, petroleum products, animal fats, vegetable oils and other liquid commodities.

The Challenge

Transloading has grown rapidly in recent years, so much so that it now has its own trade association. The Transloading Distribution Association—TDA (www.transload.org)—West Linn, Ore., represents the interests of the transloading industry as it relates to business and political leaders, while positioning transloading as the preferred method for efficient distribution of product in the 21st century. Currently, the TDA has more than 200 members throughout the U.S., Canada and Mexico.

As mentioned, the main challenge for shippers is moving their products in the safest manner while also minimizing the risk of costly and environmentally damaging product spills. Recently, however, economics have played an

Operators at this chemical distribution/storage terminal facility transload hydrogen peroxide from a railcar to a transport via a sliding vane pump.

increasingly important role in a shipper's decision to move product via a transloading operation. These economic pressures have come to bear in the form of driver and equipment shortages, record high fuel costs found in long haul trucking and increased demand for shipping capacity.

A producer relying on long-distance trucking to service a set of customers faces many difficulties. The most significant is the likelihood of empty cargo holds on return trips, in addition to the need for a large fleet of trucks to ensure service frequency.

Adopting a transloading operation can allow these shippers to rely on a smaller fleet of trucks that travel shorter distances, which may also allow them to make several deliveries per day. A transloading facility can also offer a large number of value-added incentives for the shipper, including storage, blending, packaging, consolidated invoicing, combined product shipments, bar-coding and labeling.

For shippers who are considering a switch from a single transportation mode to transloading, some useful benchmarks can help guide the decision. A main consideration is whether the product's travel distance is great enough to make the cost of transloading worthwhile.

As a transloading general rule, 300 miles is the differentiation breakpoint for transloading. This is about the distance that a long-haul trucker can safely and efficiently travel in one day. Another thing that should be taken into consideration is the transportation and handling costs associated with trucking and transloading.

In a true bulk-transport transloading operation, a shipper can often ship four truckloads of product on a railcar while paying about the equivalent of only two-and-a-half truckloads.

Currently, according to the TDA, approximately 650 transloading terminals are in the U.S., with more planned for the future. The TDA forecasts double-digit growth in throughput by its members through 2015. The average number of available railcar positions per transloading facility is 50.

If these estimates are correct, then more than 32,000 tank cars can be unloaded at any one time. Granted, that full capacity will probably never happen, but these numbers do offer an idea of the potential size of the market.

Using these estimates and assuming only a 60 percent use factor, each facility would require three to five pieces of off-loading equipment to keep up with demand. At the lowest level, that would be almost 2,000 units on the ground.

While transloading may make sense for a shipper, both economically and logistically, the world's most efficient transloading operation will not function successfully if the pumping and compressor equipment for the transloading process does not work effectively.

This transloading application features compressors transferring LPG from railcars to transports.

The Solution

Fortunately for shippers who are implementing transloading operations, an easy solution is available for their product-transfer needs—sliding vane pumps and reciprocating-gas compressors. Sliding vane pumps and compressors used in transloading operations must be highly energy efficient and eliminate many of the maintenance concerns that are inherent in these pumps and compressors.

The sliding vane technology makes these pumps ideal for transloading applications. These pumps are self-priming, designed to run dry for short periods and their high suction makes them ideal for line-stripping. They are available in cast iron, ductile iron and stainless steel models with special elastomers that make them compatible with the handling of many products.

For self-loading trucks, the pumps come with port sizes to 4 inches and have maximum working pressures up to 175 psi (12.1 bar). They can reach speeds of 1,200 rpm with both PTO and hydraulic drive capabilities.

For transloading applications that involve stationary and portable onsite pumps, by manifolding the railcars, the flow rates are limited to the receiving capacity of the system. Some sliding vane pumps are also available in sealless designs for applications that require zero shaft leakage.

The vanes in a sliding vane pump move freely into or out of slots in the pump rotor. When the pump driver turns the rotor, centrifugal force, rods and/or pressurized fluid causes the vanes to move outward in their slots and bear against the inner bore of the pump casing, forming pumping chambers.

As the rotor revolves, fluid flows into the area between the vanes when they pass the suction port. This fluid is transported around the pump casing until the discharge port is reached. At this point, the fluid is squeezed out into the discharge piping.

This simple pumping principle, which has been an industry standard for more than a century, allows sliding vane pumps to handle numerous products safely and efficiently. Among these are:

- Clean, non-corrosive industrial liquids and petroleum products
- Liquids ranging in viscosity from thin solvents to heavy oils
- Hazardous fluids
- Biofuels
- Non-lubricating solvents to highly viscous liquids or abrasive slurries
- Corrosive or caustic fluids
- Inks, paints and adhesives

Like the sliding vane pump, some reciprocating-gas compressors have been designed with liquefied gas transloading operations in mind. A compressor draws vapor from the storage vessel and boosts the pressure into the top of the railcar. The increased pressure in the railcar and slightly decreased pressure in the storage vessel results in a pressure differential between the two tanks that will easily push the liquid from the railcar to storage.

The result is fast and quiet liquid transfer with no NPSH or cavitation problems. These compressors are equipped with high efficiency valves, ductile-iron cylinders, self-adjusting piston rod seals and other robust features.

Some specialty compressors not only evacuate a railcar or truck tank, but they can also recover vapors, which is similar to adding 3 percent capacity to every load. They are designed to handle transfer and recovery of propane, butane, liquefied petroleum gas (LPG) and anhydrous ammonia. Compressors can handle the transfer and recovery of carbon dioxide, refrigerants, sulfur dioxide, chlorine, vinyl chlorine, natural gas, nitrogen and other gases.

If the sliding vane pumps and compressors are portable, the option may be available for shippers and operators of

storage facilities to create moveable skids that allow the pumps and compressors to be moved around a facility to perform transloading operations.

These transloaders can be placed between two railcars on a siding if product needs to be pumped out of one and into another or positioned between a truck and railcar to facilitate the transloading process.

For an example of how effective a transloading operation can be, consider the case of Seeler Industries. Seeler operates the 3 Rivers Terminal in Joliet, Ill. This 100-acre facility features 17 storage tanks and 15 blend tanks. It has become one of the Midwest's leading storage facilities, handlers and packagers of hydrogen peroxide, along with other industrial liquids such as caustics, amines, glycerin propylene, glycol and chemical de-icers.

The 3 Rivers Terminal is served by seven truck-loading racks and 42 railcar-unloading positions. These racks and railcar positions enable Seeler to offer transloading services to its customers. To optimize its transloading options, Seeler installed a series of sliding vane pumps, which were chosen for this application because their stainless-steel construction makes them compatible with the chemicals, solvents, caustics, sulfates and acids that the terminal handles on a regular basis.

To increase its transloading options, Seeler also had a sliding vane pump mounted on a portable cart that is moved wherever it is needed in the facility.

Conclusion

While transloading in some form has been around since the age of steam engines and horse-drawn tank wagons, it has seen a marked resurgence during the past decade.

According to some estimates, the volume of transloaded cargo has grown by 50 percent since 2000. This increase in transloading coincides with the realization by many shippers that the cost and efficiency benefits of this multimodal approach to moving products in bulk can have an extremely positive effect on their bottom lines.

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