RIGHT TOOLS FOR THE JOB

PUMPS • TERMINALS ARE STILL BEING DESIGNED AROUND PUMP CAPABILITIES RATHER THAN OPTING FOR PUMPS THAT MEET THEIR NEEDS, ARGUE JOSH PEPPER AND MICHAEL MOORE

THE GLOBAL BULK liquids storage business has grown rapidly in recent years, with data from TankTerminals.com pointing to a doubling in total capacity since 2009. Despite that, terminal engineers are being hampered by an attachment to centrifugal pumps, which are estimated to be in use at three-quarters of all terminals in critical fluid handling applications.

This article argues that there is an alternative – positive displacement (PD) screw pumps – that can offer better performance in many applications in terms of versatility, reliability and efficiency.

CENTRIFUGAL LIMITS

Because of the success of centrifugal pumps in transferring liquids at very high flow rates and volumes, the fluid transfer systems at terminals have been designed around the pumping technology, rather than the other way around. This means that engineers are familiar with centrifugal pumps and then attempt to work within their operational limits. They know how centrifugal pumps operate, know their benefits and are confident that they are still the best technology for all their fluid transfer needs.

Operators must take care to ensure that the centrifugal pump is operating on what is known as its 'Best Efficiency Point' (BEP). This is the point at which the centrifugal pump is working at its highest level of efficiency. Centrifugal pumps rarely operate at their exact BEP because pristine pumping conditions are rarely realised, but a centrifugal pump that is functioning in a window between 80 and 110 per cent of its BEP is said to be functioning adequately.

However, when the pump moves too far off its BEP uneven pressure will be applied to the impeller, which can result in increased radial thrust that will cause the pump's shaft to deflect. When this deflection occurs, higher loads will be placed on the bearings and mechanical seal, which can lead to damage to the pump's casing, back plate and impeller. Ensuring operation at the BEP can be a time-intensive task as the pump must be monitored constantly and adjusted, which costs time and money.

What this can easily lead to is a situation in which the operator treats the fluid being handled with heat in order to keep its viscosity below 300 cSt and allow the pump to operate within its BEP range. But what they are doing in this instance is reconditioning the fluid to fit the pumping technology – irrespective of the cost impact.

Operators have become used to this way of working, making the popularity of centrifugal pumps something of a self-fulfilling prophecy.

WHAT THE TERMINAL NEEDS

There are, though, other considerations that the terminal operator needs to take

into account when deciding on the most appropriate pump technology. These include:

- The varying load requirements and different flow rates that need to be delivered across the terminal on any given day.
- Intermittent operations that call for quick, multiple starts with minimal line priming.
- Varied shipping media with differing fluid handling characteristics.
- The need for effective stripping of transport and storage vessels to maximise deliverable working volume while managing gas entrainment without the threat of pump shutdown due to vapour locking.
- Meeting strict cycle times regarding incoming and outgoing shipments, with any delays or shutdowns resulting in the incurrence of prohibitive charges or financial penalties that can reduce the terminal's profitability.
- The risk of an explosion due to static charge build-up during filling cycles.

As mentioned, the solution to the operational disadvantages of centrifugal pumps can be positive displacement (PD) screw pumps. The difficulty in expanding the penetration of screw pumps in liquid terminal settings is not only overcoming the strong customer familiarity with centrifugal pumps, as evidenced by their sizeable installed base, but in getting design engineers to acknowledge or even become aware that there are alternatives like screw pumps.

Simply put, many engineers are not taught about screw pumps in their studies, and many who are may have a preconceived notion that they are nothing more than lube pumps capable of handing only low flow rates. In reality, today's screw pumps can handle much larger flow rates, with flow ranges from 220 gpm (833 l/min) to 11,000 gpm (41,635 l/min) not uncommon.

In addition, PD pumps are better at handling high viscosity fluids due to their design and arrangement. The operating principle sees opposed screws engaged to form a sealed cavity with the surrounding pump casing. As the drive screws turn, the fluid is shifted and steadily and constantly conveyed to the discharge port of the pump, which creates a volumetrically consistent flow rate regardless of the pumping pressure.

BLACKMER IS AIMING TO CONVERT MORE TERMINAL OPERATORS TO SCREW PUMP TECHNOLOGY

BLACKMER SOLUTIONS

Blackmer, one of the leading providers of industrial pumping technologies, has developed the S Series line of screw pumps, specifically to make PD technology available to bulk liquids terminals and other industrial users. For terminal applications, Blackmer recommends its Twin Screw With Timing Gear (WTG) and Triple Screw models.

The Twin Screw (WTG) pumps have been designed with external bearings and a timing gear transmission, which produces double suction, self-priming operation with no metal-to-metal contact between the pump's internal components. This design helps the Twin Screw (WTG) pump achieve the highest flow rates of any rotary PD pump, even at varying backpressures and viscosity levels.

In fact, the deliverable flow rate of a PD screw pump, unlike a centrifugal pump, actually increases as the fluid's viscosity increases. These design characteristics also make screw pumps suitable for all types of transfer applications, including low- or high-viscosity, lubricating or non-lubricating, neutral or aggressive, and clean or contaminated fluids.

The Triple Screw pumps are made to handle clean lubricating fluids without solid content across a wide range of viscosities, temperatures and pressures. They are designed with a male drive spindle, two female secondary spindles and a case that contains the screws, which allows the fluid to move smoothly and continuously in an axial direction from suction to discharge. This method of operation delivers smooth, constant product flow with low noise and high levels of energy efficiency.

Both models feature no metal-to-metal internal contact, with optional double mechanical seals available as a way to eliminate an ignition source and to safeguard against process fluid discharges. The result is a safer pump for site personnel, the terminal, surrounding communities and he environment. HCB

Blackmer is a product brand of PSG®, a Dover company. More information on its line of pumps and compressors can be found at www.blackmer.com.

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