Pumps Built for Chemical Compatibility, Part 1

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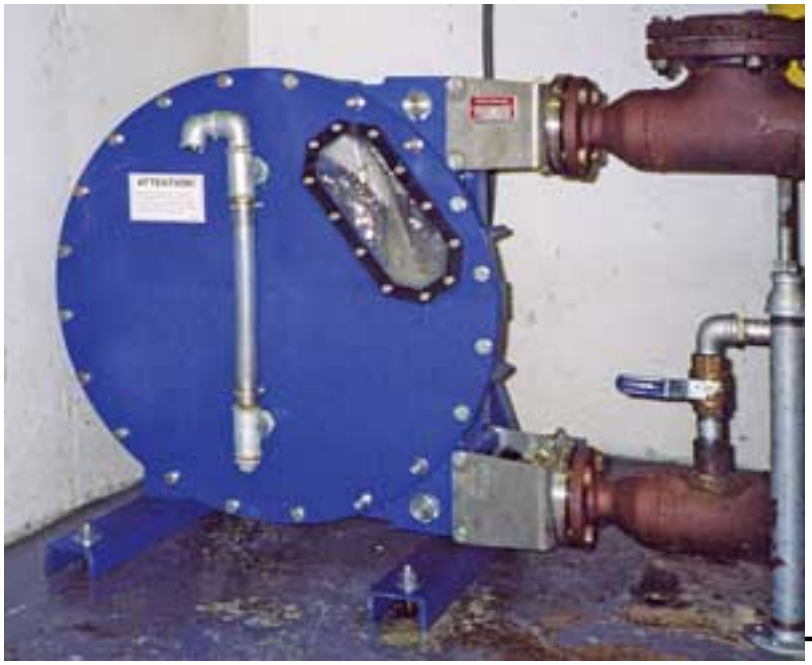
It’s far from hyperbole to say that chemicals help make the world go round. In fact, the chemical industry enables the conversion of a wide array of raw materials into more than 70,000 different products, many of which people around the world use on a daily basis. This reliance on chemicals and the products that they help produce has made the chemical-processing industry a €2.4 trillion ($3 trillion) behemoth, which accounts for nearly 10 percent of all global trade. With a compound annual growth rate of nearly 8 percent, it’s also safe to say that chemicals will continue to be a fulcrum in the global economy well into the future.

Thanks to its sheer size, the chemical industry features a number of sub-sets, each of which holds its own unique manufacturing, transferring, transporting and handling challenges. Among the most critical chemical applications are the ones that involve the use of dangerous chemicals, those that — if mishandled — can pose a palpable threat to production-facility personnel and the environment. Therefore, dangerous chemicals, which are classified as being highly corrosive, toxic or potentially explosive, require cautious and vigilant handling.

In addition to cautious handling, the sheer volume of chemicals that need to be produced in order to meet global demand also requires a production process that can reliably and consistently meet production quotas. This means identifying and incorporating a pumping technology that not only is compatible with the myriad types of chemicals, dangerous or not, that are being manufactured and used at one

time, but also one that can meet the unwavering demands of product flow and volumetric consistency.

This white paper will highlight why one type of pumping technology — positive displacement peristaltic (hose) pumps — can rise to the challenges inherent in the manufacture, transfer, transport and containment of many of the world's unique chemical configurations.



The Challenge

The design and operational characteristics of peristaltic (hose) pump technology, which was patented in 1925 in France, make it a wise choice in a wide range of chemical-handling applications — from moving viscous and/or abrasive slurries to the transfer of water-thin, non-lubricating fluids and shear-sensitive materials. These characteristics make peristaltic (hose) pumps ideal for the full array of diverse operations within the chemical-processing industry.

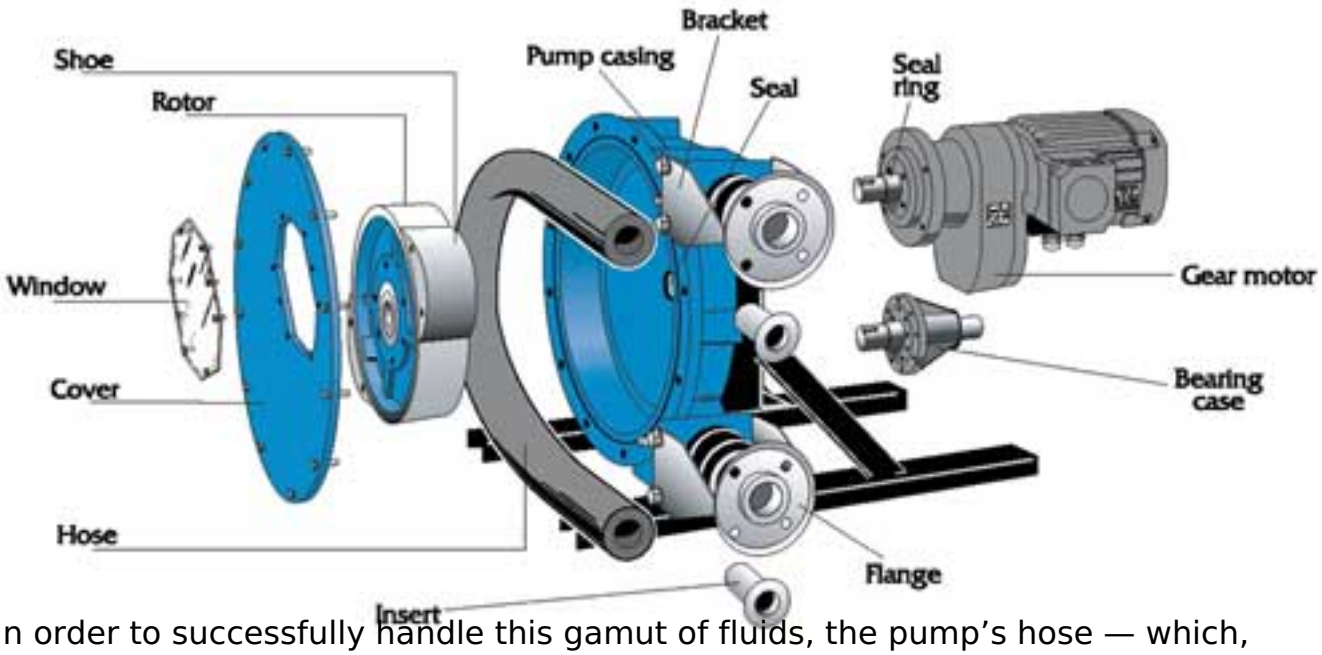
Peristaltic (hose) pumps satisfy the requirements of such a wide range of chemical applications because their operation is based on the alternating contraction and relaxation of the hose, forcing the contents to move through the pump and into the discharge piping. A smooth-wall, flexible hose is fitted in the pump casing, and is squeezed between shoes on the rotor and the inside of the pump casing. This rotating action moves the product through the hose at a constant rate of displacement. The hose restitution after the squeeze produces an almost full vacuum that draws the product into the hose from the intake piping. The pump casing is lubricated to cool the pump and lengthen the service life of the shoes and hose. Since the product only contacts the hose and not the internal pump components, this pumping technology is very suitable for abrasive and corrosive applications.

This pump style also maintains excellent volumetric consistency, making it ideal for the strict dosing applications that can be found in chemical processing. The pump's seal-free design makes it dry-run, self-priming and low-slip capable, and eliminates

any potential leak or contamination points while simultaneously providing superior suction lift. Finally, peristaltic (hose) pumps are easy to operate and easy to maintain. The pump's reversible operation also allows for pumping in both directions.

However, while peristaltic (hose) pumps can be a workhorse in chemical handling, concerns regarding the pump hose's chemical compatibility are ever-present. For example, these are just some of the diverse chemicals that a peristaltic (hose) pump may encounter during its operational life:

1. Sodium hydroxide.
2. Sodium hypochlorite.
3. Cyanide solutions.
4. Calcium hydroxide.
5. Sulfuric acid.
6. Catalytic agents.
7. Plating solutions.
8. Solvents.
9. Resins.



In order to successfully handle this gamut of fluids, the pump's hose — which, because of its seal-less design, is the only component to actually come in contact with the pumped medium — needs to achieve the highest level of chemical compatibility, while also being able to reliably deliver the millions of pumping cycles that are required during its lifetime.

Another consideration when selecting a hose material is its "fatigue resistance." This trait defines how resistant to failure the hose material is as it runs through its millions of pumping cycles. A hose material that is susceptible to developing cracks and holes relatively early in its operational life is not as desirable as a material that can reliably handle the demands of the repeated contraction and relaxation of the hose. The reinforcement construction of the Abaque hose and its use of rubber

compositions that have been specially designed for the stresses within the peristaltic hose allow for the optimum life cycle and performance.

Please tune into Friday's Chemical Equipment Daily *for part two of this two-part series. For more information, please contact Meijer at +49.151.6283.5979 or* johannes.meijer@psgdover.com *[1], or visit www.psgdover.com* [2].

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