

Peristaltic Pumps in Paint & Coatings

ABAQUE™ SERIES PERISTALTIC (HOSE) PUMP TECHNOLOGY, FROM PUMP SOLUTIONS GROUP (PSG®), PROVIDES MANUFACTURERS WITH LEAK-FREE, VOLUMETRICALLY CONSISTENT PRODUCT TRANSFER

By Johannes Meijer



As paint and coatings manufacturing becomes more and more complex, facility operators are turning to Abaque™ Series Peristaltic (Hose) Pump technology (inset) to handle a wider variety of components, all of which possess their own unique handling characteristics.

Anthropologists and historians have determined that the first paints were used in primitive cave drawings 30,000 years ago—and for most of the ensuing 30 millennia their basic composition was relatively unchanged. It is only in the past 20 years, actually, that most of the major changes in the paint-and-coatings industry have taken place. Among these changes are new low-solvent and solvent-less coating technologies that reduce the emission of volatile organic compounds (VOCs), which leads to safer working conditions for the painter, as well as a reduced impact on the environment. These advances in paint-and-coatings formulations and application techniques have made them an even more reliable component for use in applications as varied as traffic markings, battleship hulls, dollhouses and aluminum cans.

Despite the recent technological advances in the industry, the actual definition of paint and coatings remains much as it was hundreds of years ago: “a group of emulsions

generally consisting of pigments suspended in a liquid medium, such as oil or water, for use as a decorative or protective coating.” After all these years, paints still fall into one of two general categories:

- Latex-based paint is a general term used for water-based emulsion paints made with synthetic binders such as 100% acrylic, vinyl acrylic, terpolymer or styrene acrylic, providing a stable emulsion of polymers and pigment in water
- Oil-based paint is a paint that contains drying oil, oil varnish or oil-modified resin as the film-forming ingredient.

However, with new, safer, easier-to-use paint-and-coatings formulations within the latex-based and oil-based subsets constantly being developed, the manufacturer must rely on pumping equipment that can effectively and reliably handle these new media, while maintaining compatibility



Paint and coatings manufacture is one of the world's most important industries, one that relies on pumping technology that can handle many different types of liquid components with the old formulations. 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 and containment of many of the world's unique paint-and-coatings 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 paint-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 paint-and-coatings industry.

Peristaltic (hose) pumps satisfy the requirements of such a wide range of paint-and-coating 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 are required in paint-and-coatings production. 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.

While peristaltic (hose) pumps can be a workhorse in paint-handling, they must be able to nimbly and reliably handle the four basic paint components:

- **Pigments.** These are finely ground particles or powders that are dispersed in paints to provide color hiding ability and bulk. Pigments are divided into two subsets: prime, which provide whiteness, color and hiding ability, extender, which provide bulk that can enhance sheen, scrub resistance and color retention.
- **Binders.** These components “bind” the pigment together, which provides added adhesion, integrity and toughness to the dry paint film.
- **Solvents.** Also known as the “carrier,” solvents are low-viscosity, volatile liquids that provide a medium to get the pigment and binder from the container onto the surface that is to be painted.
- **Additives.** Additives are low-level ingredients that provide specific paint properties, such as mildew resistance, defoaming, and good flow and leveling.



Abaque™ Series Peristaltic (Hose) Pumps possess the operational versatility to reliably handle a wide array of fluids in paint-and-coatings manufacture, from viscous slurries to water-thin liquids.

In order to successfully handle this gamut of paint components, the peristaltic 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 material 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, especially when particulate-laden liquids are being pumped. The reinforced construction of the peristaltic 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.

The Solution

While peristaltic (hose) pumps can be a reliable component in the optimization of paint-and-coatings operations, one specific pump brand has risen above the competition to be a top choice among paint manufacturers—Abaque™ Series Peristaltic (Hose) Pumps from Dover Corporation's Pump Solutions Group (PSG®). PSG was formed in 2008 and has grown to become a global corporation with world-class facilities in the United States, France, Germany, India and China.

Abaque Series pumps feature a seal-free design that eliminates leaks and product contamination, which enables them to handle the paint-and-coatings industry's toughest pumping applications, from abrasive and aggressive fluids to shear-sensitive and viscous materials. The pumps, which can run in either forward or reverse, are self-priming and offer suction-lift capabilities to 9 meters (25.5 feet), as well as the ability to run dry continuously without adversely affecting the pump's performance. Ductile-iron and steel construction lets

the pump produce discharge pressures as high as 16 bar (232 psi).

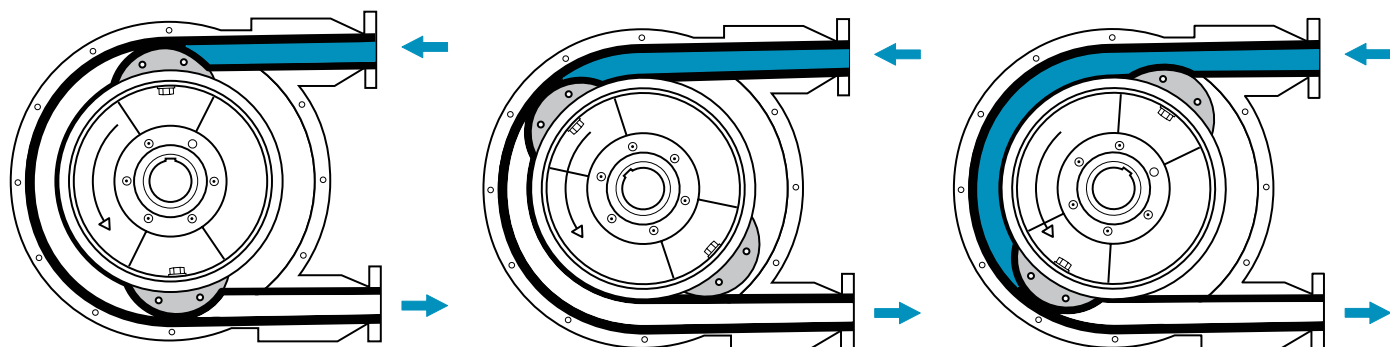
The Abaque pump's hoses are available in three materials of construction, all of which have been chosen because of their high levels of fatigue resistance:

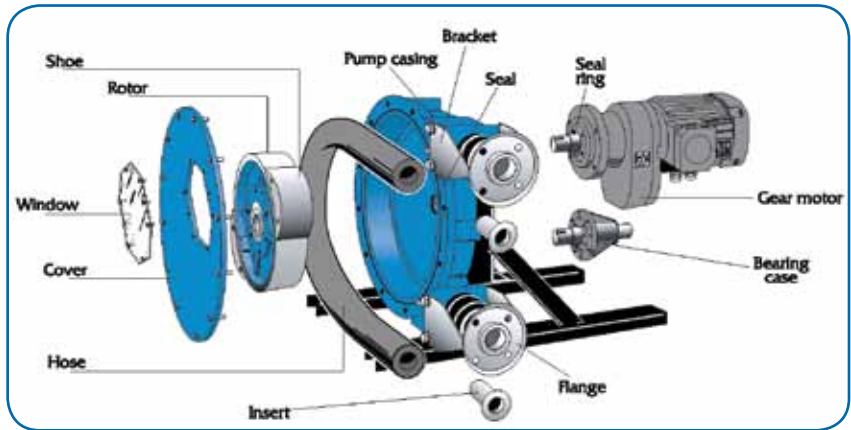
- **Natural rubber** – highly resilient with excellent abrasion resistance and strength
- **EPDM** – high chemical resistance, especially when handling concentrated acids, and alcohols
- **Buna®-N** – highly wear resistant to natural gas containing products



Finding a pump that can reliably handle all types of fluids, from abrasive to highly viscous, is a constant concern for paint and coatings manufacturers and the operation of Abaque Peristaltic (Hose) Pumps delivers the performance that is required.

Below: The Abaque pump's hose restitution after the squeeze produces an almost full vacuum that draws the product into the hose from the intake piping.





The simple design of the Abaque Series Peristaltic (Hose) Pumps features a seal-free design that eliminates leaks and product contamination, which enables them to handle the paint and coatings industry's toughest pumping applications.

Abaque pumps are available in 10 different sizes and 19 total models with flow rates ranging from 1.7 to 1,249 L/min (0.46 to 330 gpm). They have been designed to handle products with water-like viscosities to those as high as 70,000 cSt (352,000 SSU), solid particle sizes from 1.5 mm to 18 mm (0.06 inches to 0.71 inches) and soft particle sizes from 1.5 mm to 31 mm (0.06 inches to 1.22 inches). All Abaque pumps can handle product temperatures ranging from 0°C to 70°C (32°F to 158°F) with models featuring an EPDM hose capable of handling maximum temperatures to 80°C (176°F). Optional equipment includes hose-failure detectors, vacuum kits and non-metallic (PPH and PVDF) inserts.

Conclusion

The paint-and-coatings universe is one of the most diverse in the global economy. This diversity means that the pumps used in their manufacture, transport, handling and containment must be nimble and versatile enough to cope with fluids with many different levels of viscosity, temperature, corrosiveness, toxicity and abrasiveness, to name a few. These varying product characteristics must also be successfully handled while adhering to strict production

quotas. For more than 80 years, peristaltic (hose) pump technology, as epitomized by the standard-setting operation and reliability of the Abaque Series Peristaltic (Hose) Pump family from PSG, has been a leading choice for paint producers and processors who know the value of highly reliable, environmentally friendly, maintenance-free pump operation.

About the Author:

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