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Addressing fourth utility of pharma installations

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Compressed air is often referred to as the "fourth utility," which determines its huge importance in pharmaceutical installations. Many industries require compressed air, but in the pharmaceutical industry, if the highest standards are not maintained, it can lead to reduced performance, product spoilage, and damaged production equipment, resulting in additional costs and unexpected downtime for site owners and operators. Reliable, high-quality compressed air is required to power pharmaceutical manufacturing processes.

Traditionally, compressed air has had several shortcomings, impacting drug manufacturing and handlings, such as high maintenance cost, high risk of contamination, and the presence of moisture. Compressed air quality in a pharmaceutical manufacturing process has a direct relation to the end-product quality and cost. The luxury afforded previously by pharmaceutical companies was that this quality was worth paying the additional price. Nowadays, pharmaceutical companies need to balance the rising energy costs and carbon dioxide emissions of the plant while at the same time maintaining product quality and process efficiency. This has caused pharma manufacturers to challenge the existing norms and look for innovative solutions to their quality compressed air needs.

Besides, reducing emissions and energy use of operations is also under the increased attention of policymakers. Energy efficiency and the broader goal of reduction in carbon emissions add to the pressures on manufacturing industries. Regardless of the current pandemic and anticipated global slowdown, successful and economically sustainable businesses know that they need to make the investment decisions now to protect their viability in the medium-term.

Air purity

For a pharmaceutical manufacturing plant, compressed air is one of the utilities of absolute priority. The absence of compressed air will bring a plant to a standstill, much like the lack of power. However, the lack of good air quality, which does not meet the global compliance requirements of ISO 8573, 1:2010, and ISO 8573-7, can cause a high risk of contamination and moisture. This could result in drug recalls and export bans, thereby damaging the reputation of the company in question.

Across these processes, plants must maintain zero tolerance for impurities. Oil-free screw compressors are the preferred choice as they compress the air inside an oil-free compression chamber which is well sealed to avoid lubrication oil contaminating the compressed air.

Until a few years ago, companies used oil-injected compressors with filtration to meet the 'Class 1' oil quality standards, which means the air must have no more than 0.01 mg/m3 of oil residue. To ensure no residual oil, airborne particulates, or vapor could enter the system, they used downstream air dryers and double line filters to further purify the air.

Today, quality sensitive drug manufacturing companies use oil-free air compressors to ensure 100% contaminant-free air is produced for various applications in their manufacturing and packaging processes. However, until recently, these compressors were expensive and were used primarily by large companies and those that exported drugs to markets with stringent standards. With the advanced oil-free technology in 'Class 0' certified compressors, every pharmaceutical manufacturing company is assured of not only oil-free air that meets the most stringent standards but also much higher energy savings and uptime.

Going Oil-Free

Compliance and quality norms clearly define the pharma industry thereby pushing compressor manufacturers to evolve and demonstrate their commitment to compressed air purity of the highest standards. For several years, the pharmaceutical industry has seen water injected oil-free compressors as a highly efficient alternative to traditional oil-free, dry screw two-stage compressors. It delivers the same 'Class 0' compressed air in a much simpler, one-stage design whereby cleaned and cooled water is injected into the air-end as opposed to oil thereby cooling it down and sealing the system. Consequently, the compressor and air-end can run much cooler and at a much slower speed than a dry screw compressor, which translates into increased reliability, lower parts wear, less maintenance, and better energy efficiency.

Selecting the Right Compressed Air System

For pharmaceutical manufacturing where failures equal significant losses, and where reduced power and maintenance costs are critical, the advantages are clear. Most of the water injected oil-free compressors come with additions like sensitive reverse osmosis (RO) purifiers in the water inlet line, special rotor materials, and complex bearing systems. These systems have proven to be cost-intensive and prone to failure, but very few companies have succeeded in eliminating these in their water-injected compressors.

The total cost of ownership of a water-injected compressor is considerably lower (8% or more) versus traditional two-stage oil-free screw compressors thanks to the reduced power consumption and the simplicity of the design as well as maintenance ease. Compared with oil-injected solutions, these systems are even more interesting since the downstream filtration is less stressed. Simplicity, efficiency, and have lower maintenance requirements, the advanced design language of the latest closed-loop water-injected oil-free compressors can help companies unlock new avenues of quality in their compressed air needs while also improving equipment peak uptime.

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