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Achieving industry-standard air purity at a lower total cost of ownership

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Rajesh Premchandran, Director (India, South Asia, Africa and Middle-east), Elgi Equipments talks about Trends and challenges in the use of compressed air in healthcare industry



Traditionally, compressed air has had several shortcomings that impacted drug manufacturing and handling, such as high maintenance cost, high risk of contamination and the presence of moisture. Pharmaceutical companies have long believed that quality comes at a price. The industry has struggled to find a balance between the rising costs of operating a plant and maintaining product quality or process efficiency. But in recent years advanced technologies are enabling companies to contain costs without compromising on other critical factors.

There is increased realisation now among players across the pharmaceutical value chain of the need to upgrade their systems to newer technologies. Equipment manufacturers have seen a reflection of this in their customers' buying behaviour.

When it comes to compressed air systems, drug manufacturers are investing in 'Class 0' oil free compressors that offer lower total lifecycle costs.

Companies are also turning to data-driven predictive technology to pre-empt failures and minimise downtime, and air audits to help identify problem areas with a view to optimising air usage and reducing energy consumption.

Concerns facing pharmaceutical manufacturing companies

The pharmaceutical industry in India has seen rapid growth in the past few decades. Today, more than half the vaccines in the world are made in India; one-fourth of all the medicines consumed in the UK are from India; and 40 per cent of generics in the US are sourced from this country. In all, over 200 countries buy their drugs from India. This year the pharmaceutical industry in India is expected to reach USD 55 billion.

But the industry has had a chequered past, with allegations of drug adulteration and poor manufacturing practices often casting a shadow. To remove the spectre of quality issues that looms over the industry, companies have consistently needed to evolve and demonstrate their commitment to quality.

The other big concern is escalating production costs at a time of a volatile export market and a heavily price-controlled domestic market. In recent times, the cost of raw materials has risen sharply, with reports of 50-200 percent rise in the price of bulk drugs from China. Considering that over 70 percent of bulk drugs come from China, it has had a significant impact on production costs. Companies need to now turn their attention to optimising processes and improving efficiency even as they keep an incisive focus on product quality.

Air quality

Air quality is of critical importance in the pharmaceutical manufacturing industry. More specifically, poor 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. Pharmaceutical plants need clean air across the manufacturing cycle to run applications (process air) and as an ingredient in the product being made (direct air). For example, compressed air is used as a utility in dispensing substances, where air is used to operate vacuums to transfer chemicals from storage containers to the production area. An application where direct air is used as an ingredient in pill-making, is in drying or hardening. Here, the air is sprayed on granules to dry the contents of a pill before it is bound together and shaped into a tablet form. Across these processes, plants must maintain zero tolerance for impurities. Oil free screw compressors are the preferred choice, where there is a separate lubrication system for the gears inside. These machines have an efficient sealing system that prevents the entry of lubricating oil into the compression chamber.

Until a few years ago, companies used oil free compressors with ‘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, air-borne particulates or vapour entered the system, they used downstream accessories such as air dryers and double line filters to further purify the air.

Today, quality sensitive industries such as drug manufacturing and food and beverage use oil free air compressors that deliver ISO:8573 (P-2):2007 ‘Class 0’ oil free air to ensure 100 percent contaminant-free air is used for various applications in their production 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 such as those set by the US Food and Drug Administration (FDA). With the advanced oil free technology in ‘Class 0’ certified compressors, every pharmaceutical manufacturing company is assured of not only 100 percent pure air that meets the most stringent standards but also much higher energy savings and zero downtime.

Adopting a proactive approach

Internet of Things (IOT) technology offers further opportunities to optimise operating costs. Plants can now get compressors with in-built IOT devices that track key parameters such as operating temperature, pressure, load patterns and energy usage. The manufacturer of an IOT-enabled compressor receives real-time data about the compressor, which is reviewed and analysed continuously by its engineers. If the analysis shows unhealthy deviations in the key parameters, the user receives an automated alert. Real-time alerts help in eliminating breakdowns and service delays, which could lead to expensive downtime. The analysis also provides meaningful insights to the user and the manufacturer on usage patterns for predictive machine failure monitoring. Such pre-emptive care goes a long way in reducing operating costs and prolonging the compressor’s life.

Air audits are another way for pharmaceutical companies to reduce high energy costs. The energy efficiency of air compressor systems tends to reduce over time. To retain optimum efficiency, plants need to be proactive in monitoring the performance and energy usage of their compressors. An air audit helps in identifying and fixing any problem areas in the air compressor system, such as arresting leaks, eliminating wasteful use, modifying the pipe design or changing the type of compressor and down line accessories being used. Sometimes, simple factors such as an incorrect compressor size, incorrect positioning of a downstream accessory or poor regulation of pressure can have a big impact on energy consumption.

Across plants in India, companies are adopting these solutions, besides upgrading to ‘Class 0’ oil free compressors, to power various applications. In the days ahead, the type of compressor system a pharmaceutical company uses will to a large extent decide how it addresses new market conditions, build a competitive advantage and stay ahead of the curve.