Hygienic, efficient food processing through progressive cavity pumps

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INDUSTRIAL pumps are indispensable to industries across segments. According to research by McKinsey, the global industrial pumps market is worth approximately $70 billion today and can reach $85 billion to $90 billion by 2025.

A larger share of this growth relies on the customisation and adaptability of speciality pumps, which is crucial for several industries including, civil construction, oil and petroleum refineries, and food-and-beverage manufacturing.

Custom-built for executing the requisite functions efficiently, they are vital for the continued functioning of these segments. Any irregularity can result in safety hazards and significant financial losses from unplanned downtime. Industries like the food and beverage industry and pharmaceutical manufacturing cannot afford failures and malfunctioning of these machines due to the detrimental product-safety defects it may cause.

The pandemic necessitated several changes in the existing industry norms and practices. As the food and beverages industry is a highly sensitive segment, it needed to make radical changes in its extant standards and procedures. Thus, it was mandatory for the segment to take stringent safety measures to improve product-safety and ensure that it has not been contaminated with microorganisms.

Here, automated self-cleaning pumps can play a vital role in matching and maintaining the improved standards. The pumps come with a metal bonded aseptic food grade elastomeric stat or resistant to oil & fats, making them not only hygienic but also easy to clean.

The food processing sector of India is one of the largest in the world, and its output would reach $535 billion by 2025-26. The Indian food industry is expanding at a compound annual growth rate of 11 per cent, and the food processing sector accounts for 32% of the food industry. The rapid growth of the food processing industry is made possible by deploying speciality pumps and upgrading the existing processes.

Speciality pumps in food and beverages industry

The food and beverage industry employs a variety of pump types for various processing applications. Air-operated double diaphragm, centrifugal, peristaltic hose, progressing cavity, reciprocating positive displacement, rotary lobe and rotary piston pumps are commonly used in the food and beverages industry.

Among the mentioned equipment, progressive cavity pumps are of great significance to food and beverages companies. From morning breakfast to evening drink, they have helped food and beverage processing companies in running their processing facilities efficiently. Processing several food items would not be possible without PCPs, especially process applications where the fluid is viscous or where the application requires high suction lifts.

PCPs are used across the food and beverage manufacturing industry. Wine and breweries use it while processing and packaging Liquor, Red wine, Wine, Starch, Beer, Fruit pulp, and juices. They are used to process and package milk, cottage cheese, cream, peanut butter, yogurt, coffee, whitener, ice cream, custard, curd and malt extract in the dairy plants.

The sauce and preservative manufacturers use them to process and package mayonnaise, ketchup, apple sauce, jam, honey, golden syrup, horseradish, mustard sauce, cream, taco sauce, dough balms, lecithin preserves and tomato paste.

PCPs are used by oil manufactures to process and package cod oil, corn oil, lard, linseed oil, peanut oil, vegetable oil, rapeseed, coconut oil, soya bean oil, cooking oil, butter oil and oil slurry. Other than the above, bakeries, fruits and vegetable processing plants, sugar manufacturers, confectionaries and meat, fish and poultry plants use PCPs to process and package their products.

Progressive cavity pumps perform efficiently even for shear-sensitive liquids, which change viscosity when under stress or pressure. Some fluids become less viscous (shear-thinning or pseudoplastic), while others become more viscous (shear-thickening or dilatant). PCPs can endure this change in viscosity and continue to function efficiently. Also, they provide uniform and non-pulsating flow, which aids in the continued functioning of the process.

Pumping Principle

PCPs work on the principle of positive displacement, wherein the pump moves a fluid by repeatedly enclosing a fixed volume and moving it mechanically through the system. The pumping element comprises a precision-machined single external helix metallic rotor and a double internal helix elastomer stator. The special profile of the rotor and stator set forms a sealing line along the axis of the rotor that is maintained during both static and dynamic conditions. When the rotor turns within the stator, these cavities enclose and carry the fluid while progressing from the suction end to the discharge end.

Hygiene Matters

Hygiene is a primitive element in food and beverage processing units. To ensure hygiene, food-grade PCPs contain smooth surface stainless steel and metal bonded aseptic food-grade stator providing resistance to oil and fats. These standard equipment have closed universal joints, which enable them to handle fluids with low lubricating value like aerated or dematerialised water. Some food and beverage applications require pump cleaning after every batch.

Manufacturers install PCPs, which offer a clean-in-place advantage to cater to this requirement. Clean in place technology is the automation of the cleaning process that reduces the cleaning time, efficiently cleans and disinfects the internal components. The hygiene is also maintained as they do not have any retaining pockets, which result in zero chemical or bacterial contamination.

Furthermore, they can also handle liquids with fine solids by ensuring zero damage to their formation. They are most preferred when the suction lift is very high, as they can support a high meter water column (mwc), of suction lift.

PCPs make it easy for the food and beverage industry to process and package its products. They speed up the processing cycle while ensuring quality and hygiene, which is a prerequisite for the segment. With technological advancements, they are getting automated and would play a crucial role in the development of the food processing industry.

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