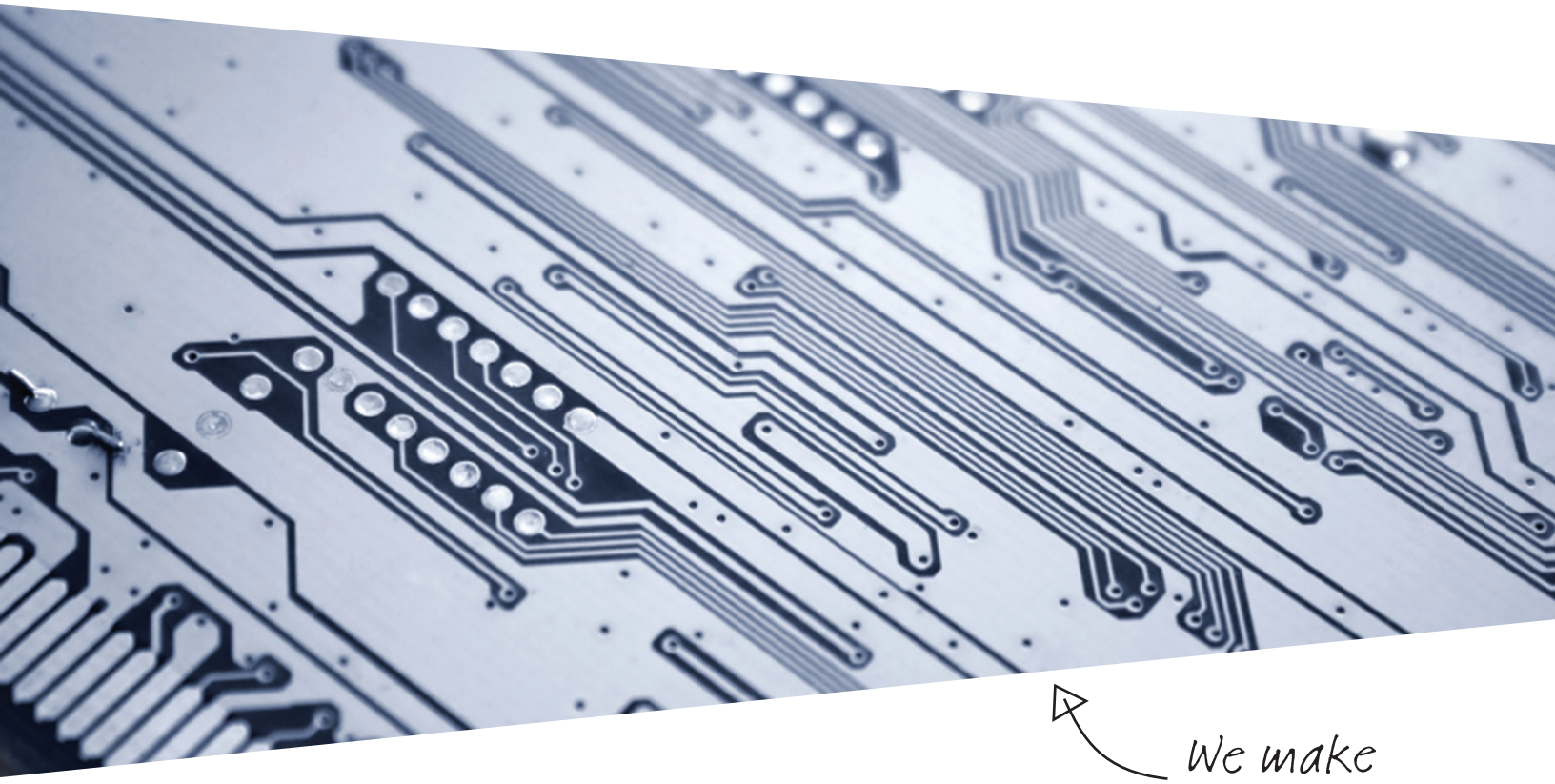


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WHITE PAPER

The Use of Pinch Valves in Food and Beverage

By Winston K. Wong, Bimba | Acro Associates

Introduction

One important focus of the food and beverage market is ensuring that its consumer products are created, packaged and consumed by the public in the safest way possible. Automation equipment that handles food and beverages plays an integral role in the overall quality of the material that is processed. To ensure that this important objective is met, continual improvements in automation equipment design and processing are necessary. Here we briefly discuss the potential advantages of using pinch valves in automated food and beverage handling equipment.

Need for Non-Contamination

The introduction of unwanted materials into food and beverage is an inevitable and captured part of the production process. For example, a food or beverage may be moved through a series of pumps, motors, valves, sensors and fittings. In each case, lubricants such as o-ring grease can come in direct contact with the product. The FDA establishes clear guidelines on acceptable amounts of these unwanted contaminants, which at acceptable levels, are tested and known to not cause harm. Preservatives, flavor enhancers and cleaning agents also serve a secondary role in food and beverage processing. However, they are considered socially undesirable, as consumption in high quantities can cause harm. Several modern-day examples include Bleach, Sodium Nitrate and Monosodium Glutamate. Many new products now claim “Nitrate Free” in order to avoid the negative connotations associated with Sodium Nitrate, a common meat preservative. MSG, a flavor enhancer prevalent in Asian food, is now proactively avoided. Bleach is used as a cleaner and safeguard against Salmonella in meat and many other products. However, eating chicken that smells of bleach has been deemed undesirable in European and U.S. societies. Utilizing system designs where the food or beverage material is never in

direct contact with processing components can systematically reduce unwanted material into the end product, thereby ensuring/enhancing the purity of the consumed product and increasing safety. can systematically reduce unwanted material into the end product, thereby ensuring/enhancing the purity of the consumed product and increasing safety.

Prevention of Undesired Bacterial Growth

The growth and presence of harmful bacteria in food and beverage is of paramount concern to consumer safety. E.Coli and Salmonella are two naturally occurring bacteria that are abundantly present in and around many food and beverage products. In excess amounts, both are common causes of food poisoning. Both grow with the assistance of air and can be introduced into automation equipment when the food or beverage material is in direct contact with processing components. Newer automated system designs that employ the use of pre-packed, sterilized FDA approved tubing or membrane bags greatly reduce the possibility of introducing external bacterial contamination by creating a sterile barrier between the food or beverage and the components used to handle it. Rather than dispensing a food or beverage directly through a traditional wetted valve component, for example, a pinch valve interacts with the tubing and never touches the fluid material being dispensed.

Efficient Installation, Servicing or Replacement

Service and replacement of components on automated systems are a normal part of life use. With traditional systems, where the material is in direct contact with the food or beverage, a pause or shut down of the line must occur for periodic cleaning or service. By utilizing a component such as a pinch valve, which does not directly come in contact with the food or beverage but rather tubing or membrane barrier material, servicing or replacement can take place readily and easily. A service or replacement of a pinch valve can be quickly executed without the need for complete shut down and re-cleaning of the line, saving valuable time and resources. Pinch valves can also be designed for full wash down cleaning or sterilization procedures that don't require them to be removed from equipment.

Potential Lessons From Related Markets

Bio-pharm Single-Use Disposable Technologies, referred to as "SUD" or "SUT", have been adopted by pharma manufacturing as an effective alternative and complement to traditional methods. SUDs utilize disposable closed membrane bags and tubing while traditional technologies have directly wetted open systems. A recent study1 conducted by GE's Ecoassessment Center of Excellence, Resource & Environmental Strategies compared the two approaches in terms of waste material generated. It was discovered that traditional processes used far more energy to sterilize and decontaminate, making them the largest contributors towards waste, cost and negative environmental impacts. As an industry that shares the needs of bio-pharm, Food and Beverage may similarly benefit from the use of disposable consumables, like SUDs, in its applications.

Limitations

Pinch valve performance is primarily determined by type. Electric-solenoid and air-pneumatic valves are designed to work effectively with different linear force output capacities and sizes of tubing or membrane bag material. Solenoid pinch valves are generally sized to work with tubing up to 7/16" in outer diameter, durometers of 65-A and average media pressures of 20-30 psi. Pneumatic pinch valves, on the other hand, can work with larger tubing up to 1.6" OD, durometers up to 75-A and media pressure of up to 80 psi. Each application should be examined to determine how the tube sizing, hardness and media pressure would impact valve choice.

Conclusion

There are a wide variety of food and beverage products that routinely employ the use of components that come into direct contact with processing and packaging used in automation equipment. Effective alternative technologies and improvements, such as pinch valves, offer system designers significant ways to better automate, service and increase production efficiency in future systems whilst further ensuring that product consumer safety is kept the top priority. Pinch valve technologies have been known for decades and recent technology advancements in design, affordability and regulatory compliancy make them a new compelling consideration alongside traditional equipment. Similar highly regulated markets, such as biopharm, have been at the forefront of this trend. Drug and biological manufacturing share similar concerns and needs. This has spawned an entire high growth focus on new application areas known as Single-Use-Disposable consumables and systems for bioprocessing applications. Food and beverage are vital parts of human existence. Thus, new component and system technologies, like those described here, will play a future role in improving manufacturing efficiencies and overall product quality.

Applications

- Medical Device Systems
- Food and Beverage Filling
- Industrial Filling
- Biopharm Bioprocessing Systems
- Light Powder or Semi Viscous Fluid Dispensing





Reference: 1. Gladd, Trisha, Is Sustainability Possible with Single-Use Technology?, Bioprocess Online, August, 2015.

Bimba
25150 S. Governors Hwy
University Park, IL 60484

Tel: +1 800 44 BIMBA
Fax: +1 708 235 2014
Email: cs@imi-precision.com
Website: www.bimba.com

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