

Growing Profits – Increase Food & Beverage Manufacturing Throughput with New Pump Technologies

By Kevin Hill, Triangle Process Equipment Operations Manager

Faster Cleaning, Reduced Maintenance and Labor Savings
Add Up to Efficient Processing



Introduction

Food and beverage manufacturers face many challenges: rigorous product quality demands, stringent food safety regulations, rapidly changing consumer preferences, rising freight costs, and an extremely competitive global marketplace. One challenge, however – the industry’s notoriously narrow operating margins – can be improved by addressing common production inefficiencies with advanced pumping technologies.

Food and beverage manufacturers who implement strategies to lower production costs increase their opportunity for higher profit margins.

This report identifies how improvements in pump design help plant managers and process engineers:

Expand production

Increase speed to market

Reduce losses

Lower expenses

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The Challenge: Costs Devouring Profits

Costs to produce goods are eating up as much as 85% of revenues in the food processing industry. Here's a look at the percentage of revenue that was absorbed by the costs of products sold for four food or beverage processing companies in 2017:

85%



Major Protein Processor

62%



Major Food Manufacturer

61%



Major Beverage Manufacturer
(Non-alcoholic)

38%



Major Beer Manufacturer

3 KEY EXPENSES

have a big impact on a food or beverage manufacturer's overall profitability:



Raw ingredients

Subject to commodity price volatility



Labor

Total labor costs accounted for 8-9% of total annual operating costs in 2016



Energy consumption

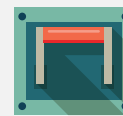
Process manufacturing has the highest absolute consumption of electricity

2 COMMON PROCESSING INEFFICIENCIES

erode a food processor's optimum production capacity:



Downtime to facilitate cleaning procedures



Equipment maintenance

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Production Inefficiencies – Symptoms and Solutions

By identifying the causes of compromised production and streamlining those processes, throughput can be increased and losses minimized. Let's look at three common production inefficiencies and equipment solutions that can mitigate those inefficiencies.



Symptom #1:

CIP systems that require disassembly for cleaning or other manual cleaning procedures need significant downtime to complete.

Manual cleaning processes require technicians to disassemble equipment by hand, manually clean the equipment and reassemble it. This process could require the efforts of several technicians over the course of an entire shift to complete. Reoccurring production stoppages such as these increase processing cycle time and constrain the amount of finished product a manufacturer is capable of producing.

Solution:

Food manufacturers who integrate the newest CIP pump technologies into their production lines will realize time and labor savings, while also reducing the risk of contamination caused by improper manual cleaning procedures. However, selecting a pump that is engineered to be truly CIP-capable or features a hygienic design is essential. Some pumps are marketed as CIP and/or SIP, but still require operators to make performance sacrifices or complete additional prep. Truly CIP-capable pumps will not require the removal of parts, nor will flow rate efficiencies be compromised. Select quaternary diaphragm pumps and positive displacement pumps on the market today offer these advanced CIP features.

Switching to a single-use pump configuration – where a disposable, product-wetted plastic pump chamber is replaced within the pump – is another alternative. Single-use pumps eliminate time-consuming cleaning, sterilization and validation procedures during batch changeovers. A single-use polypropylene chamber can be installed, and the pump can be returned to service in as little as 15 to 30 minutes. By significantly reducing or eliminating cleaning cycles, downtime is reduced and throughput can be increased.



Symptom #2:

Re-occurring maintenance and service needs for pumps results in days of downtime and lost production.

In some cases, manufacturers pull existing pumps from production and replace them with back-up/spare pumps while the original pumps are serviced. This results in both significant time and labor costs.

Solution:

Newer “maintenance-friendly” pump designs include features that eliminate many of the repetitious service requirements that older pumps demand, such as the need to lubricate bearings and gears, replace seals, perform oil changes and adjust impellers. For instance, new low-pulsation quaternary diaphragm pumps are dry-run safe, feature a seal-less design, are self-priming and include few rotating parts that can deteriorate. Bearing replacements and other regular maintenance requirements for this type of pump are minimal; cam kits for new quaternary diaphragm pumps can be changed in less than one hour.

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Symptom #3:

General-purpose, stainless steel industrial pumps are vulnerable to ingredient waste, contamination and batch inconsistencies.

Until recently, the majority of pump technologies available to food and beverage manufacturers posed several imperfections, including – but not limited to – production losses caused by inaccurate in-line dosing, uneven flow rates or high pulsation. Further, many traditional pump designs have included mechanical seals and rotating parts, that through their movement, can introduce metal contaminants into the product. Food manufacturers not only realize product losses when this occurs, but production must be stopped and maintenance must be performed.

Solution:

Manufacturers are engineering pump designs that not only significantly reduce the risk of contamination, they outperform their predecessors in key applications such as dosing and blending. In fact, some manufacturers are incorporating capabilities into food and beverage pumps that were previously reserved for the stringent sterility and gentle pumping requirements associated with pharmaceutical processing. For instance, quaternary diaphragm pumps, a popular choice in biopharmaceutical processing, are now being introduced to food and beverage manufacturing. Their unique design, patterned after the pumping operation of a human heart, provides a gentle and efficient transfer of liquids that require precise flow, high turndown and accurate dosing in a hermetically sealed environment.

Conclusion

Twenty years ago, the primary factors that influenced equipment acquisitions in the food and beverage industry were the initial purchase price, reliable performance and low cost of ownership through nominal maintenance expenses. While those qualities are still paramount today, engineering advancements in processing equipment design are transforming production lines by driving efficiency. New innovations in quaternary diaphragm pump engineering, for example, have yielded pump designs that perform liquid transfer (including CIP media), inline dosing, proportional blending, and dispensing in a single, compact, low-maintenance package. A versatile solution such as this contributes to both leaner capital expenditures and operating expenses.

However, finding the solution that is right for your specific application is essential. Discerning process equipment selection guided by an experienced industry expert will position plant managers to establish a more efficient – and profitable – operation overall. Partnering with a reputable process equipment supplier is the first step to improving operations.

Supplier partners collaborate with food and beverage manufacturing stakeholders to provide the following benefits:

- Extensive technical expertise
- Years of practical experience on production floors
- A consultative approach to fully understand the needs and challenges unique to individual operations
- Equipment solutions that:
 - Provide a low cost of ownership
 - Create efficiencies
 - Increase production output
 - Improve operational profitability

Process engineers, plant managers, engineering firms and construction management companies who leverage the experience of trusted equipment suppliers as well as the advancements of modern processing technologies will prepare today's food- and beverage-processing operations to sustain a more profitable bottom line.

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