

## Background and Product Overview

Tuthill manufactures a variety of positive displacement pumps which have been successfully applied to numerous applications throughout the candy processing market. Positive displacement pumps are required for high viscosity and shear sensitive fluids and slurries common to the processing of confectioneries. They are also required for the metering of dyes, flavorings and preservatives.

The Tuthill Heavy Duty (HD) circumferential piston design is ideal for handling high viscosity candy mass and fillings, as well as shear sensitive chocolate and chocolates with edible solids requiring the low shear operating feature of this pump.

The Tuthill GlobalGear internal gear product line is an economical solution to the less demanding applications in the candy processing market.

The Tuthill Technaflo Products include precise, low flow pumps. They are available in a variety of pump head materials of construction and are capable of adjustable flow rate with variable frequency drives. The pumps can be combined with accessories and fabricated systems to meet a variety of chemical and process feed requirements.

## Chocolates

The positive displacement circumferential piston pump design utilizes external timing gears to synchronize rotation of single or double lobe impellers without contact between rotating and stationary elements within the pump fluid chamber. Because there is no contact and no “meshing” of rotating elements, this pump imparts a low shear upon the fluid pumped. Shear sensitive chocolates or chocolates with edible solids (fruits or nuts) are pumped successfully without damaging the quality of the product as occurs with a gear pump design. In addition, the external shaft bearing support in this design provides for successful operation at pressures above 200 PSI, higher than ratings achieved by positive displacement gear pump designs.

The non-meshing rotating elements and sharp leading edge of the impeller also lend to the success of this design on reclaiming and reprocessing applications in the chocolate markets. It can break and pass solids through the large cavity fluid chamber without binding, which commonly occurs with the meshing elements in the fluid chamber of a gear pump.

A steam jacket option is available on the HD product for applications that may result in the product setting up in the pump with decreasing

temperatures. Use of this feature allows the operator to control temperature of the product in the fluid chamber should a line shutdown occur.

Finished chocolates used for molding or enrobing (coating of raisins, nuts, etc.) are typically easier to pump. The Tuthill GlobalGear product is successfully used on these lower pressure applications. In addition, pumps are typically run at low speeds, minimizing shear. Heating jackets may be recommended for the pump cover and seal housing bracket.

## Candy Mass

Candy mass is the generic term used for the formulation of various candies, such as jelly beans, gum drops and licorice. It is typically batch formulated, and the positive displacement pump is used to transfer the product from the cooker/blender to a machine used to shape the product.

Candy mass tends to be very viscous, and is typically pumped at high temperature. The Tuthill circumferential piston design Heavy Duty Pump is selected for its ability to handle fluids with viscosity in excess of 2 million Centipoises. Pumps are typically operated at very low rotating speeds for high viscosity conditions. The large opening in the fluid chamber allows the flow of product into the pump without difficulty. The fluid chamber design of a gear pump has viscosity limitations due to the smaller area between gears available to draw the product into the pump.

The Tuthill HD pump offers an optional high torque strength feature for extreme torque requirements while operating on high viscosity product against high discharge pressures and low operating speeds. In addition, a “hot clearance” fluid chamber is available for pumping temperatures up to 525° F. Steam jackets are available to maintain temperatures during cooking and prevention of pump seizure should the product set up due to a drop in system temperature.

The Tuthill GlobalGear product is an economical selection for less demanding applications. This internal gear design is used for syrup, molasses, and lighter viscosity applications (typically with harder candies). It is also available with a steam jacket, variety of sealing arrangements and cast iron, stainless steel or cast steel construction. Some syrups, oils, and additives tend to be very expensive, and any pump leakage can be a costly problem.

HD pumps and GlobalGear can be outfitted with Tuffseal cartridge lip seals that offer sealing effectiveness with intermittent run- dry capability. A choice of mechanical seal designs is also available.

## Sugar Slurries

Sugar slurries are used in the formulation of many candy coatings and hard candies. While the sugar remains in solution, the pumping requirement is easily satisfied. Sugar slurries range in viscosity and temperature and are successfully pumped with the Tuthill GlobalGear internal gear product.

Sugar slurries become very difficult to handle when they fail to remain in solution. Any exposure to air or decrease in pumping temperature may result in crystallization of the sugar, which then becomes an abrasive product. Crystallization is damaging to mechanical seals, resulting in high maintenance costs for the operator. Quench arrangements are sometimes used to flush the atmosphere side of seal faces to prevent crystallization.

For increased wear resistance, the HD and GlobalGear pumps can be provided with abrasion-resistant rotating elements and pump internals.

## Fillings

Fillings encompass a variety of applications. They typically are highly viscous, and many have solids.

The Tuthill Heavy Duty circumferential piston pump is recommended for these applications. Products such as figs, jams, peanut butter and coconut slurry have to be force-fed into the pump suction port to prevent bridging of the product in the suction line. Pump speeds are

extremely slow (5 to 50 rpm), and high torque strength shafts are recommended.

## Dyes/Colorings/Flavorings

Typically, dyes, colorings and flavorings are added to the process with extremely low flow conditions, where metering accuracy is required to maintain product quality. Tuthill TechnaFlo products are recommended for these applications. Available in 316 stainless steel construction, these pumps provide flow capability of less than 1 GPH. The automatic controls available enable precise dosing of dyes or colorants proportioned to the speed of the production line. Tuthill's system design/fabrication ability offers a special customized design to meet unique customer requirements.

## Cleaning Solutions

Detergents and caustics required for the cleaning of process systems are successfully handled by Tuthill gear pump and TechnaFlo metering products.

