

Internal Gear Pumps Handle Harsh Conditions

These pumps offer efficiency and reliability in complex industrial operations.

By **Chrishelle Rogers**
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Pumps make industrial manufacturing possible. Every day, thousands of industries around the world rely on various pumping technologies to move raw materials and end products through the production process. Whether handling lube oils, paints and coatings, or working in applications from heat transfer to chemical processing, pumps must reliably, efficiently and safely transfer an

array of fluids, all of which have unique—and often challenging—handling characteristics.

If a pump is the weak link in the production process, the entire operation will be compromised, with the downtime required for repair or replacement eating away at production quotas and the bottom line.

Industrial manufacturers can choose from a wide range of pump options when outfitting their

facilities. A number of factors also go into choosing pumping technology. Operational reliability and the ability to meet specific fluid-handling requirements are among the most important. With manufacturing operations governed by operating budgets and expenses, equipment acquisition costs and subsequent maintenance are also primary concerns.

While all pumping technologies can have positive points in



Image 1. In order to fashion a handling and transfer operation that optimizes reliability, efficiency and safety, many chemical processors are making the decision to install internal gear pumps. (Images courtesy of PSG)

industrial manufacturing operations, positive displacement internal gear pumps can offer precise and consistent transfer of demanding fluids.

Chemical processing and manufacturing is one of the most complex industrial operations. The chemical manufacturing process is so intricate that it is comprised of several unit operations, from cracking, distillation and evaporation, to gas absorption, scrubbing and solvent extraction.

Within that family of unit operations, fluid transfer touches every stage of the manufacturing process and is vital for overall process success. Often oversimplified as “transporting fluid from one point to another,” fluid transfer in chemical manufacturing is much more.

Fluid transfer includes a spectrum of applications, with responsibilities all along the chemical production chain. For example, thin or viscous raw materials can be transferred to storage tanks or blending and mixing tanks. Final formulations can be transferred to holding tanks, and finished products can be loaded into intermediate bulk containers (IBCs) for delivery or consumer packaging.

In many cases, chemical manufacturing processes require the use of dangerous substances, such as strong acids, caustics, solvents, resins and polymers. Despite their inherent danger, these are necessary for the manufacture of thousands of consumer goods or to facilitate other industrial processes. The challenge when using dangerous chemicals is to construct, handle and transfer them in a safe and reliable way.

Fortunately for chemical processors, positive displacement



Image 2. No acid, polymer, resin or caustic has the same handling characteristics, which makes pump versatility a primary concern for chemical processors. These internal gear pumps overcome many handling concerns by featuring a method of operation that can successfully and safely transfer fluids of differing viscosities and chemical makeups.



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internal gear pumps have continually offered the reliability and cost-effectiveness required for handling raw materials and finished products.

One manufacturer has created an internal gear pump with a simple design that includes only two moving parts, a pair of coinciding gears called the rotor and idler, for precise and consistent transfer of demanding fluids.

This design creates a four-step operating process:

1. The rotor and idler gears un-mesh at the suction port to create an atmospheric vacuum that draws fluid into the pump. As the rotor turns, the fluid is forced between the rotor teeth and idler teeth.
2. Continual rotation of the rotor forces the fluid through a



Image 3. Internal gear pumps feature a unique design that features only two moving parts, a rotor and idler gear, which allows them to operate equally well in either direction and deliver positive, non-pulsating flow of the liquid being handled.

crescent-shaped area within the wetted path. The crescent-shaped area divides the fluid and acts as a barrier between the inlet and discharge ports.

3. As the rotor continues rotation, the fluid is forced past the crescent-shaped area and moves toward the discharge port.

4. As the rotor completes its rotation, the rotor and idler teeth engage, forcing the fluid through the discharge port of the pump.

This method allows the pumps to operate equally well in either direction, resulting in a positive, non-pulsating flow of the pumped fluid. Other design features include a rotatable pump casing that allows for multiple inlet and outlet port positions and single-point end-clearance adjustment. It also features an enlarged bearing housing at the rear of the pump that allows easy drive-end access to the shaft seal.



Chemical processors must deal daily with fluids that are difficult to transfer. Their task is to create a handling and transfer regimen that includes pumping equipment compatible with many different types of dangerous chemicals while also offering reliable operation and cost-effectiveness with regard to maintenance, repair and downtime. ■

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Image 4. Internal gear pumps feature a unique design that have only two moving parts, a rotor and idler gear, which allows them to operate equally well in either direction and deliver positive, non-pulsating flow of the liquid being handled.



Image 5. Fluid transfer touches every stage of the manufacturing process and is vital for overall process success.