



**TECHNICAL
ARTICLE
SERIES**

Pump Choice Supports Continuous Production at Hitachi

ARTICLE # TL-107

INDUSTRY: Electronics

ENTITY: Hitachi

SOLUTION(S) PUMPED: Deionized water, Hydrochloric acid, Hydrofluoric acid

PUMP TYPE(S): CHEM-GARD Horizontal Centrifugal Pump

Vanton Pump & Equipment Corp.
201 Sweetland Avenue
Hillside, NJ 07205 USA
Telephone: 908-688-4216
Fax: 908-686-9314
E-Mail: mkt@vanton.com
www.vanton.com

Vanton Pumps (Europe) Ltd
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FOCUS ON FACILITIES

In addition to an ultra-clean environment, the fabrication of high quality silicon wafers — submicron integrated circuits — requires dependable equipment to ensure continuous production. So, you can imagine the concern when maintenance personnel at Hitachi's wafer fabrication facility in Irving, Texas, discovered that original pumps were not doing the job. Some leaked and others failed to keep up with flow requirements.

During the production process, high-standard circuits result from a series of physical and chemical steps. Layer upon layer of micro-thin material is applied to silicon wafers. The process involves the use of severely corrosive materials such as hydrochloric acid, hydrofluoric acid and various caustic solutions.

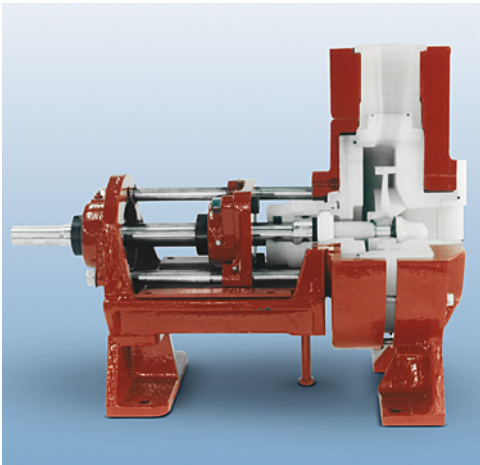
Almost from the beginning of operations, maintenance personnel reported that pumps of thermoset plastic on bulk hydrochloric acid (HCl) storage tanks leaked. HCl is used for regeneration of mixed beds (deionized water) and pH control of waste water. The source of the problem was a combination of the pump's design and the materials of construction.

In addition, during the start-up phase, maintenance noted capacity problems with pumps handling dilute hydrofluoric acid-waste. Operations were exceeding original design flows; the pumps couldn't keep up.

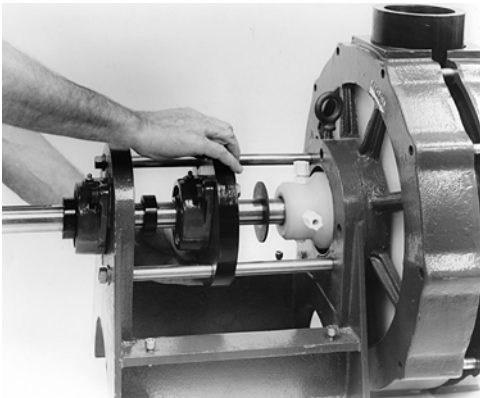
The facility decided to replace the thermoset pumps with heavy-duty centrifugal polypropylene pumps (Vanton Pump & Equipment Corp., Hillside, N.J.) The new pump's design limits fluid contact to plastic components and, in fluid-contact areas, uses acid-resistant polyvinylidene fluoride to sheath a stainless-steel shaft.

According to Paul W. LeMarie, Jr., senior facilities engineer, since installing the new pumps, leakage and capacity problems have disappeared.

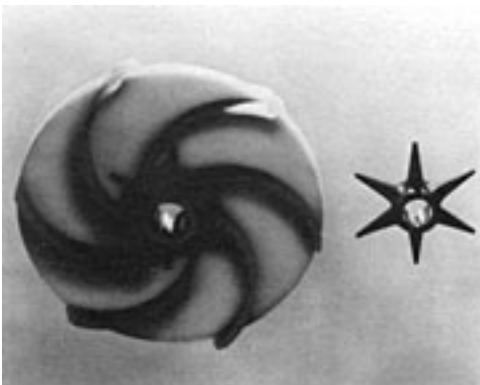
NOTE: Although Hitachi has been assembling semiconductor memories and microprocessors in the Las Colinas area of Irving, Texas since 1978, it was not until 1989 that they expanded operations to include their first wafer fabrication capability outside of Japan. The new facility can now provide submicron products fully manufactured in the United States, for use in data communication equipment, office automation equipment, industrial equipment and home appliances. The Hitachi commitment to quality is recognized worldwide.



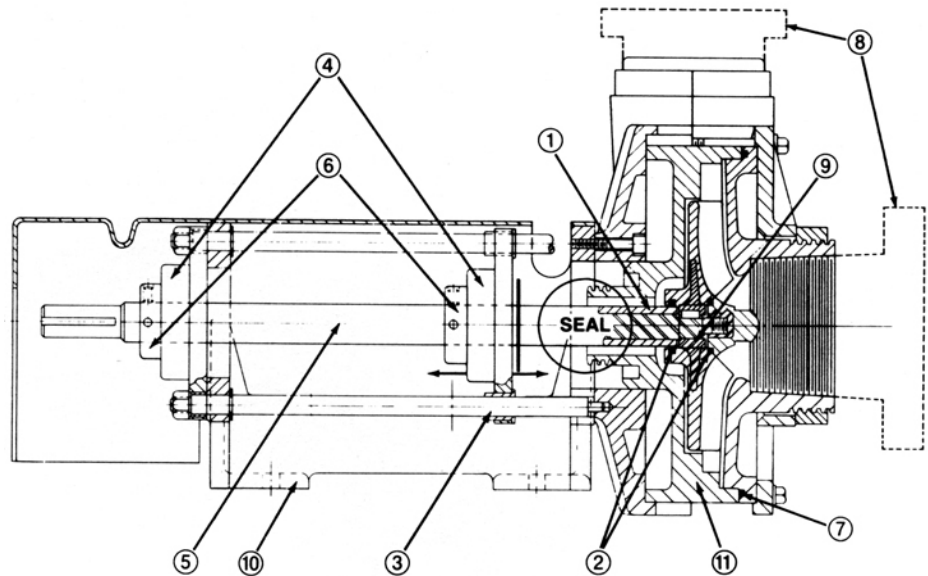
Cut-away of heavy duty Vanton polypropylene centrifugal pump of the design selected by Hitachi for their wafer fabrication facility. These pumps replaced thermoset units, which leaked and deteriorated under the severe corrosive service.



The front bearing can be pulled back on sliding bars for easy maintenance and flexibility to accommodate virtually any sealing arrangement.



Key driven molded impeller with investment casting insert to insure positive drive, provide additional rigidity to impeller at higher temperatures and heads, as well as to prevent damage from reverse rotation.



DESIGN FEATURES

1. The use of plastic sleeve on the wet end of the pump allows the mechanical seal to totally isolate the fluid to plastic materials.
2. "O" ring seals between the plastic sleeve and impeller, and between the impeller and the lock nut, assure no metal in contact with solution.
3. The front bearing can be pulled back on sliding bars for easy maintenance and flexibility to accommodate virtually any sealing arrangement.
4. Heavy duty, sealed, self-aligning ball bearings widely spaced on shaft, offer maximum stability and long life. The sliding bar in combination with these bearings reduces stresses from thermal expansion and provides first critical speed of over 20,000 rpm with virtually zero shaft deflection.
5. The relatively short, large diameter stainless steel shaft of stepless design eliminates stress concentrations and possible failure.
6. Cam lock bearings are utilized to allow easy adjustment of the impeller.
7. Effective "O" ring sealing prevents leaks and blow-outs.
8. Choice of the threaded ends or welded flanges.
9. Key driven molded impeller with investment casting insert to insure positive drive, provide additional rigidity to impeller at higher temperatures and heads, as well as to prevent damage from reverse rotation.
10. Open pedestal design avoids corrosion damage from drippage.
11. Heavy wall, homogeneous injection molded casing.