



PUMP RELIABILITY

General

Centrifugal pumps when properly applied, installed and when given reasonable care and maintenance, should operate satisfactorily for a long period of time. The following general principles should be considered to insure trouble free operation.

Centrifugal pumps are built in a wide variety of designs and for many different services. The manufacturers instruction book should be followed, as there may be specific requirements for a particular machine or application, which cannot be covered in a general discussion.

Location of Unit

The pump should be as near the liquid source as practical, either submerged or so that a short, direct suction pipe may be used. The pump should be located so that a short, direct discharge pipe, with the least number of elbows and fittings, may be used to minimize head loss due to friction. If practical it should be placed so that it will be accessible for inspection during operation. Pumps and drivers, other than submersible types, should be protected against flooding. Motor driven pumps installed in enclosed cabinets should have sufficient air circulation to prevent overheating of the motor during normal operation.

Foundation

The pump mounting should be sufficiently rigid so as to absorb vibration and prevent undue stress at the inlet and outlet connections. If a shock absorber (flexible) mount is used then the inlet and outlet piping should provide for movement of the pump without placing undue stress on in and out connections and electrical connections.

Extending Operating Life

Pump operating life is dependent on the operating conditions, product pumped, frequency of start/stops and site environment. If the pumped product is free of contaminants and does not change its characteristics over time pump life can be greatly extended. The least damaging operating parameters for a centrifugal pump are pumping clean, clear water at ambient temperature and not alternately starting and stopping the unit. Defining this as “normal” operating conditions, the following generalizations can be made:

1. Under "normal" operating conditions the pump and motor should have a useful life of approximately 3 years or longer, with maintenance as noted in both the pump and motor Operating and Instruction Manual.
2. Start/stop cycles greatly reduce seal and bearing life due to the lack of lubrication at the seal during the initial start of the pump and the extra torque load on the bearings during startup.

3. Above ambient product temperatures can adversely affect pump life by inducing cavitation, which can erode impeller surfaces. Fluctuations in operating temperatures can change the characteristics of the liquid pumped causing it to become corrosive (acidic) reducing the life of seals, gaskets and possibly materials of construction.

Some liquids used in the semiconductor industry such as DI water and glycol's can limit pump life if they are not kept clean and within defined ph levels. For example, ethylene glycol will become acidic over time when exposed to heat and oxygen. It is recommended the pumped product be filtered and checked for ph levels periodically (dependent on operating time). It may be necessary to change the fluid in chiller/wash systems on a scheduled interval or event, to prolong equipment life.

4. Abrasive particles in the pumped liquid greatly reduce seal life and can also adversely effect impeller and volute/diffuser by eroding high velocity surface areas.

5. Improper installation of piping, can induce stresses causing misalignment, fractures in suction or discharge ports or disrupt laminar flow to the suction port (causes cavitation).

6. Some small motor bearings require periodic lubrication. If the motor has an oiling cup or grease fitting, follow the manufacturers recommendation of oil/grease quality and frequency.

It is recommended that a pump operated 24/7 be serviced at 12-18 month intervals to insure its reliability. The following service is recommended but may be modified based on the factors noted above:

1. Disassembled and inspect

Check condition of the volute/diffusers and impeller (s) for erosion or corrosion replace if necessary.

Replace seals, gaskets & bushings

Check motor shaft axial and radial movement. If excessive, replace motor bearings or motor.

Inspect suction and discharge connections threads or flanges for damage. Refinish or replace as needed.

2. Re-assemble pump and motor in accordance with Operating and Instruction manual.

3. Follow installation and startup procedures.

Remember, a pump and its driver are pieces of machinery that require preventative maintenance to prolong their useful life. Proper operation and maintenance will insure long and trouble free operation.