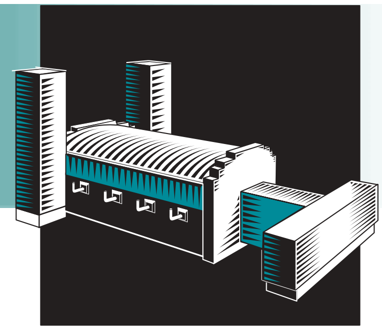
PUMPS

Cost Reduction Strategies



System Energy Reduction Opportunities

Did you know...
a 10 psi pressure drop across a control valve in a pumping system handling 1,000 gpm of water costs $2,500 per year in electrical energy?

Pumping systems are the largest single industrial user of motor-driven electricity. Here are some experience-based approaches and guidelines that can help you prioritize the pump population at your plant and focus on a more manageable set. The screening process illustrated in the figure and discussed below will help you zero in on the biggest energy saving opportunities within your plant.

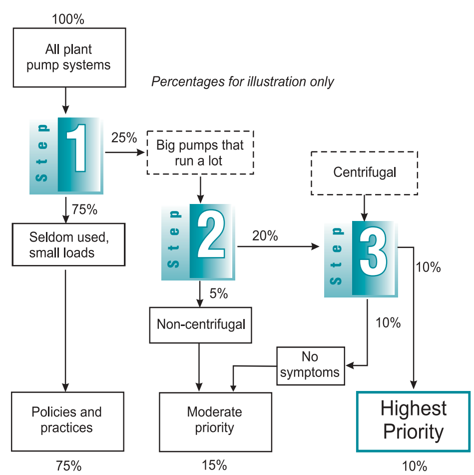
Narrow it down

Step 1 — Select the pumping systems that run the most

In this case, "big" refers to the size (rated power) of the equipment required to drive the pump. We suggest you select the largest 25% of the pump population. If you have an equipment database, let the computer perform the selection. If not, an operator or facilities engineer should be able to create this initial listing within a few hours, based primarily on physical equipment size and general process knowledge. Approximate annual run times should be noted.

Step 2 — Focus on centrifugal pumps

Systems using centrifugal (as opposed to positive-displacement) pumps generally offer the greatest energy-saving opportunities. This is due, in part, to the inherent performance characteristics of centrifugal devices. If you use centrifugal pumps almost exclusively, you can disregard this step.



Sample screening process for pump population

Step 3 — Line up the likely suspects

The following types of systems are likely to harbor energy-saving opportunities. If a pumping system exhibits any of these symptoms, mark it "Highest Priority" and pay special attention to those that exhibit multiple symptoms.

- Systems with throttled flow control, particularly with significantly throttled values[1]
- Systems with bypass lines normally open for flow control or pump minimum flow protection (unless the minimum flow protection bypass flow is known to be less than about 5% of the normal flow rate)
- Systems with multiple parallel pumps for which the number of operating pumps is seldom changed
- A system with continuous, but variable, requirements and a fixed number of pumps
- Significant cavitation noise, either at the pump or in the system (such as at a throttled valve). At low levels, this sounds, live gravel being pump through the system. At high levels, more like a loud, raspy roar.

1 Particularly note systems where high loss control valves (e.g., glove valve) are used and valves are significantly smaller than the adjacent piping.

Two more factors to be considered:

• Systems with requirements that have changed over time (especially if demand has dropped) merit particular attention.

• Systems operated as a general utility (supporting plant-or unit-wide operations) represent likely opportunities; they typically receive less attention from plant management than systems with a close, obvious link to production.

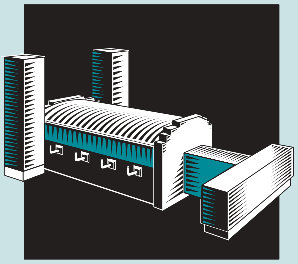
Although the steps on the previous page are presented in sequential fashion, knowledgeable plant staff who become familiar with the general process can usually perform all three steps at once. In fact, use of discretion should be actively encouraged, particularly regarding the symptoms. For example, if several of the symptoms under Step 3 apply to a pump with a driver that doesn't quite meet the size threshold, it might belong on the Highest Priority list.

Evaluate and take action

Each pump system must be considered on its own merits. The following table provides examples of actions that can be effective in reducing pumping energy.

Problem	Energy Saving Method	Typical Implementation Period*	Typical Payback Period
Unneeded Pumps	Investigate whether or not a pump needs to run continuously or at all. Manually turn off the pump if not needed or install an automatic start control to allow the pump to run only when needed.	Immediate to months (if automatic start control is needed)	Immediate to months
Variable Flow Requirements	Use adjustable speed drives or parallel pumps. Adjustable speed drives tend to be better suited to systems with high frictional losses, while parallel pumps are usually better suited to variable flow needs in systems that have a mostly static head.	Weeks to months	Months to year
Oversized Pumps (1)	Trim impellers. Use slower speed motors and/or gear reducers where pumps are dramatically oversized.	Days to months	Weeks to years
Oversized Pumps (2)	Where pumps are dramatically oversized, reduce speed with gear or belt drives or slower speed motor.	Weeks to months	Months
Oversized Pumps (3)	Pump replacement with a properly sized pump.	Weeks to months	Months to years
Worn Pumps	Repair and maintain pumps when performance degrades.	Hours to days	Weeks
Pipe Build-up	Clean piping systems to reduce frictional losses (use pipe pigs, high velocity, or chemical treatment to clean lines). Avoid build-up by use of gravity separation and if required chemical treatment and filtration.	Hours to days	Weeks to months

* The longer implementation periods (months) are primarily for engineering, procurement, and installation scheduling.



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