

# Pumps and fans



Pumps and fans often don't run at their maximum efficiency. Dampers, throttling valves, by-pass systems and pressure relief valves are used to reduce energy output levels to match demand, but these can make systems highly inefficient and use more energy.

One option is to trim impellers, install variable speed drives and improve controls, so motor efficiency is increased and equipment life is extended.

A simple rule to remember is to work backwards when trying to save energy. A unit of energy saved at the pump or fan saves 3.3 units at the motor, and

you can reduce your energy costs by over 80 percent if you can halve the motor speed.

### Assess operating efficiency

To assess efficiency of pumps and fans, check the systems flow rate. Determine if any throttling valves or dampers are restricting the flow rate to 10 percent less than the equipment is designed for. Excessive noise and vibration is another clue that your system is inefficient. If you do discover these things, consult an engineer or the supplier for the best solution to your problem.

An efficient pump or fan will reduce energy costs for your business. Consider the following tips to help you select the best size for your needs.

### Pumps

- Centrifugal pumps are generally oversized because pumping requirements are unknown and can change over time.
- Optimise the system requirements to avoid purchasing an oversized pump.
- Over-sizing can cause a pump to continually throttle to compensate and balance the system.

- To balance output efficiently, trim or replace the pump's impeller with a smaller one.
- A Variable Speed Drive can be installed on the motor.
- If a pump is continuously throttled to 10 percent less than its design flow rate, trim the impeller to reduce the electrical demand by up to 25 percent.
- Impeller pumps can be trimmed if they have a constant flow rate, have a partially closed discharge valve, and no process changes are planned.
- Quantify pumping process requirements and seek appropriate advice to take advantage of impeller.

## Fans

- It is common for most building fan systems to be oversized by an average of 60 percent.
- Resizing your fan system will help you save an average of 50 percent on energy costs.
- Trim impellers by altering the angle of the fan blades to reduce the load on the motor and save energy.

## Pipes and ducts

- Installing undersized piping or ductwork may reduce initial outlay, but it puts additional loads on the fans, pumps and motors increasing running costs.
- To reduce energy consumption of pumps and motors, increasing pipe diameter by only 15 percent will halve the pressure drop.
- To reduce energy lost to friction, minimise the number of bends and valves in pipework.

## Take control of pumps and fans

Applying controls to pump and fan systems can reduce energy consumption and costs. One way is to **turn off** your pump or fan when it's not required, which is where controls play their part.

**Slow down** pumps and fans to match output to demand. Use a Variable Speed Drive (VSD) to allow pump and fan motors to be matched to the actual load required.

Incorporating a VSD is a positive step towards becoming more efficient, but prolonged use of an oversized motor with a VSD at low speeds can reduce the life of motors and other equipment.

## Maintenance is invaluable

Establish a regular maintenance program for your pumps and fans. Clean pumps and fans to prevent dirt and dust build-up and deliver maximum efficiency. Dirty fans add weight to a system and increase pressure loss. It is important to keep filters, heating coils, silencers and fan blades clean to reduce weight.

Replace worn seals and fan blades. Use low friction coatings on internal surfaces of pumps to improve efficiency, and ensure drive belts are in good condition, evenly matched and correctly aligned.

## For more information

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