

# Advantages of Fluid Power



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Fluid power offers a wide range of advantages in comparison to electro mechanical power options. The following provides a review of these advantages.

## Efficiency

Fluid power is a highly efficient method of power generation — one of the areas that this efficiency is derived from concerns the amount of energy required to produce pressure. Fluid power systems support the maintenance of constant pressure within a system with minimal additional energy requirements. This delivers economical operation in fluid power systems from



reduced energy needs.

While the ability to maintain constant pressure with little effort drives efficiency in fluid power systems, the ease with which [hydraulic systems](#) can achieve high power outputs is also beneficial. The ability to scale power simply and effectively by utilizing hydraulics explains their wide use in large machinery and heavy industry applications.

Additionally, hydraulics provides a unique capability to change direction, speed, and torque across a system for a fraction of what it would cost to provide these capabilities using an electric motor. This ability to easily deal with a variable straight line or rotary based power delivery is a strong benefit of fluid power systems when contrasted with electric motor based solutions.

Another point of contrast regarding hydraulic versus electrically powered alternatives has to do with capacity. A hydraulic system can be designed based on the average load of a system, whereas, with electric motors, they must be sized to meet peak system capacity. This difference can result in significant savings.

Hydraulic pumps are also easier and more cost-effective for tasks that require both pressure and position control. Compare this to an electric motor, which requires constant torque to drive it which can lead to overheating. Not surprisingly this same characteristic of fluid power based systems means that they generally require a smaller footprint as compared to electromechanical options to deliver the same amount of power. This advantage increases as the power delivery requirements increase for specific applications.

The reduction in mechanical parts in a hydraulic as opposed to mechanical systems also creates benefits. For example, when machines must perform at slower rates of speed the gearing down required within mechanical systems between the gearbox and the motor is simply not as efficient as what can be accomplished with a fluid power alternative.

Staying with this line of reasoning it is also noteworthy that the greatly reduced number of mechanical components in a hydraulic system, when compared to a mechanical system, means less wear, breakage and overall maintenance requirements. This all translates into less downtime for fluid power systems.

### **Control & Accuracy**

By nature of their very design fluid, power systems offer ease of control and accuracy that is hard to match.

Firstly, the various elements of a fluid power system can exist in different locations. This means that the control elements of a fluid power system (e.g., levers and buttons) can be established at those locations where it is convenient for the system operator. This is possible because of the ability of hydraulic-based systems to generate and disperse power quickly and evenly without significant power loss over distance.

Also, fluid power systems can be designed to accommodate the environment in which they will operate regarding rises, bends or corners without appreciable degradation in their power output.

A central control capability of fluid power based systems is their ability to respond quickly and easily to the changes in acceleration or direction required for a particular application.

Finally, hydraulic pumps that are linked to fluid power manifolds provide the ability to easily control a number of machines from a single location.

### **Flexibility**

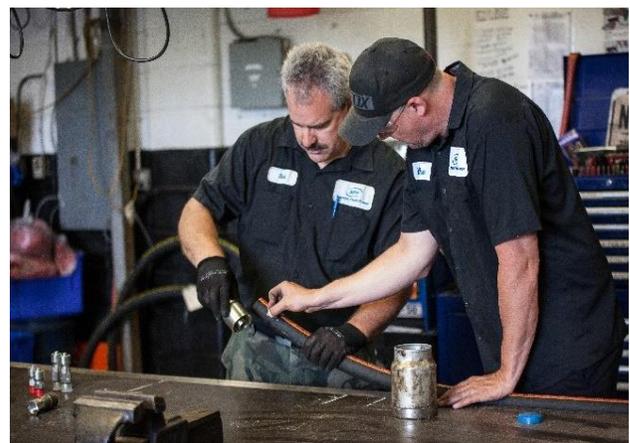
The lack of mechanical components that exist for electromechanical systems is an advantage for hydraulic systems when it comes to flexibility.

Think about it. Without mechanical parts such as pulleys, gears and levers fluid power based systems are flexible enough to support applications with widely varied load management requirements.



### **Ease of Maintenance**

Some of the things we have been discussing regarding fluid power based systems serve to make them easy to maintain. The fact that hydraulic power systems have little in





the way of mechanical and moving parts greatly reduces the potential for breakdowns. It is a simple truth that fluid is less likely to break than are mechanical parts and is easier on its supporting mechanisms.

For the most part, hydraulic systems are simple, safe and economical because they use fewer moving parts compared to mechanical and electrical systems, which makes them easier to maintain.

Another aspect of fluid power systems that helps in the reduction of maintenance costs is the ability of these systems to release pressure on the system in the event of an overload. This has the obvious benefit of preventing potential breakdowns.

Finally, as an outcome of the simplicity of designs that is part of hydraulic systems, i.e. no gear, levers etc. it is possible for lower skilled, lower cost operators to be employed to operate these systems.

## **Safety**

There are some specific applications for which fluid power provides a much higher degree of safety than electrical based power sources.

As hydraulic based power systems do not necessarily require electrical power, there is a greatly reduced risk of fire, sparking or shock.

This feature of hydraulic systems also means that they have advantages in some specific environments. High temperature, chemical and other such environments are better served by fluid power solutions.

To be clear hydraulic systems have historically been viewed as having safety concerns. The potential for accidents such as a ruptured [hydraulic hose](#) and the resultant release of high-pressure hydraulic fluid is a real concern.

It should be noted that steps to address this issue have resulted in a new generation of hydraulic fluids that feature water bases and increased fire resistance. This has resulted in the safer operation of fluid power systems.