Solving Common Problems in Hydraulic Actuators by Using Electric Actuators

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This whitepaper seeks to solve some of the most common problems associated with hydraulic actuators by replacing those systems with electric actuators when the force required is under 2,000lbs. Through understanding the problems, we can then begin to present workable, safe and efficient solutions, providing benefit to the customer, the manufacturer and the automated system.
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Introduction

The debate surrounding the benefits of each type of actuation, such as electric, hydraulic and pneumatic, has been raging on since their invention. As we move into the future, electric actuation is gaining steam and is now more than just a viable alternative to hydraulic actuation. It is becoming the preferred alternative.

Our world is changing, and so must our expectations in our components. New technology must take into account safety, efficiency, financial benefit and environmentalism to be truly effective. It’s not enough for an actuator to simply do its job anymore. A new system should provide solutions that ripple out toward the user, the operation, and even the community, while allowing the company to maintain the major benefits of the old system.

Hydraulic actuators, by design, exhibit problems associated with these modern issues. Alternatively, by implementing electric actuators into an already existing system, when that system requires less than 2,000lbs of force, these problems can be solved.
Part I: Problems Associated with Heat

Overheating is one of the most common problems associated with hydraulic systems. This can occur at various areas in the system. Overheating may exist at many different areas or in a combination of areas. The problem can affect the performance of each component individually, and it can have an effect on the system as a whole.

Determining the source of overheating can be a tedious, complex process. Due to the number of parts, discovering how deep the problem goes may be more than just finding the source of the heat. Once the source has been determined, a long maintenance process may begin. This can result in long periods of downtime, maintenance costs, and the purchasing or repairing of components or even entirely new systems.

That time and money is wasted.
Actuators with Less Heat

Electric actuators have no fluid, no hoses and a much more efficient motor. So long as these devices are used within their stated capabilities, overheating is not a problem with electric linear actuators, and if it does occur, fewer components are at risk of being damaged.

With the considerably lower risk of component damage, there’s also a lower risk of part replacement.

Your actuators and your applications are less likely to fail or stop working before you intend them to when you choose electric actuators.


Electric linear actuators are up to 80% more efficient than hydraulics. It can take as little as six months to start seeing the savings. Those costs aren’t only directly a result of operation. Since you have a more efficient, longer lasting device, you are experiencing less downtime, less maintenance and less time trying to troubleshoot problems.
Part II: Problems Associated with Fluids

Hydraulic actuator systems use fluids, usually oil. When the liquid is compromised or the seals that contain it are compromised, one of the most common problems to arise is leakage.

Although an individual might be inclined to ignore the problem of leakage when it occurs in small amounts, it is, in fact, a problem. Let’s take a look at the major issues associated with leakage in sections.

1. The Mess and The Slip Hazard

Every time hydraulic fluid leaks, it creates extra work somewhere along the system. That spill must be noticed, reported and cleaned by the appropriate employee. For every minute that leaks remains, it can present a fire hazard, and it always presents a slip hazard. An injury can cost you much more than it’s worth, especially if the accident could have been prevented.

2. Leakage and Heat

Hydraulic fluid can rise to temperatures that can easily scold skin. They can even get hot enough to penetrate the skin. Hydraulic fluid that has penetrated the skin can cause poisoning or infection.

3. Environmental Contamination

It is near-impossible to ignore the environmental hazard that these leaks pose when they occur. It may seem insignificant when it happens in small amounts, but a few thousand times over at the same site and the impact can add up.
Choose Less Fluid, Less Contamination and More Environmentalism

When you purchase a Progressive Automations’ electric linear actuator, you can bet the risk of contamination is a fraction of that of hydraulics. The only substance required for our linear actuators is a small amount of lubrication for the gears. This lubrication is more viscous than hydraulic fluids, lowering the chance of dripping if a leak does occur.

There is less risk of overheating fluids or contamination, keeping your employees and your environment out of harm’s way. Additionally, a strong sense of environmental awareness can increase your company’s marketability.

Make safety your priority.
Part III: Problems Associated with Contamination

There are two contaminants that can affect the performance of hydraulic system: foreign fluids and solids.

Particle Issues

Any hydraulic system you invest in will have PPM limitations on the particles, indicating how much contamination can occur before performance and integrity issues arise. Mere particle accumulation is enough to stop the system from working correctly if it goes on too long, but these contaminants may also interact with the fluid chemically, changing the way it operates.

Particle contamination can happen at any stage, from the fluid’s manufacturing to its operation. The way a fluid is stored before use can have an effect on whether it becomes contaminated, as well as the quality and make of replacement parts.

Foreign Liquid Issues

Foreign fluids and moisture can compromise the performance of the system over time. Even if a container of fluid is tightly sealed, wide fluctuations in temperature can cause sweating on the inside of the container, virtually unnoticeable until it is too late.

The biggest effect of these two problems is performance. Often these issues go unnoticed, and once they are, even decontamination can’t stop the progression. The final result is downtime and replacement.
Simplify. Remove the Risk. Improve Operation.

Electric actuators do not rely on fluids to function in the same way that hydraulic actuators do. Electric actuators require a small amount of lubrication for the oil, so the risk of contamination is significantly reduced. If the seals are compromised and contamination starts, replacing the lubrication is short work with only minutes of downtime.

When you have a system at less risk of contamination, you have a system that will operate better, longer and more efficiently.
Part IV: Problems Associated with Control

Hydraulic systems have got the power to move things, but they just don’t fit the bill when it comes to more delicate, precise operations. Typically, hydraulic actuators can achieve positions to one thousandths of an inch. To get the kind of control that other systems are capable of, it can be a costly venture. A basic hydraulic system just won’t have the kind of precision required for many operations.

Hydraulic systems rely on pressurized fluid, meaning that these systems are susceptible to issues with performance and repeatability. Using a high pressure system can improve these issues, but they are exchanged with the problem of more leakage.

Most components are not geared up for high-precision, high-performance control, and the ones that are often come at a high cost.
More Control

When you need the type of control that a hydraulic system just can’t provide out-of-the-box, electric actuators can deliver. Electric actuators can provide positioning control of up to ten thousandths of an inch. They provide more precise control for those delicate operations. You’re no longer wasting your precious bottom line spending more of it to get the kind of control that electric actuators can instantly provide you.

Precision. Control.
Part V: Problems Associated with Cost

After taking in the previous information, how the costs associated with operation go through the roof should be no secret. The financial strain on hydraulic systems manifest itself in four major ways:

- Downtime
- Replacement
- Energy Usage
- Complexity

**Downtime**

When a hose leaks, when a seal breaks, when contamination occurs or any other series of problems, it has to be fixed. The sheer complexity of a hydraulic system means that there is a higher likelihood of experiencing downtime.

**Replacement**

Every time a part breaks, you have to replace it. Hydraulic systems operate with a number of parts that, when they break down, need to be repaired or replaced. If you can cut down on the number of parts, you’re instantly saving cash.

**Energy Usage**

Sometimes we just accept energy usage as a necessary cost. The way in which hydraulic actuators use power makes them less efficient than their alternatives. Primarily, when a load requires a change in speed, hydraulic systems can’t react fast enough to make the entire system as efficient as others.

**Complexity**

A complex system inherently increases the risk of running higher operating costs. Each component must be maintained, fixed and replaced when it reaches the end of its life cycle. Hydraulic actuators commonly have a high number of components for operation.
Cut Costs

Electric linear actuators are less likely to break down. When you have a system that can deliver more up-time, you have a system that cuts down on your maintenance work and parts replacement.

Electric actuators are more efficient at using energy to change speeds. The low energy consumption of electric actuators translates directly into your bottom line. Those savings can be better spent where they’re needed most.

System Complexity: Hydraulic vs. Electric
Progressive Automations’
Linear Electric Actuators

- More Efficient
- Less Cost
- Less Maintenance
- More Safety
- More Control
- Less Fluid
- More Environmentalism

We’re constantly striving to manufacture the actuators that provide our customers with not only the benefit of a superior device, but a superior system. We carry a complete line of electric actuators designed to suit every manufacturing need.

If we don’t carry the actuator you want, we can custom create it for you.
Contact Us

Do you have questions about our products?

Get in contact with us by emailing
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