*FLOW EZY FILTERS NOTES*

# How Dirt Levels Affect Hydraulic System Performance

Did you know that by controlling the level of contamination (dirt) to acceptable levels you can eliminate as high as 80% of the potential causes of system failure? That is extremely important when you consider high equipment costs and our dependence on today's sophisticated and complex hydraulic fluid power systems.

The reason dirt plays a large role in system inefficiency is simple. In reality, dirt is minute abrasive "gravel" which travels through a system and internally deteriorates and destroys sensitive hydraulic components, causing reduced efficiency and, eventually, system failure. When we talk about "dirt" and "contamination," Contamination is defined as, "*anything that is in the system that is not supposed to be there."* That is why "water" is contamination, as well.

Here is what happens. . .

- **Surface scoring**—produced when abrasive particles flow across contact surfaces of hydraulic seals.
- **Clearance honing**—from dirt flowing through spaces between moving parts, creating greater clearances and destroying critical tolerances.
- **Fluid degradation**—fine metallic particles act as a catalyst promoting the chemical breakdown of the fluid.

If not properly controlled, the presence of dirt can initiate one or more of the following undesirable conditions.

- **Internal leakage**—or slippage, lowering the efficiency of pumps, motors, and cylinders, wasting power and increasing heat. Valves cannot control flow and pressure accurately.
- **Corrosion**—damage to delicate component parts from fluid degradation.
- **Sticking parts**—causing erratic or intermittent component operation.

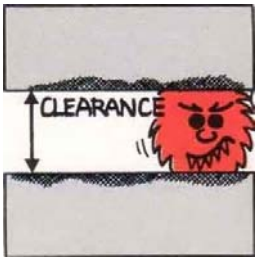
**Remember these facts!!**

- Dirt levels affect system performance
- Filters control dirt levels

Unless measures are taken to remove certain amounts of particles in hydraulic fluid, the dirt level will continue to rise until a component and the entire system fails.

**What is the cure?**

In this case the cure is simple - filters! Quality filters designed and built by a quality filter manufacturer is what's needed. That is why we urge you to rely on Flow Ezy, a filter manufacturer who has been making filters for over 67 years. We are filter specialists and filters are our only business.




**What do we know this guy, the enemy?**

Dirt particles that cause trouble in a hydraulic system are extremely small. Typically, 98% of hydraulic fluid is composed of particles so small that we cannot see them without magnification. Fluid samples from operating systems show us that as the size of a particle decreases, its quantity increases. In other words, the smaller the particles, the more there are in a given volume of fluid. Filters are the only available means of controlling the over-all level when such small particles are involved. However, before we can begin to eliminate hazardous dirt levels and contaminants, it is first necessary to understand their source.

**How does dirt get into a closed system?**

Since hydraulic systems are closed, and the same fluid is continually recirculated, you may wonder how dirt gets in. As an aid to understanding this basic problem, let's examine some of the most common sources of

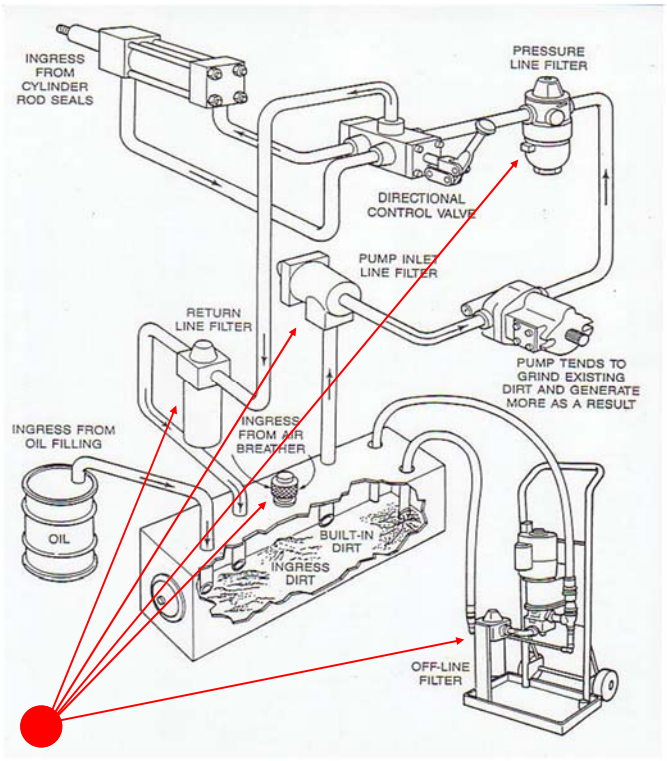
contaminants that contribute to higher levels of dirt in fluid power systems.

- **Built-In Dirt**—Specifically, core sand, weld splatter, metal chips, lint, and abrasive dust are all considered built-in contaminants. Also, the initial fluid charge within the system, before the system and equipment is turned on , will contain a certain amount of fine particles of contamination.
- **Introduced Contaminants**—These are particles that enter through the seals, fluid-filter tubes and breather caps, or when the system is open for component repair or replacement. Here, too, if fluid is added to replenish the reservoir supply, it will contain particle contaminants which are introduced to the system.
- **Internally Generated Particles**—Wear from system components also contribute to the presence of contamination. Friction of moving parts gradually produces small particles of metal and sealing materials, continuously adding to the particle count in the fluid.
- **Fluid Breakdown**—When chemical reactions occur within the fluid itself, the result is usually in the form of sludge and acids. Although not generally abrasive, sludge is a source of resinous coatings on moving parts, slowing movement and clogging passages. Acid, however, can pit and corrode vital internal parts.

Let's say you have a 20 gpm pump. The fluid is clean and the pump is producing 20 gpm with no problems. However, contamination loading builds up on the suction strainer thus restricting flow to the pump. What we now have is a higher pressure drop than what we should have to be able to operate at peak efficiency. The pump will still function, but because of degradation, it operates 50% less efficiently because of the excessive heat build-up which means other problems are soon to follow.

**Remember. . .** To maintain longer system life and higher performance, the optimum cleanliness levels must be maintained.

Take a look at the following diagram. It shows the 5 most important areas of filter placement in a fluid power system. Use this diagram as a guide when determining filter placement.

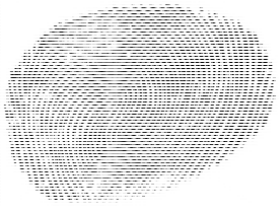



**5 areas of filtration placement in a fluid power system**

**Don't Overdo it:**

Flow Ezy believes there is an optimum level of cleanliness in all hydraulic systems, a level where increased filtration does not significantly reduce component wear. Keep economics in mind. You don't want to overdo it, but you don't want to "under" filter either. Determine the acceptable dirt level, choose the right filter combination and maintain the level of dirt below the limit. This is where filtration specialists come in to play.

**How To Select Filters:**



Individual filtration needs are as unique as fingerprints. Many factors must be considered before filter selection can be made. Flow Ezy has worksheets that can assist you in your decision making process.

- System components
- Flow rate
- Allowable system pressure drop
- Filter element life
- Type of fluid
- System pressure
- Ease of element maintenance
- Operating temperature
- Chemical compatability
- Level of filtration
- environment

If you are unsure about proper filtration selection, feel free to contact Flow Ezy Filters anytime. We will be glad to help you.