

ON YOUR OWN



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**Louisiana
Machinery**



KEEP IT CLEAN

Minute contaminants can be your machine fluid systems' biggest enemy.

No earthmoving machine is ever 100 percent clean. Contaminants are always present in the fluid systems. Sometimes contamination is introduced during assembly. Other times, it enters while the machine is working or being serviced. Whenever contaminants invade a system, they impair machine performance and reduce component life.

Equipment owners are demanding increased performance, improved efficiency and longer life from their equipment. As a result, Caterpillar has designed products with advanced electro-hydraulic components and high-pressure fluid systems. Today's hydraulic systems operate at pressures of 6,000 psi and higher. Fuel system pressures can reach nearly 40,000 psi. To achieve these pressure levels, Caterpillar designs must incorporate extremely tight tolerances. That makes them especially vulnerable to contamination that cannot be detected by the human eye.

Too Small to See

Contaminants are measured in units called microns. One micron is equivalent to one-millionth of a meter. A grain of salt is about 100 microns in diameter, a human hair, around 80. We can't see particles smaller than 40 microns, yet a 5-micron particle damages earthmoving equipment systems.

Most manufacturers assess the cleanli-



It's Never Too Late

Research shows that even high-hour machines achieve longer component life when strict contamination control procedures are applied.

- Make sure you're doing everything you can to minimize contamination during operation and maintenance.
- Find out what your dealer is doing to reduce the risk of contamination during service work. Observe your field technician. Visit the shop. Inquire about the tools and processes they use.
- Take advantage of your dealer's oil analysis services.

The Cat S•O•S™ Services program is a proactive approach to maintenance that enables Cat certified technicians to track machine condition.

ness of their fluid systems by counting and measuring the particles present in the oil and comparing those results to an International Standards Organization (ISO) code. An ISO contaminant code contains two numbers. The first refers to the number of 5-micron and larger particles in a 1-millimeter oil sample. The second indicates the quantity of 15-micron and larger particles in that same sample. A rating of 21/17 rating, for example, means that 1 millimeter of oil contains up to 221



(about 2 million) particles 5 microns and larger, as well as 217 (130,000) particles 15 microns and larger. A 1-millimeter oil sample that earns a 21/17 rating is equivalent to a 55-gallon drum of oil contaminated with a half teaspoon of very fine dust. Although that's considered "clean" by ISO standards, it's not acceptable for new Caterpillar machines.

In fact, if your machine meets the 21/17 standard – and the hydraulic pumps operate at 32 gallons per minute, 8 hours a day, 200 days per year – you're actually running more than 625 pounds of dirt through the hydraulic system annually. By improving cleanliness to ISO 18/15, you can reduce the amount of dirt in your system to about 80 pounds per year. Achieve a 16/13 rating, and the number drops to 20 pounds.

Doing the Dirty Work

No matter how much grime is circulating through your hydraulic system, the effects of contamination are serious.

- Productivity declines, often without your knowledge. As particulates build up on metal surfaces and impede hydraulic flow, system efficiency erodes. But even a skilled operator may not notice a drop in responsiveness until the system has lost nearly 20 percent of its power – or after you're getting just four days' worth of production for every five days on the job.
- Component life suffers. A three-year independent study of hydraulic systems found that some hydraulics components lasted up to 10 times longer with proper contamination control.
- The odds of a catastrophic failure increase. Left unchecked, severe contamination leads to unplanned failures, unscheduled downtime and higher repair costs. ■

Controlling Contamination: Factory to Field

Manufacturers, dealers and owners can work together to maximize contamination control. Their united efforts keep earthmoving machines clean over their entire life cycle.

Manufacturer

The manufacturer is primarily responsible for designing and building clean equipment.

- Work with suppliers to improve the cleanliness of purchased finished parts and components.
- Educate employees about the vital role they play in contamination control.
- Redesign work stations to enhance cleanliness.
- Invest in advanced cleaning technologies.
- Provide covers and doors for storage areas.
- Use foam and plastic packaging, rather than cardboard, to reduce paper contamination.
- Filter oil repeatedly prior to filling new machine systems.
- Use particle counting technology to verify cleanliness before shipping.

Dealer

Here's how your local dealer must control contamination:

- Manage oil storage and transfer systems effectively.
- Maintain a clean work environment in all service areas.
- Train employees to use proper maintenance and repair processes in the field, as well as in the service shop.
- Invest in tools and technology that enhance contamination control efforts.
- Advise customers on ways to control contamination.



Owner

It's the owner's job to reduce the risk of contamination during operation and maintenance.

- Control operating temperature to reduce internal wear.
- Fix leaks immediately. If oil is leaking out, particles are getting in.
- Replace worn seals without delay. A bad seal makes a perfect entry point for dirt.
- Remove old filters carefully. They hold sludge that can fall back into the system.
- Keep new filters packaged until they're ready for installation.
- Drain oil when it's warm and agitated. And make sure to drain the dirty fluid as thoroughly as possible.
- Use a filtered fluid transfer cart to add new oil.
- Enroll in an oil-analysis program.