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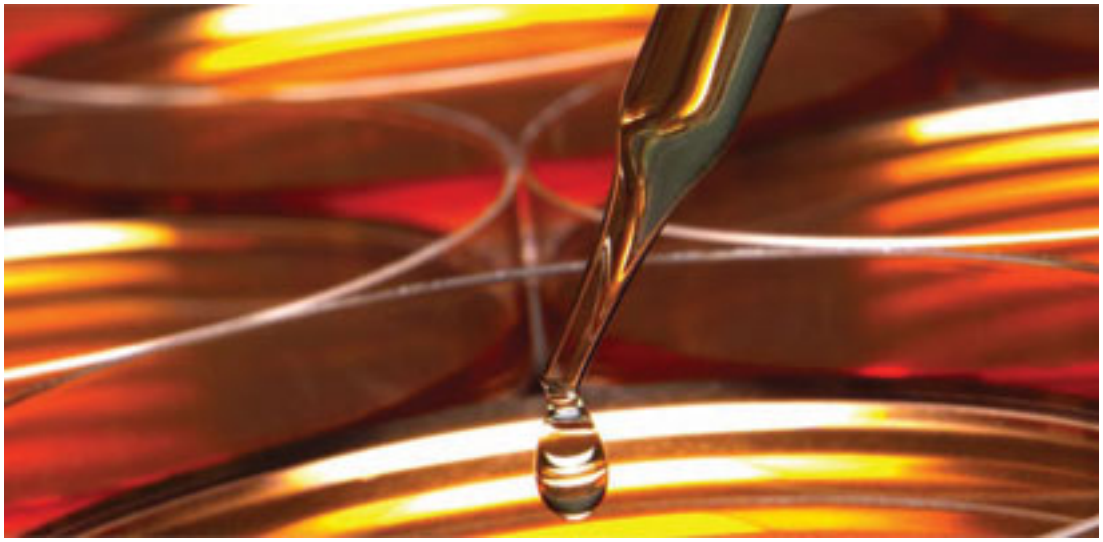

Clean oil greatly extends equipment life. Studies have indicated that over 70% of the equipment failures in circulating systems were caused by particulate contamination.

A key component in developing and maintaining an oil-cleanliness program is the ability to accurately measure that cleanliness. The most common method involves optical particle counters designed for use in the field or an oil-analysis laboratory.

Any circulating oil system where cleanliness is important should routinely have particle counts run on it. The frequency is dependent on the criticality of the equipment—*normally, though, it's on a monthly basis* .
Figure 1 is a diagram of a typical optical particle counter with a fluid flowing through a laser light source. As the light encounters particles, a photosensor records the resulting shadows. This provides an electrical input. The particle counter is calibrated with a sized test dust, and the results are expressed as the number of particles in specified size ranges—
typically in terms of particles per milliliter.
(Some labs, however, report particles per 100 milliliters.) Interestingly, the light will also count water droplets and air as particles.

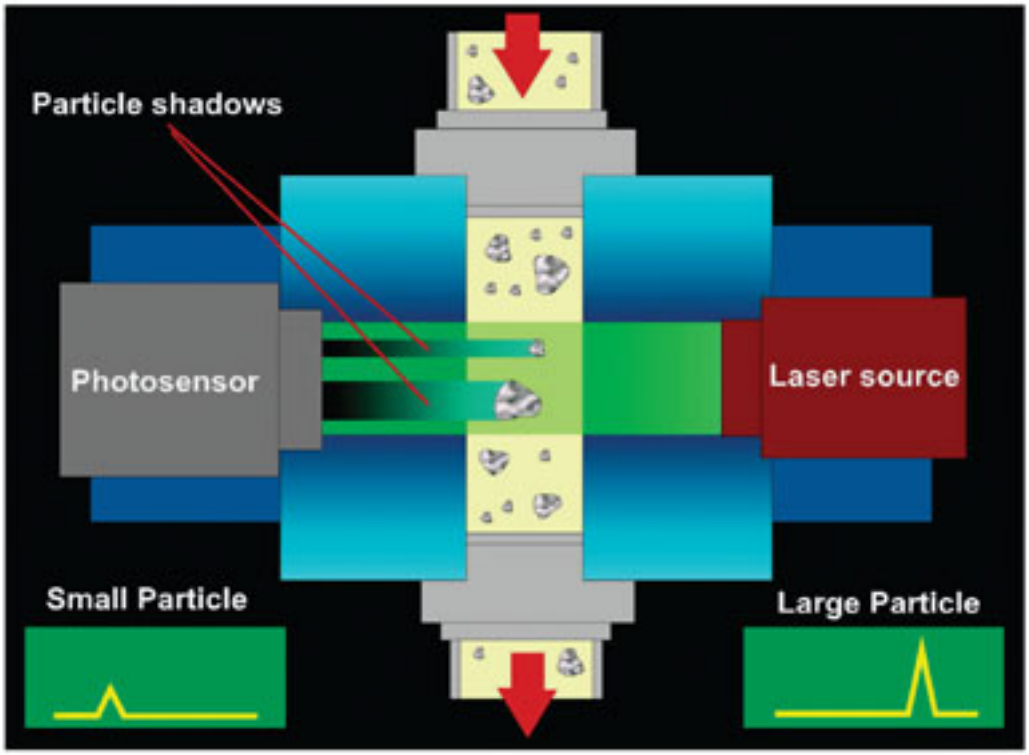

Fig. 1. Diagram of a typical optical particle counter

Restrictions on the use of optical particle counters include:

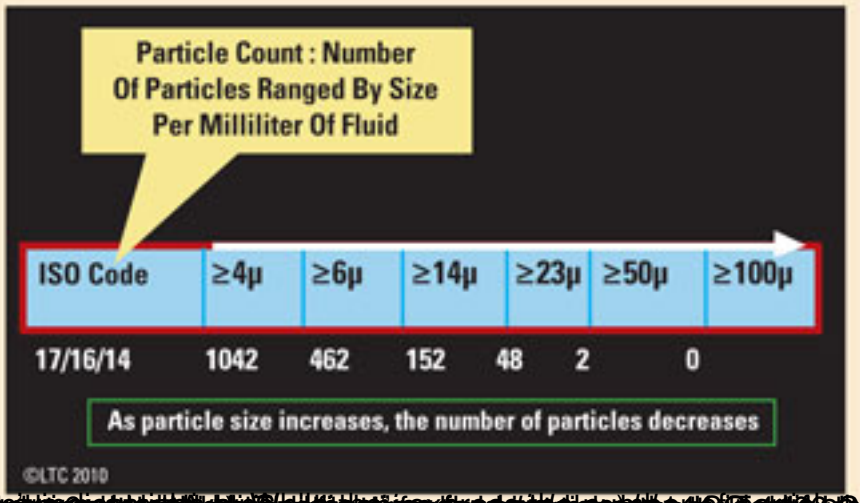

Fig. 2. Typical lab report of a particle-count analysis

Table I. ISO 4406 Cleanliness Code Chart

Range Number	Number of particles per ml	
	More Than	Up to and including
24	80000	160000
23	40000	80000
22	20000	40000
21	10000	20000
20	5000	10000
19	2500	5000
18	1300	2500
17	640	1300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	0.64	1.3
6	0.32	0.64

[illegible]