



Particle Count results, although typically very high on a non-filtered gear system, provide limited information as to any ferrous wear occurring. PC measures **all particles** present > 4, 6, 10, 14, 21, 38, 70 and 100 μ and assigns an ISO Cleanliness Code based on the 4, 6 & 14 μ levels. It **does not** distinguish between metallic, non-metallic, fibers, dirt, water, bacteria or other debris. While Particle Count does establish a level of fluid cleanliness, it **cannot** determine if ferrous wear is occurring.

Hydraulics, turbines, compressors and automatic and power shift transmissions are typically expected to operate for long periods of time under extremely close tolerances. Routine testing in filtered systems like these – when fluid viscosity is less than ISO 320 – should always include a Particle Count so that **any** potential wear-causing dirt and contaminants are detected early enough to take corrective action.

Direct Read Ferrography measures **only ferrous particles**, providing a ratio of large ferrous particles (>5 μ microns) to small ferrous particles (<5 μ). The farther the distance between the large and small number indicates that larger ferrous particles are being generated. The closer the large and small number are to each other indicates that the majority of ferrous particles being generated is less than 5 μ .

Gear systems operate under a boundary lubrication regime, are made primarily from steel alloy and have very high tolerances for larger particles. Therefore, some degree of ferrous wear is always occurring. Roller bearing systems operate under a hydrodynamic lubrication regime, but their small clearances will not tolerate even small ferrous wear particles. In either case, ferrous wear is the primary concern making Direct Read Ferrography the better choice for the most accurate picture of what is actually happening inside the unit.

So what does this ratio of ferrous large to ferrous small mean to you and how do you know what action to take?

DR results should always be considered in conjunction with accompanying test results. For example, if the ratio of ferrous large to ferrous small indicates that larger ferrous particles are being generated, ICP results for iron should be low since



ICP reports only iron particles $<5\mu$. A low ICP number for iron therefore supports DR results that indicate larger ferrous particles are being generated.

However, what may be considered an alarming DR result for one unit may not necessarily present the same cause for concern in another, regardless of correlating test results. A unit's metallurgy, sump capacity, load requirements and the environmental conditions under which it operates are all factors to be considered when determining what, if any, maintenance action should be taken.