



PQ Provides Low-Cost Alternative to Direct Read Ferroggraphy

PQ, or particle quantifying, is becoming an increasingly popular method for measuring concentrations of large ferrous wear particles in used oil samples and, when supplemented by spectrographic oil analysis, such as ICP (Inductively Coupled Plasma) Spectrometry (metals analysis), PQ provides a low-cost alternative to Direct Read Ferroggraphy for many reasons.

Unlike DR, PQ does not require multi-phase dilution for accurate results. The expense of using chemicals and the hazards of handling them are eliminated. Less material interference reduces both sample preparation time and the probability of human error. Therefore, PQ not only has better repeatability - it makes trend analysis more reliable and costs less.

HOW PQ WORKS

PQ exposes samples to a magnetic field. Those containing ferrous metals cause a distortion in the field, which is represented as the PQ Index, an arbitrary unit of measurement that correlates well with DR ferro large. The PQ is designed to monitor trends. It does not provide a ratio or FWPC (Ferrous Wear Particle Concentration) code of small to large particles as does DR. However, if the PQ Index is smaller than an iron ppm by ICP, it's unlikely that particles larger than 5 microns are present. If the PQ Index increases dramatically while the ICP's iron ppm remains consistent or goes down, larger ferrous particles are being generated and further testing or diagnostics would likely be recommended.



EXAMPLE:

Helical gear		<5 micron ferrous wear	>5 micron ferrous wear
Iron	PQ Index		
129 ppm	21	Normal <5 micron wear	Very little >5 micron
129 ppm	126	Normal <5 micron wear	Minor level >5 micron
129 ppm	208	Normal <5 micron wear	Moderate level >5 micron
129 ppm	355	Normal <5 micron wear	*Significant level >5 micron
129 ppm	552	Normal <5 micron wear	*Severe level >5 micron
Trend			
152 ppm	68	Normal	Normal
229 ppm	92	Upward trend	Some increase in larger wear
447 ppm	211	Wear event occurring	*Larger wear increasing
459 ppm	408	Small wear stabilizing	*Significant larger wear
222 ppm	817	Small wear decreasing	*Severe large wear (Failure event)

*An increasing PQ Index with little or no change in Iron ppm <5 microns is a strong indicator that Iron particles >5 microns are being generated and an Analytical Ferrograph should be performed to qualify the type of wear, alloy and source.

WHY INCLUDE PQ IN YOUR TESTING REGIME?

The benefits of PQ are substantial. There is no single laboratory test that gives a result to quantify or qualify wear. Metals analysis from AES (Atomic Emission Spectroscopy) is typically limited to <10 micron metallic particles. Most wear trends start with the smaller size particles and will eventually lead to larger (>10 microns) wear particle generation. If your testing regime only includes metals analysis from spectroscopy, you are not getting all the information you need. Including PQ gets you much closer to the full picture.

ADDITIONAL TESTING

Carefully monitoring Iron concentrations with metals analysis and particle quantifying will identify the development of wear trends and provide the trigger for ordering an Analytical Ferrograph to qualify the type and severity of the wear. Analytical Ferrography is a powerful tool and when used in conjunction with metals analysis, PQ, viscosity, acid number and water content, helps a Data Analyst provide users with a well-defined course of action to correct the condition of the unit and/or the lubricant.



WHAT UNIT TYPES SHOULD UTILIZE PQ

PQ works very well for units where ferrous metals are the primary wear concern. These unit types include, gear systems, transmissions, PTO's, wheel motor bearings, rolling element bearings, rotary screw compressors, reciprocating compressors, engines and hydraulic gear pumps.

WHAT PQ CAN DO FOR YOU

PQ is a very inexpensive way to regularly screen samples for ferrous metals and provides adequate information for recommending further testing on those samples determined to be problems. By far, it is considerably more thorough and cost effective to do PQ on a regular basis and run Analytical Ferrographs on samples with potential problems than it is to run a DR on EVERY sample.