Magnetism in an Engine

The AERA Technical Committee offers the following information regarding magnetism within an engine. Magnetism in an engine is an unwanted phenomenon and it is a best practice to remove anytime it is noticed, especially during repairs.

While a small limited amount may be acceptable, the source or cause of magnetism must be found and eliminated to reduce the likelihood of reoccurrence. The following is a suggest procedure to remove magnetism from engine components.

If your engine is magnetized, disassemble engine and inspect for: magnetism of ferrous engine components, electrical pass through damage, dirt/debris in lubrication system, worn or damaged bearings and bushings/other components.

PERMISSIBLE MAGNETISM LEVELS CHART

Injectors and Ferrous Injector Components	All Other Ferrous Components
5 or less gauss units	15 or less gauss units

Use a gauss meter and measure magnetism of each ferrous component. If magnetism is incorrect, service engine assuming that debris has contaminated lubrication system and caused worn or damaged components. If gauss units are more than specification, replace or demagnetize component using device used for magnetic testing (Magnaflux). Visually inspect lubrication system components. Clean oil galleries. Replace these items: main bearings, thrust bearings, connecting rod bearings, and camshaft bushings.

NOTE: DO NOT demagnetize sensors, engine control modules, or actuators.

- Demagnetize component either passing component through an alternating current coil, 50 or 60 cycles per second or passing a reversing, 30-point step down current through component.
- If using coil, position coil so longest axis of component is perpendicular to coil when passing through.
- Ensure components are passed through at least 18 - 24 in (457.2-609.6 mm) beyond coil.

NOTE: Use alternating current coil just large enough for components to pass through. If a small component is passed through a large coil, no demagnetization will occur.

NOTE: Demagnetize smaller components using alternating current coil and larger components using reversing 30-point step down current.

If using coil, position coil so longest axis of component is perpendicular to coil when passing through. Ensure components are passed through at least 18-24” (457-609 mm) beyond coil.

CAUTION: Placing small components into a basket and passing basket through a coil as an attempt to demagnetize is a useless effort. **DO NOT** demagnetize a whole engine assembly.

Clean and inspect all components with acceptable levels of magnetization for reusability. It is important to realize some components may not achieve acceptable levels and should not be re-used at that time. Re-checking at a much later time may provide acceptable levels of magnetism. Magnetic forces in parts can reduce over time through a phenomenon called attenuation if the part is not subject to heat, friction, vibration or forces that applied the unwanted magnetism to begin with.

Direct current demagnetization is accomplished using a magnetizing unit. For this application, mount the component between head and tail stock; activate demagnetization controls and reversing, step down current passes through component; and then using a gauss meter, test all components.

An electric current concern is often indicated with clearly defined pattern of tiny pits, or fluted surfaces. Metals, sources, and movement influence patterns. Pitting is usually observed with insert bearings while fluted surfaces or wavy lines of pitting are prone to anti-friction bearings, such as ball bearings. Pitting patterns vary with rotation, vibration, and current.

It is important to trace to following areas to locate electrical fault and correct the cause:

- Components that are electrically actuated.
- Incorrectly grounded voltage system.
- Ground path made through crankshaft when some component (generator or engine block etc.) are not grounded correctly.
- Belts or other moving components are generating static current