TYPICAL FERROGRAPHIC WEAR PARTICLES

**RUBBING WEAR**
Flat platelets < 15 microns in major dimension
- **Cause**: Normal machine wear
- **Magnification**: 500x

**SEVERE WEAR**
Flat elongated > 20 microns with striations
- **Cause**: Excessive load/speed on sliding surface. This example is composed of copper alloy.
- **Left**: Magnification 500x
- **Right**: 3D photomicroscopy

**ABRASIVE WEAR**
Long, curved strips of metal Heat treated
- **Cause**: Misalignment or abrasive contamination in lubricant
- **Magnification**: 500x

**CHUNKS**
Flat striated particles Heat treated
- **Cause**: Fatigue, scuffing or scoring of gear teeth
- **Magnification**: 200x

**LAMINAR WEAR**
Laminar platelets Heat treated
- **Cause**: Rolling contact failure
- **Magnification**: 500x

**SPHERES**
Small spheres < 5 microns in diameter
- **Cause**: Early warning of rolling element bearing failure
- **Magnification**: 500x

**DARK METALLO OXIDES**
Black particles aligned in magnetic field
- **Cause**: High operating temperatures and/or insufficient lubrication
- **Magnification**: 500x

**RED OXIDE**
Red-orange particles aligned in magnetic field
- **Cause**: Water in the oil or poor lubricant condition
- **Magnification**: 500x

**CORROSIVE WEAR**
Heavy concentration of fine particles at exit of ferrogram
- **Cause**: Oil additive condition
- **Magnification**: 100x

**FIBERS**
Non-aligned and passes transmitted light
- **Cause**: Possible paper filter failure
- **Magnification**: 200x

**FRICION POLYMERS**
Amorphous materials which pass transmitted light
- **Cause**: Excessive load or stress on lubricant
- **Magnification**: 500x

**CONTAMINANT SPHERES**
An indication of welding, grinding, sandblasting, etc., near the equipment
- **Cause**: Outside contamination
- **Magnification**: 500x

**LOW ALLOY & MEDIUM ALLOY STEEL PARTICLES**
Heat treated ferrogram (1300°C/2372°F) show both blue and gold temper colors indicating low alloy steel and medium alloy steel respectively
- **Cause**: Abnormal gear wear
- **Left**: Magnification 400x
- **Right**: 3D photomicroscopy

**LEAD/TIN BABBITT**
Nonferrous – before and after heat treatment
- **Cause**: Babbitt journal bearing wear
- **Magnification**: 500x

**MOLYBDENUM DISULFIDE**
Nonferrous particle, gray in color with many shear planes
- **Cause**: Solid lubricant additives in system
- **Magnification**: 400x

95% of your ferrogram analysis can be identified on this chart.