

3 Interpretation of Used Oil Analysis Results

Changes in the properties of lubricating oils depend on the type of oil as well as the lubricating and operating conditions of the various machinery and equipment used. For more effective lubrication control, it is advisable to find the cause for change in the oil properties through examination of the analysis test results in order to determine appropriate countermeasures.

Listed below are the usual cause of changes in oil properties :

Tests	Causes	
	Decreased Value	Increased Value
Specific Gravity	<ol style="list-style-type: none"> 1. Oil of lower specific gravity being supplied/introduced 2. Fuel diluted by light fuel 	<ol style="list-style-type: none"> 1. Contamination by insoluble matters (eg metal powder, fuel residues and carbon) 2. Deterioration of oil 3. Oil of higher specific gravity being supplied/introduced
Flash Point	<ol style="list-style-type: none"> 1. Fuel dilution (lighter fuel has more pronounced effect) 2. Oil of lower viscosity being supplied/introduced 	<ol style="list-style-type: none"> 1. Oil of higher viscosity being supplied/introduced
Kinematic Viscosity	<ol style="list-style-type: none"> 1. Oil of lower viscosity being supplied/introduced 2. Diluted by lighter fuel 	<ol style="list-style-type: none"> 1. Oil of higher viscosity being supplied/introduced (e.g. Trunk type diesel engine increase in kinematic viscosity is usually caused by entry of cylinder oil) 2. Contamination by insoluble matter 3. Deterioration of oil 4. Emulsification due to water
Total Acid Number	<ol style="list-style-type: none"> 1. Large amount of new oil being supplied 2. Decreased value occurring in the initial stage of use due to characteristics of lubricating oil (often observed in turbine oil with additives) 	<ol style="list-style-type: none"> 1. Oxidized substances from combustion 2. Deterioration of oil (difficult to observe deterioration in HD type oil)

Tests	Causes	
	Decreased Value	Increased Value
Total Base Number	<ol style="list-style-type: none"> 1. Consumption of additives (ability to act as detergent, disperse and neutralize acid) 	<ol style="list-style-type: none"> 1. New or "made-up" oil is added 2. Entry of cylinder oil 3. Residue of chemical purification liquid
Solvent Insoluble and Contamination Level	<ol style="list-style-type: none"> 1. Supply of new oil 2. Effect of purification 3. Renewal of filters 4. Precipitation in lubrication system 5. Inappropriate sampling method 	<ol style="list-style-type: none"> 1. Extreme amount of combustion residues entering oil 2. Heavy corrosion and wear 3. Bad environmental conditions (sand & dirt enter into oil during machine operation) 4. Oil filter is plugged 5. Deterioration of oil
Water Content	<ol style="list-style-type: none"> 1. Water evaporation 2. Inappropriate sampling method 	<ol style="list-style-type: none"> 1. Cooling water temperature too low 2. Water leakage from cooling system 3. Severe blow (by gas) esp. in trunk type diesel engine 4. Inappropriate water injection method in detergent action 5. Decrease of oil anti-emulsification property
Colour	<ol style="list-style-type: none"> 1. Supply of new oil 2. Oil of paler colour is supplied/introduced 	<ol style="list-style-type: none"> 1. Combustion residues (esp. carbon particles) and entry of foreign substances into oil 2. Deterioration of oil (formation of sludge)