IB002. WHY WATER AFFECTS LUBRICANT PERFORMANCE?

How water affects lubricant performance

Lubricants consist of base oils and additives, some of these additives performance will be affected by the ingress of water. For example the detergent, calcium carbonate may deteriorate upon the presence of water, resulting in a “de-carbonation” phenomena in the lubricant, which may cause the base number to decrease. As a result, the calcium carbonate accumulate and block the pipes causing serious problems. ZDDP multi-functional properties may also be affected by the ingress of water.

Another major problem caused by water is the formation of sludge and corrosion. In the presence of water, the acids, ketones, aldehydes, esters generated from the degradation of lubricants, may easily form sludge in the “colder” part of an engine. And corrosion in the bare metal parts are inevitable in the presence of water.

Sources of water contamination

Water can enter the lubricant in various ways. During engine combustion, CHx is a major way of generating water during low operating loads, it would seep into the crank case through the cylinder wall. Another source maybe the leakage of cooling water. Modern engines are cooled by lubricants, however there are engine which are still being cooled by water, as such the pipes may have a risk of water leakage into the lubricant.

Storage tanks could also be a source of water ingress. During the night, when ambient temperature is lower than daytime, water vapour will condense on the tank walls and drip into the lubricant.

Warning limits of water contents

Although there are various ways of water contamination occurring and the harmful effects that it can create to the lubricant and engine, water content is acceptable and normal to a certain extend. Typical water content and warning limits are listed in the table below.

Lubricant	Acceptable Range
TPEO	0~0.25%
System Oil	0~0.25%

Even though water content is acceptable to a certain degree, it is best to eliminate the presence of water in the lubrication system. Always check the water content in your lubricant to ensure that it is within the acceptable range. Finally, the best recommendation is to identify and stop water ingress as soon as possible to keep your lubricant dry.