

Memo



To: All Staff involved in Industrial sales
of X-1R Asia Pacific

From: Nigel McKenzie

Cc:

Date

2nd March 2007

Subject: Engineering Bulletin, Testing procedure in medium speed diesel engines and the need to create Elasto-hydrodynamic and Extreme Pressure internal regime to facilitate the creation iron chloride.

Recently we have encountered an engineering problem during a live test of a large output capacity diesel fired electricity generator. The engine in question was a medium speed type with a steady state of about 600 RPM. During the test there were minimal improvements in the fuel economy after the treatment with X-1R engine treatment. This has given cause for concern as we have routinely gained a minimum of 5% improvement, with 11% being more typical when the engine treatment is used with a fuel treatment. There are a number of reasons why this may have occurred and thus this short memorandum is an attempt to help you all avoid some of the potential problems.

Within any engine there are differing pressure regimes. All engines are designed to function primarily in Hydrodynamic Regime. This is where all the moving parts are covered with a measurable layer of lubricant. Nearly all engines are designed to have a hydrodynamic regime when they are operating at steady-state, this is typified by the long cruise down the freeway where the engine is at a constant speed and well below maximum operating load.

As the engine is increasingly stressed the aspirarities (the engineering terms for the peaks and irregularities on the surface of metal)become closer and start to create a turbulent flow, this increases the viscosity and thus reduces the engine efficiency. This is termed Elasto-Hydrodynamic. This occurs when there are significant load variations and an over-all increase in engine stress.

Finally as the either the load is dramatically varied or the machinery is operating nearer the top end of the recommended range the machine will enter into an Extreme-Pressure regime. At this point the oil is squeezed out and lubrication becomes ineffective.

As an additive designed to work synergistically with ANY engine X-1R has been formulated to undertake a number of differing functions within any engine. Part of the product, and the one that has the greatest effect as a friction modifier or eliminator is what is know as the EP package. Basically the EP package is designed to be inert and thus it needs to be activated. To activate it we need three elements;

Time + Heat + Pressure = Lowered friction

When we apply the above three items to the EP package within X-1R engine treatment a chemical reaction occurs which creates IRON CHLORIDE (a mix of Ferrous and Ferric elements). This is a layered compound that behaves in a similar manner to graphite (graphite is an amazing lubricant, the reason that we do not use graphite in an engine is because it is a solid similar to PTFE and thus would potentially harm an engine). We use a liquid format to deliver this graphite so that as the effect is required it can be "manufactured" by the engine as it is required. Thus we need to create some extreme pressure within and engine to "activate" one of the primary components of X-1R.

Therefore to create Iron Chloride we need to stress our engine. This is achieved in two ways firstly by varying the load on the engine. This is achieved by increasing and decreasing the revs dramatically over a period of time and thus creating an Elasto-hydrodynamic regime within. Conversely and just as valid is to run the machine at maximum revs for as long as you are allowed to do so. Dr. Brian Taylor recommends a combination of the two although he does caution that in many power generating situations the plant managers and engineers will not allow lengthy "red-lining" of their machines and thus you will need to negotiate to run the machine as high and for as long as will be permitted and repeat this for approximately the length of time that it takes to cycle the lubricant through the engine.

Thereafter to gain the maximum benefit from the engine treatment we have proven (I refer to the work of Dr. J Micklow) that operating in a steady-state is where we see the lowest improvements from our product. Therefore, a live test incorporating two similar generators over a period of time is really the way to test our product.

There are other areas that must be considered when testing any engine but in particular the larger medium speed types.

1. Even though the engine may look clean from the outside there is a possibility that internally it is not. Therefore, one method of ensuring that our product is seen in its best light is to treat the engine a day or more BEFORE the oil change during which time the engine is stressed creating at least an Elasto-hydrodynamic regime. If possible remove the oil when the machine is still hot, this will aid the removal of sediment (et al) and thus you have a greater chance of creating a good result. In addition to this it will allow for the formation of Iron Chloride and thus the reduction in the size and amount of aspirarities therefore reducing the increase in viscosity associated with them making your engine run more efficiently. With the ol change treat the engine a second time with at least 50% of the normal treat rate.
2. During the pre-oil change phase and for the last day tank to be used prior to the oil change it is also advisable to treat the fuel with our additive as well. In many locations the handling of the fuel will be poor and thus a "double-dose" of treatment can be applied. After the oil change treat a second day tank. Measurements can be started whilst the second treated day tank is being used but don't be surprised if the results are worse as there is a need to allow some "soak-time" to get rid of all of the wax, carbon and other contaminants that will be negatively effecting the fuel efficiency. Also do not be surprised if the exhaust becomes dirtier for a while, this is our product eliminating the crud from the engine.
3. It is imperative the al of the products are mixed effectively and efficiently.
 - a. For both medium and high speed generators always try to add the product from the top of the engine preferably whilst the machine is on. This allows for the engine to effectively act as an agitator.
 - b. If you are in a situation where the oil sump is external to the machine then trying to follow step a. above is imperative. However, if you cannot ad to the top of the engine then you must ensure that the product is effectively mixed into the lubricant. Always check the lubricant outlet and return locations. They should be designed to be far apart on the reservoir, however if they are not you may not be achieving adequate mixing and thus a differentiated oil profile could be achieved. This is not good as it means that our product will sit on top of the oil and not be cycled and thus not show a benefit.
 - c. Mixing the Fuel Treatments adequately is absolutely imperative otherwise they move through the engine as a slug or pill and not have soak time and thus not work.

I trust that this is food for though

Nigel McKenzie
March 2007