

TECHNICAL BULLETIN ON MILITEC-1® IN DIESEL ENGINES

From an interview with Michael J. Politte, June 7, 1991.

Source of Information

Mike is an E9 Engineman and 4314 Diesel Inspector in the U.S. Navy's Pacific Fleet. He was Shop Master for the engine overhaul facility at the Shore Intermediate Maintenance Activity (SIMA) in San Diego, California. For a period of 8 months he had considerable experience in the use of Militec-1. The following interview report is based on his personal experience and is not meant to represent the official views of the U.S. Navy.

Early Skepticism

Mike was initially skeptical of the Militec-1 claims and any "mechanic-in-a-bottle". It was only when he observed a dramatic change in the way the machine shop tools were working (drilling, tapping and cutting) with Militec-1 applied that he thought that there might be something of value here.

Militec-1 as an Assembly Lube

The first step then was to try Militec-1 as an assembly lube. The pre-lube compounds that were then being used for assembly lubrication were interfering with the oil analyses that were done subsequent to break-in. These lubricants had copper oxalates and other compounds which would confuse the oil analysis readings. Mike thought that Militec-1 might provide the necessary assembly lubrication but without interfering with the oil analyses. He found that not only did it provide such a benefit, but it also afforded much greater protection of the metal surfaces.

A major problem for the metal surfaces is that once engines are overhauled, there often is a considerable time lag before they are put into operation. Lubricants that have been used during assembly are inadequate to protect the metal surfaces from considerable rust, corrosion and acidity. The oils are hygroscopic (water-absorbing) in nature and therefore promoted the rust and corrosion activity. When Militec-1 was used, the metal surfaces remained in excellent condition.

Protection for Emergency Diesels

This same problem also existed for emergency diesels that were run only for emergency or periodic tests and were damaged by inactivity. While Militec-1 also protected the metal surfaces of these engines when they were inactive, it protected them equally well during start-up. These engines come on line with full power and full speed with no warmup. Considerable wear occurs before the lubricating oil has had a chance to fully circulate. Mike found that this wear did not occur when Militec-1 was used. For the newly overhauled engines, Mike found that the normal piston scuffing and bearing scrape that occurred during break-in disappeared when Militec-1 was used.

The Need for Operating Parameters

The diesel engines used for normal operations are Stewart & Stevenson 149s (16V Detroit Diesels that are modified by Stewart & Stevenson Services, Inc. and attached to a generator set before delivery to the Navy). They have manufacturer-required operating parameters that are important to follow to minimize wear. This is especially important for start-up and shut-down. For start-up, the engines should not be accelerated until the oil has had a chance to fully circulate. For shut-down, engines need to be idled first.

Out-of-Parameter Operation

Mike does regular inspections of his overhauled engines to see how well they are performing in service. He cannot monitor the engines during use so he cannot know how they were operated. If the engines have problems, his facility could come under criticism for an inadequate job. Yet, the problems of an engine may be due to "out-of-parameter" operation rather than any inadequacy during the rebuild. Mike found that Militec-1 protected the engine against abuse by "out-of-parameter" operation. When he inspected engines that had been running with Militec-1 until the inspection (which could be 250 hours or more), he found that the rocker arms and piston skirt areas did not show the wear that normally occurs.

Protection for High-Speed, High-Output Diesels

The Navy also uses high-speed, high-output diesels (e.g. 8V 71TI twin turbo intercooled with a 149 injector) that use a 30W 9250 oil. The life expectancy of these diesels is relatively short primarily because of inadequate lubrication during start-up (light-off) and shut-down. During light-off, the turbo starts spinning without oil and the bearings are running dry (it takes a few seconds for the oil to get up there). This is especially harmful when the engine is accelerated before the oil is in place. During shut-down the turbo is hot and free-wheels and there is zero oil pressure while the turbo winds down. The engine must be idled for a considerable period of time to allow the turbo time to cool. The idling time is often inadequate and the turbo is too hot while it free wheels without any oil pressure.

Dyno Tests on Turbo-Charged Engines

The Navy ran dyno tests with and without Militec-1 on turbo-charged engines without adequate cooling before shut-down. The engines without Militec-1 were damaged but those with Militec-1 were not. With Militec-1 there is no catastrophic failure and the metal remains usable. An engine that is operated within the manufacturers guidelines or parameters does not experience rapid wear. However, SIMA cannot control or even monitor how people are operating the engines and Mike found Militec-1 provided a safety margin to accomodate poor operation (out-of-parameter conditions). The survivability of the equipment using Militec-1 seemed to increase dramatically when operated in out-of-parameter conditions. While Mike believes that engines using Militec-1 and operated normally would also have less wear over time, the engine inspections were not able to statistically verify this.

Protection for Fuel Injectors

Militec-1 was found to also be helpful in dealing with the overhaul of fuel injectors. There is a problem in that the calibrating fluid that should be used (for testing and calibration) when these are overhauled is rarely available and regular diesel fuel is often used as a substitute to fill the injector. The fuel is very hydroscopic, and when the injectors sit around after overhaul, there can be considerable rust - to the extent that the equipment can become unusable. Using the diesel fuel, SIMA had a pretty high return rate on injectors due to excessive rusting. It was found that when Militec-1 is mixed with the fuel oil (and the tests performed with the mixture) the metal is protected for the three or four months the injector sits in the box until the fleet needs it.