LABORATORY ANALYSIS REPORT

Report Date/Time:
Pages: 5

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Herguth Project Number: #600909A
Sample Description: Solvency Test Motor Silk Boron CLS Bond

Dear Mike:

Please accept this report as our findings on the above project. If you have any questions or comments, please feel free to call.

_Conclusion__:_ Under the test conditions described, the combination of Pennzoil 10W 40 and Motor Silk, Boron CLS Bond removed more "baked-on" carbon and varnish deposits than the Pennzoil product alone.

Background and Analysis: At your request we developed a qualitative laboratory bench test that compared the solvency characteristic of different lubricating oils. The development of this method was necessary since there are no American Society of Testing and Materials (ASTM) methods for this type of analysis.

The steps taken to in the method were:

1. Acquire test specimens – We acquired a valve cover from a used automobile engine. As can be seen in the photos, it had a substantial amount of baked-on carbon and varnish. We then sectioned the cover into 10 pieces of approximately the same width. These were used as test coupons. We straightened out the bends in the valve cover coupons by hand bending. We were careful not to disturb the carbon as we bent them to form a relatively straight test coupon.   The carbon deposits were rather moist and no carbon appeared to have cracked of flaked off of the coupons.

2. Mix lubricant and additives - In order to evaluate the solvency characteristics of the Motor Silk product, we added the recommended quantity to a fresh, unused Pennzoil 10W 40 product in 500ml beakers. The ratio of Motor Silk to lube oil was 1:10 parts.

3. Perform test sequence - After stirring in the Motor Silk we placed the test coupons in the beakers and heated for 4 days alternately heating to @ 100C, lightly stirring with coupon cooling and repeating.

Observe - Photo Coupons
Heat 8 Hours
Cool 16 Hours – Stir
Heat 8 Hours
Cool 48 Hours – Stir
Heat 8 Hours
Cool 16 Hours
Observe – Photo Coupons

Initial Test Setup

![Herguth Laboratories, Inc. logo] Herguth Laboratories, Inc.
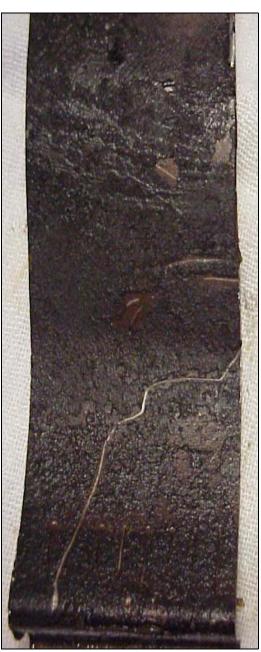101 CORPORATE PLACE · P.O. BOX B · VALLEJO, CA 94590

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Pennzoil Test Coupons
Before   *After*

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Pennzoil With Motor Silk Test Coupons
Before   After

Page, 5
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Discussion: As can be seen in the photos on page 3 and 4, the Motor Silk sample cleaned off a greater portion of the carbon deposits leaving more visible metal with a slight varnish coating. Overall the thickness of the carbon was reduced as compared to the Pennzoil with Motor Silk. Few metal areas are observed with only the Pennzoil.

24 hours after removing the test specimens from the test lubricants, allowing the oil to drain off under heated conditions, the specimen were wiped with a rag. This was to determine how easy it was to remove the remaining carbon. The carbon on the Motor Silk specimen was moist and wiped off fairly easy. The carbon on the Pennzoil specimen was more difficult to remove and was not as saturated with oil as was the Motor Silk specimen.

In our opinion the solvency is not so sudden and dramatic that there needs to be any concern about plugging up oil passageways with old baked-on carbon deposits. However, older engines using Motor Silk may experience an initial decrease in the filter life due to the filter getting full.

The sometimes practice of changing oil and not filters should be avoided when using Motor Silk.

Respectfully Submitted,

William R. Herguth, CLS

cc: Herguth file - K:\Clients\ALTEMP\solvent.doc