CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1997

DateRun: 10/14/1997

Experimenters: Jason Marshall, Prashant Trivedi

ClientType: Manufacturers of Harmonic Drive

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Greases

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: Find cleaners to remove grease.

Experimental Procedure: The objective of the experiment was to find cleaners that would be effective in removing the contaminant from the given substrate material.

Precleaned and pre-weighed coupons were contaminated with the Braycote 601 grease using the container. The grease was then evenly distributed on the coupon using a swab. Six cleaners were selected from the lab's database of chemistries and through previous testing trials. Five percent solutions were made in beakers and heated to 150 F on a hot plate. Three contaminated coupons per chemistry were cleaned using stir bar agitation for five minutes. The coupons were rinsed in tap water at 130 F for thirty seconds. Coupons were dried with a portable heater until dry (approximately 3 minutes). Finally the cleaned coupons were weighed and the percent contaminant removals were calculated.

SUBSTRATE MATERIAL: 17-4 Stainless steel
CONTAMINANTS: Braycote 601-perfluoropolyether grease

Results: After completion of the cleaning process, it was noted that there was not a substantial removal of the contaminant from the coupons. The values for the percent removal for each cleaner were all less than 10%. Table one lists the average percent removal for each of the cleaners. Figure 1 displays the average percent removal graphically.

Table 1 Percent Removal

Cleaner #	1	2	3	4	5	6
	Bio-Might	Daraclean	Kleer-Flo	InproClean	F020805M	ND-17
	10.58	8.66	5.42	2.67	-11.65	0.45
	-0.15	-8.69	-4.49	3.02	2.63	0.33
	0.94	2.61	16.84	1.81	5.79	0.95
Average	3.79	0.86	5.92	2.50	-1.08	0.58
Std Dev	5.91	8.81	10.67	0.62	9.29	0.33

From the graph and, cleaner #3 appears to have the highest level of contaminant removal. It was noted in the table that one of the three coupons cleaned in this solution was dropped. When the coupon landed, some of the contaminant was removed, thus elevating the average percent removal. The remaining chemistries had less than five percent removal. Most of the cleaners showed very inconsistent cleaning capabilities. Only cleaner # 4, InproClean, and cleaner #6, ND-17, had consistent results. Number 6 however, did not have any notable removal of the contaminant.

Summary:

Substrates:	Stainless Steel				
Contaminants:	Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Abatement Technologies	Bio Might 100 Cleaner - Degreaser	5	3.79	☐	
Fine Organic Corporation	FO 2085 M	5	-1.07	☐	
Kleer Flo Company	Grease Off 2	5	5.92	☐	
MacDermid Industrial Products	ND 17	5	0.58	☐	
Oakite Products	Inproclean 3800	5	2.50	☐	
Magnaflux	Daraclean 212	5	0.86	☐	

Conclusion:

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All of the cleaners selected for testing had little to no effect on the Braycote 601 grease. Most of the cleaners were also inconsistent in the removal of the contaminant. Only the Oakite InproClean 3800 showed consistent results with some cleaning action. This cleaner will be tested further using mechanical energy, 40KHz ultrasonics.
Due to the limited success of this trial, an additional test will be conducted to find possible cleaning chemistries. Since the aqueous cleaners had little effect on the grease, the next search will include semi-aqueous cleaners.