

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1997

DateRun: 10/20/1997

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 additional cleaners for grease cleaning

Experimental Procedure: The objective of the experiment was to find additional 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. Three 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: These chemistries showed slightly better results than the initial testing trials. The HTF-321 terpene had the most success removing the contaminant. Despite this increased efficiency, the chemistry only had ~8% removal. Table 1 contains the numerical results from this trial.

Table 1 Percent Removal

| Cleaner   | HTF-321 | DEOX 007 | CT-1  |
|-----------|---------|----------|-------|
| Cleaner # | 1       | 2        | 3     |
|           | 5.08    | 3.94     | 5.06  |
|           | 9.77    | 4.27     | 10.62 |
|           | 8.15    |          | 2.09  |
| Average   | 7.66    | 4.10     | 5.92  |
| Std Dev   | 2.38    | 0.24     | 4.33  |

Summary:

| Substrates:                  |                           | Stainless Steel |             |                          |               |  |
|------------------------------|---------------------------|-----------------|-------------|--------------------------|---------------|--|
| Contaminants:                |                           | Greases         |             |                          |               |  |
| Company Name:                | Product Name:             | Conc.:          | Efficiency: | Effective:               | Observations: |  |
| Chemkleen International Inc. | CT 1 Multipurpose Cleaner | 5               | 5.92        | <input type="checkbox"/> |               |  |
| US Polychem Corporation      | Polychem DEOX 007         | 5               | 4.10        | <input type="checkbox"/> |               |  |
| Tarksol Inc                  | Tarksol HTF 321           | 5               | 7.66        | <input type="checkbox"/> |               |  |

Conclusion: The semi-aqueous products did show to be slightly more effective in removing the contaminant from the stainless steel coupons. Again, it should be noted that the percentage of the grease removed was still not very high. The three cleaners from this trial and one from the first trial, Oakite InproClean 3800, will be used in conjunction with a 40 KHz ultrasonic cleaning tank. In addition to the four cleaners, tap water will also be tested