# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1998

DateRun: 08/23/1998

Experimenters: Jason Marshall

ClientType: Electromagnetic Manufacturer

ProjectNumber: Project #1

Substrates: Copper, Nickel

PartType: Coupon

Contaminants: Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil

Cleaning Methods:

Analytical Methods: Gravimetric

Purpose: To identify aqueous cleaning solutions and equipment that will remove oil from metal tape.

Experimental Procedure: Six cleaners were selected based on the laboratory's database and vendor information. Five percent solutions were made using DI water in 400 mL beakers. Solutions were heated to 130 F on a hot plate.

Eighteen preweighed coupons were contaminated with the oil using hand held swabs. Contaminated weights were recorded for each coupon. Three coupons were placed into each cleaner and cleaned for 5 minutes using stir bar agitation. Coupons were rinsed in tap water at 120 F for 30 seconds. Drying was performed using a Master Appliance Heat Gun model HG-301A for about 30 seconds and then air dried for 1 hour. Final clean weights were made and the percent removal of the oil was calculated.

SUBSTRATE MATERIAL: Copper/Nickel 70/30 coupons
CONTAMINANTS: Oil-Castrol 10W-40

Results: Most of the cleaners selected removed a majority of the oil contaminant from the coupons. Table 1 lists the cleaning efficiencies for the 6 solutions tested.

Table 1 Cleaning Efficiencies

| | Shopmaster | SWR One | AK 6215 | Daraclean 282 | Inproclean 3800 | Luminox |
|---|---|---|---|---|---|---|
| Coupon 1 | 73.5 | 73.5 | 79.9 | 80.6 | 85.2 | 73.4 |
| Coupon 2 | 53.6 | 68.5 | 85.3* | 80.5 | 75.8 | 70.8 |
| Coupon 3 | 64.4 | 78.5 | 81.0 | 82.9 | 64.0 | 74.7 |
| Ave | 63.8 | 73.5 | 82.1 | 81.3 | 75.0 | 73.0 |
| Std Dev | 9.98 | 5.0 | 2.85 | 1.36 | 10.6 | 1.99 |

*coupon dropped (85%) face down.

Of the cleaners tested only Shopmaster showed less than 70% removal of the contaminant. There were two cleaners which removed over 80%, Daraclean and AK 6215. Both will be used in the next set of test using ultrasonic energy.

Summary:

| **Substrates:** | Copper, Nickel | | | | |
|---|---|---|---|---|---|
| **Contaminants:** | Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil | | | | |
| **Company Name:** | **Product Name:** | **Conc.:** | **Efficiency:** | **Effective:** | **Observations:** |
| Buckeye International | Shopmaster | 5 | 63.80 | ☐ | |
| SWR Corporation | SWR One | 5 | 73.50 | ☐ | |
| Calgon Corporation | AK 6215 | 5 | 82.10 | ☑ | |
| Magnaflux | Daraclean 282 | 5 | 81.30 | ☑ | |
| Oakite Products | Inproclean 3800 | 5 | 75.00 | ☐ | |
| Alconox Inc | Luminox | 5 | 73.00 | ☐ | |

Conclusion: Two aqueous cleaners, WR Grace's Daraclean 282 and Calgon's AK-6215, were found to have adequate cleaning capabilities of the Castrol motor oil. Further testing will be performed using a 40 kHz ultrasonic cleaning tank to enhance the cleaning efficiency of the two cleaners.