

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2002  
 DateRun: 01/23/2002  
 Experimenters: Jason Marshall  
 ClientType: Electromagnetic Manufacturer  
 ProjectNumber: Project #2  
 Substrates: Aluminum  
 PartType: Coupon  
 Contaminants: Greases, Lubricating/Lapping Oils  
 Cleaning Methods: Immersion/Soak  
 Analytical Methods: Gravimetric

Purpose: To identify possible cleaner for removal of lubricant/grease from silver

Experimental Procedure: Eight cleaners were selected from the lab's databases based on client supplied information. Each product was diluted to 5% in a 600 ml beaker using DI water and heated to 140 F on a hot plate. Twenty-four preweighed coupons were coated with Richard Apex Inc. D644 CPD Drawing compound using a hand held swab. Coupons were reweighed. Three coupons were cleaned in each solution for 1 minute using stir-bar agitation, followed by a 15 second rinse in tap water at 120 F and a 30 second drying using a heat gun at 500 F. Coupons were allowed to cool to room temperature and weighed again. Effectiveness of each product was calculated and recorded.

Results: All eight cleaners worked fairly well in the one minute of cleaning. Average cleaning efficiencies ranged from 84 to 99%. The results for each coupon are listed below.

|              | Coupon 1 | Coupon 2 | Coupon 3 | Average | Std Dev |
|--------------|----------|----------|----------|---------|---------|
| EXP 1400     | 96.03    | 90.48    | 82.63    | 89.71   | 6.73    |
| Green Stuff  | 99.81    | 98.86    | 97.53    | 98.73   | 1.15    |
| SC AMC       | 89.13    | 82.89    | 94.65    | 88.89   | 5.88    |
| Surface 930  | 88.75    | 81.92    | 82.96    | 84.54   | 3.68    |
| Inproclean   | 88.33    | 86.90    | 88.05    | 87.76   | 0.75    |
| Simple Green | 86.36    | 86.96    | 83.70    | 85.67   | 1.74    |
| Beyond 2005  | 91.71    | 91.74    | 94.51    | 92.65   | 1.61    |
| Daraclean    | 89.99    | 91.36    | 84.66    | 88.67   | 3.54    |

The coupons that were cleaned in this trial were over contaminated so that a worst case scenario could be evaluated.

Summary:

|                                    |   |               |                    |                                     |                      |
|------------------------------------|---|---------------|--------------------|-------------------------------------|----------------------|
| <b>Substrates:</b>                 | Aluminum  |               |                    |                                     |                      |
| <b>Contaminants:</b>               | Greases, Lubricating/Lapping Oils                   |               |                    |                                     |                      |
| <b>Company Name:</b>               | <b>Product Name:</b>                                | <b>Conc.:</b> | <b>Efficiency:</b> | <b>Effective:</b>                   | <b>Observations:</b> |
| Today & Beyond                     | Beyond 2005   | 5             | 92.65              | <input checked="" type="checkbox"/> |                      |
| Simple Green                       | Crystal Simple Green Industrial Cleaner & Degreaser | 5             | 85.67              | <input checked="" type="checkbox"/> |                      |
| Magnaflux                          | Daraclean 282 GF                                    | 5             | 88.67              | <input checked="" type="checkbox"/> |                      |
| Brulin Corporation                 | Aquavantage 1400                                    | 5             | 89.71              | <input checked="" type="checkbox"/> |                      |
| Gemtek Products                    | SC Aircraft & Metal Cleaner Super Concentrate       | 5             | 88.89              | <input checked="" type="checkbox"/> |                      |
| Bio Chem Systems                   | Green Stuff 6325                                    | 5             | 98.73              | <input checked="" type="checkbox"/> |                      |
| International Products Corporation | Surface Cleanse Concentrated Neutral 930            | 5             | 84.54              | <input checked="" type="checkbox"/> |                      |
| Oakite Products                    | Inproclean 3800                                     | 5             | 87.76              | <input checked="" type="checkbox"/> |                      |

Conclusion: All eight cleaners will be evaluated using 25 kHz ultrasonic cleaning.