

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: Ultrasonics
 Analytical Methods: Gravimetric
 Purpose: To evaluate successful cleaners using ultrasonic energy

Experimental Procedure: The eight cleaners from the previous trial were used again in this trial. Each solution was diluted to 5% in 600 ml beakers and heated to 140 F in a Crest 25 kHz ultrasonic tank filled with tap water. Twenty-four preweighed coupons were coated with the Richard Apex Inc. D644 CPD Drawing compound using a hand held swab. Coupons were reweighed. Three coupons were cleaned in each solution for 20 seconds using 25 kHz ultrasonic agitation, followed by a 10 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 were very successful in removing the drawing compound from the coupons. Most of the products evaluated needed less than the 20 seconds of cleaning, requiring around 10 seconds to remove all of the contaminant. Calculated efficiencies are listed below.

| Cleaner | Coupon 1 | Coupon 2 | Coupon 3 | Average | Std Dev |
|--------------|----------|----------|----------|---------|---------|
| EXP 1400 | 100.19 | 100.15 | 100.00 | 100.11 | 0.10 |
| Green Stuff | 100.06 | 99.97 | 99.26 | 99.76 | 0.44 |
| SC AMC | 92.55 | 100.07 | 100.32 | 97.65 | 4.41 |
| Surface 930 | 99.05 | 98.69 | 99.26 | 99.00 | 0.29 |
| Inproclean | 99.90 | 99.73 | 100.10 | 99.91 | 0.18 |
| Simple Green | 99.63 | 100.00 | 100.00 | 99.88 | 0.22 |
| Beyond 2005 | 100.06 | 99.95 | 99.89 | 99.97 | 0.08 |
| Daraclean | 97.67 | 99.66 | 100.10 | 99.14 | 1.29 |

Summary:

| Substrates: | | Aluminum | | | |
|------------------------------------|---|-----------------------------------|-------------|-------------------------------------|---------------|
| Contaminants: | | Greases, Lubricating/Lapping Oils | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Brulin Corporation | Aquavantage 1400 | 5 | 100.11 | <input checked="" type="checkbox"/> | |
| Bio Chem Systems | Green Stuff 6325 | 5 | 99.76 | <input checked="" type="checkbox"/> | |
| Gemtek Products | SC Aircraft & Metal Cleaner Super Concentrate | 5 | 97.65 | <input checked="" type="checkbox"/> | |
| International Products Corporation | Surface Cleanse Concentrated Neutral 930 | 5 | 99.00 | <input checked="" type="checkbox"/> | |
| Oakite Products | Inproclean 3800 | 5 | 99.91 | <input checked="" type="checkbox"/> | |
| Simple Green | Crystal Simple Green Industrial Cleaner & Degreaser | 5 | 99.88 | <input checked="" type="checkbox"/> | |
| Today & Beyond | Beyond 2005 | 5 | 99.97 | <input checked="" type="checkbox"/> | |
| Magnaflux | Daraclean 282 GF | 5 | 99.14 | <input checked="" type="checkbox"/> | |

Conclusion: Since the eight products worked well under these laboratory conditions, all will be used to clean the supplied silver tape under the same conditions. In addition to gravimetric analysis, two additional analysis methods will be evaluated. These are OSEE and contact angle goniometry.