

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004
 DateRun: 11/09/2004
 Experimenters: Jason Marshall
 ClientType: Manufacturers of Precision Parts and Assemblies
 ProjectNumber: Project #1
 Substrates: Aluminum
 PartType: Coupon
 Contaminants: Oil
 Cleaning Methods: Ultrasonics
 Analytical Methods: Gravimetric

Purpose: To evaluate products on second supplied contaminant using ultrasonic cleaning

Experimental Procedure: The same six products from the previous trial were used at the same dilutions and time (5 min). Each beaker was immersed into a Crest 40 kHz ultrasonic tank filled with water heated to 115 F. The products were degassed for 5 minutes. Eighteen preweighed 6061 aluminum coupons were again contaminated with Valenite Inc. Valcool VNT 910 (102-71-6, 141-43-5, 26896-20-8, 112-05-0) using a swab. A second weighing was performed to determine the amount of soil added. Three coupons were cleaned in each product for 5 minutes with ultrasonics. Coupons were again rinsed in water at 120 F for 15 seconds and dried with air blow off at room temperature for 30 seconds. Once dry, final weights were recorded and efficiencies were calculated.

Results: All six products removed over 89% of the coolant within 5 minutes of cleaning. Five of the six removed over 96%. The client's current cleaner had the highest cleaning efficiency followed closely by Brulin 815 GD. The table below lists the amount of soil added, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|---------------------|------------|----------|-----------|
| Amberclean Q3 | 0.0098 | 0.0001 | 98.98 |
| | 0.0190 | -0.0001 | 100.53 |
| | 0.0435 | 0.0002 | 99.54 |
| Formula 815 GD | 0.0216 | 0.0000 | 100.00 |
| | 0.1134 | 0.0001 | 99.91 |
| | 0.0730 | 0.0008 | 98.90 |
| Inproclean 3800 | 0.0435 | 0.0017 | 96.09 |
| | 0.1306 | 0.0005 | 99.62 |
| | 0.0971 | 0.0042 | 95.67 |
| Surface Cleanse 930 | 0.0651 | 0.0012 | 98.16 |
| | 0.1170 | 0.0040 | 96.58 |
| | 0.0348 | 0.0017 | 95.11 |
| Valtron SP 2275 | 0.0963 | 0.0002 | 99.79 |
| | 0.1114 | 0.0030 | 97.31 |
| | 0.0567 | 0.0017 | 97.00 |
| Ionox HC2 | 0.1680 | 0.0040 | 97.62 |
| | 0.0906 | 0.0059 | 93.49 |
| | 0.0147 | 0.0033 | 77.55 |

Summary:

| Substrates: | Aluminum | | | | |
|------------------------------------|--|--------|-------------|-------------------------------------|---------------|
| Contaminants: | Oil | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Innovative Organics Inc | Amberclean Q3 | 2 | 99.68 | <input checked="" type="checkbox"/> | |
| Brulin Corporation | Formula 815 GD | 2 | 99.61 | <input checked="" type="checkbox"/> | |
| Oakite Products | Inproclean 3800 | 2 | 97.13 | <input checked="" type="checkbox"/> | |
| International Products Corporation | Surface Cleanse Concentrated Neutral 930 | 2 | 96.62 | <input checked="" type="checkbox"/> | |

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|---------------------|-----------------|-----|-------|-------------------------------------|--|
| Valtech Corporation | Valtron SP 2275 | 2 | 98.03 | <input checked="" type="checkbox"/> | |
| Kyzen Corporation | Ionox HC 2 | 100 | 89.55 | <input checked="" type="checkbox"/> | |

Conclusion: Ultrasonic cleaning of both contaminants were effective with many of the aqueous based products in under 5 minutes of cleaning. Supplied parts will be cleaned in the top two cleaning products.