

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2008
 DateRun: 10/10/2008
 Experimenters: Jason Marshall
 ClientType: Electronics Manufacturer
 ProjectNumber: Project #1
 Substrates: Aluminum
 PartType: Coupon
 Contaminants: Cutting/Tapping Fluids
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric

Purpose: To evaluate top performing products on fourth supplied contaminant using immersion cleaning.

Experimental Procedure: The top five products based on past testing results were again diluted to 5% using DI water in 400 ml beakers. All five products were heated to 130 F on a hot plate. Peweighed aluminum coupons were coated with the Hagsterfer's Hard Cut 5318 cutting oil using a handheld swab. The contaminant was allowed to dry for about 10 minutes. Once dry, the coupons were weighed a second time to determine the amount of oil applied.

Three coupons were immersed into each solution and cleaned for 5 minutes using stir-bar agitation. Rinsing was performed for 15 seconds using tap water heated to 120 F and followed by 30 seconds of air blow off with dry compressed air at room temperature. Final weights were recorded, and efficiencies were calculated for each coupon cleaned.

Results: Not all of the products were effective at removing the cutting oil from the aluminum coupons within 5 minutes of immersion cleaning. Three of the five removed over 80% of the cutting fluid. The other two removed between 70 and 75%. The table lists the amount of soil added, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|-----------------------------|------------|----------|-----------|
| Green Soak | 0.1416 | 0.0538 | 62.01 |
| | 0.2755 | 0.0310 | 88.75 |
| | 0.1838 | 0.0430 | 76.61 |
| Shopmaster LpH | 0.2743 | 0.0572 | 79.15 |
| | 0.1377 | 0.0083 | 93.97 |
| | 0.1811 | 0.0389 | 78.52 |
| FPC 100 | 0.1386 | 0.0434 | 68.69 |
| | 0.1963 | 0.0801 | 59.20 |
| | 0.3006 | 0.0417 | 86.13 |
| SC Aircraft & Metal Cleaner | 0.2222 | 0.0264 | 88.12 |
| | 0.2050 | 0.0257 | 87.46 |
| | 0.2183 | 0.0095 | 95.65 |
| Amberclean L12 | 0.2221 | 0.0327 | 85.28 |
| | 0.1871 | 0.0408 | 78.19 |
| | 0.3836 | 0.0379 | 90.12 |

Summary:

| Substrates: | | Aluminum | | | | |
|-------------------------------------|---|------------------------|-------------|-------------------------------------|---------------|--|
| Contaminants: | | Cutting/Tapping Fluids | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: | |
| BCS Company | Green Spray 400 | 5 | 75.79 | <input type="checkbox"/> | | |
| Buckeye International | Shopmaster LPH | 5 | 83.88 | <input checked="" type="checkbox"/> | | |
| Environmental Solution Products Inc | FPC 100 | 5 | 71.34 | <input type="checkbox"/> | | |
| Gemtek Products | SC Aircraft & Metal Cleaner Super Concentrate | 5 | 90.41 | <input checked="" type="checkbox"/> | | |
| Innovative Organics Inc | Amberclean L 12 | 5 | 84.53 | <input checked="" type="checkbox"/> | | |

Conclusion: The top products will be evaluated on the fifth supplied contaminant under the same cleaning conditions.