

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004  
 DateRun: 03/04/2004  
 Experimenters: Jason Marshall  
 ClientType: Manufacturer of Ceramic Capacitors  
 ProjectNumber: Project #1  
 Substrates: Ceramics  
 PartType: Coupon  
 Contaminants: Greases  
 Cleaning Methods: Ultrasonics  
 Analytical Methods: Gravimetric

Purpose: To evaluate cleaners from previous grease trial using ultrasonic energy

Experimental Procedure: Five cleaners from the previous trial were diluted to 10% in 250 ml beakers. A sixth product was used at full strength. All products were suspended in a Branson 3510 ultrasonic tank (40kHz) filled with water at 130 F and degassed for five minutes. Eighteen preweighed coupons were coated with Hibrenia Way Apiezon M1 grease using a hand held swab. Coupons were then reweighed. Three coupons were cleaned in each product for 5 minutes using ultrasonic energy. At the end of cleaning, coupons were rinsed with tap water at 120 F for 15 seconds and dried using air blow off for 30 seconds at 68 F. Once dry, coupons were weighed a final time and efficiencies were calculated.

Results: All six products removed over 98% of the grease within the five minutes of ultrasonic cleaning. The table lists the amount of soil added, the amount remaining and the efficiency for each coupon.

| Cleaner         | Initial wt | Final wt | % Removed |
|-----------------|------------|----------|-----------|
| Liquinox        | 0.1311     | 0.0002   | 99.85     |
|                 | 0.1182     | -0.0002  | 100.17    |
|                 | 0.1275     | 0.0017   | 98.67     |
| SC Aircraft     | 0.1637     | 0.0015   | 99.08     |
|                 | 0.1059     | 0.0016   | 98.49     |
|                 | 0.1685     | 0.0017   | 98.99     |
| Micro 90        | 0.1469     | -0.0001  | 100.07    |
|                 | 0.0846     | 0.0001   | 99.88     |
|                 | 0.2092     | 0.0000   | 100.00    |
| Metalnox M6314  | 0.1427     | -0.0004  | 100.28    |
|                 | 0.0967     | -0.0003  | 100.31    |
|                 | 0.1604     | 0.0014   | 99.13     |
| E3HB            | 0.1287     | -0.0003  | 100.23    |
|                 | 0.0629     | -0.0001  | 100.16    |
|                 | 0.0668     | -0.0003  | 100.45    |
| Inproclean 3800 | 0.0615     | 0.0009   | 98.54     |
|                 | 0.0713     | -0.0001  | 100.14    |
|                 | 0.1283     | -0.0003  | 100.23    |

Summary:

| <b>Substrates:</b>                 | Ceramics                                      |        |             |                                     |               |
|------------------------------------|---|--------|-------------|-------------------------------------|---------------|
| <b>Contaminants:</b>               | Greases                                       |        |             |                                     |               |
| Company Name:                      | Product Name:                                 | Conc.: | Efficiency: | Effective:                          | Observations: |
| Alconox Inc                        | Liquinox                                      | 10     | 99.56       | <input checked="" type="checkbox"/> |               |
| Gemtek Products                    | SC Aircraft & Metal Cleaner Super Concentrate | 10     | 98.85       | <input checked="" type="checkbox"/> |               |
| International Products Corporation | Micro 90 Conc.                                | 10     | 99.98       | <input checked="" type="checkbox"/> |               |
| Kyzen Corporation                  | Metalnox M6314 (For Comparison Only)          | 10     | 99.91       | <input checked="" type="checkbox"/> |               |
| Metabolix Inc                      | Metabolix E3HB                                | 100    | 100.28      | <input checked="" type="checkbox"/> |               |
| Oakite Products                    | Inproclean 3800                               | 10     | 99.64       | <input checked="" type="checkbox"/> |               |

Conclusion:

## **CLEANING LABORATORY EVALUATION SUMMARY**

Ultrasonic cleaning has been shown to be an effective way to remove the M1 grease from ceramic coupons.