

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021  
 DateRun: 01/14/2021  
 Experimenters: Justin Kiander  
 ClientType: Precision Instrument Manufacturer  
 ProjectNumber: Project #1  
 Substrates: Aluminum  
 PartType: Coupon  
 Contaminants: Oil  
 Cleaning Methods: Immersion/Soak  
 Analytical Methods: Gravimetric, Visual

Purpose: The purpose of this experiment was to verify the effectiveness of cleaners after compatibility testing.

Experimental Procedure: Compatibility testing was conducted before the experiment to ensure cleaners were compatible and not damaging the aluminum substrates. Pieces of aluminum foil were cleaned through the same process as coupons would be, but without soil. All cleaners were determined to be compatible with aluminum. Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Dimethyl Glutarate 100%, SC Aircraft & Metal Cleaner 20%, Crystal Simple Green Industrial 30 parts water. SC Aircraft & Metal was heated to 100°F while the rest remained at room temperature. Three aluminum coupons were obtained and weighed for each of the cleaners being tested. Coupons were then soiled with V-4B oil and a dirty weight was recorded. Once solutions reached the proper temperature, coupons were submerged into their respective cleaners for 15 minutes. After 15 minutes, coupons cleaned with SC Aircraft were submerged into a deionized water bath at 100°F for 30 seconds. All coupons were then dried with a heat gun to remove excess solution and allowed to finish drying in air for 24 hours. Following the drying step, coupons were weighed and a clean weight was recorded. Effectiveness of the cleaners was determined.

Results:

| Cleaner              | Initial wt of cont | Final wt of cont | %Cont Removed | %AVG    |
|----------------------|--------------------|------------------|---------------|---------|
| Metalnox 6386        | 0.0140             | -0.0024          | 117.14        | 109.35% |
|                      | 0.0147             | -0.0008          | 105.44        |         |
|                      | 0.0128             | -0.0007          | 105.47        |         |
| Dimethyl Glutarate   | 0.0112             | -0.0010          | 108.93        | 107.68% |
|                      | 0.0096             | -0.0011          | 111.46        |         |
|                      | 0.0113             | -0.0003          | 102.65        |         |
| SC Aircraft & Metal  | 0.0081             | -0.0007          | 108.64        | 124.09% |
|                      | 0.0062             | -0.0005          | 108.06        |         |
|                      | 0.0072             | -0.0040          | 155.56        |         |
| Crystal Simple Green | 0.0069             | -0.0010          | 114.49        | 109.98% |
|                      | 0.0049             | -0.0005          | 110.20        |         |
|                      | 0.0057             | -0.0003          | 105.26        |         |

All cleaners were effective at removing the oil from aluminum substrates. However, % removals have exceeded 100. There was no visual damage to the coupons at any stage in the cleaning process. Additionally, prior compatibility testing ensured that these cleaners are not stripping the aluminum coupons. Solutions have also mostly retained their original clear colors, with a hint of cloudiness due to the removal of the oil. While optimal testing conditions have been determined, total time of cleaning still requires optimization to get % removals at or just below 100. Next steps would be to test effectiveness after 10 minutes of immersion.

Summary:

| <b>Substrates:</b>   |   | Aluminum       |             |                                     |               |  |
|----------------------|---|----------------|-------------|-------------------------------------|---------------|--|
| <b>Contaminants:</b> |   | Oil            |             |                                     |               |  |
| Company Name:        | Product Name:                                       | Conc.:         | Efficiency: | Effective:                          | Observations: |  |
| Kyzen Corporation    | Metalnox M6386                                      | 100%           | 109.35      | <input checked="" type="checkbox"/> |               |  |
| Fisher Scientific    | Dimethyl glutarate (CAS:1119-40-0)                  | 100%           | 107.68      | <input checked="" type="checkbox"/> |               |  |
| Gemtek Products      | SC Aircraft & Metal Cleaner Super Concentrate       | 20%            | 124.09      | <input checked="" type="checkbox"/> |               |  |
| Simple Green         | Crystal Simple Green Industrial Cleaner & Degreaser | 30 parts water | 109.98      | <input checked="" type="checkbox"/> |               |  |

Conclusion:

## **CLEANING LABORATORY EVALUATION SUMMARY**

All cleaners were effective at removing the oil, however, % removals remain above 100. The total time to clean could be too long leading to the increased removal values. Next steps would be to test effectiveness after 10 minutes of immersion to determine an optimal cleaning time.