

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004

DateRun: 07/08/2004

Experimenters: Jason Marshall

ClientType: Bicycle Manufacturer

ProjectNumber: Project #1

Substrates: Titanium

PartType: Coupon

Contaminants: Fluxes

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate client requested products on the fifth soil.

Experimental Procedure: The three cleaners were diluted to 5% using DI water in 600 ml beakers and heated to 120 F on a hot plate.

Nine preweighed titanium coupons were coated with client supplied Wolverine Ultra Flux (1332-77-0, 10043-35-3, 7789-29-9, 11128-29-3, 151-21-3), using a hand held swab and then heated with a Master Appliance Heat Gun at 500 F for 10 minutes. Coupons were allowed to cool and then weighed a second time to determine the amount of soil added. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation. Coupons were rinsed in tap water for 15 seconds at 120 F, followed by air blow off at room temperature. Once dry, coupons were weighed a final time and efficiencies for each cleaner were calculated.

Results: All three products removed over 99% of the second oil. 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 |
|-----------|------------|----------|-----------|
| M Aero    | 1.1170     | 0.0014   | 99.87     |
|           | 1.2380     | 0.0004   | 99.97     |
|           | 0.8871     | 0.0069   | 99.22     |
| M Aero NS | 0.9014     | 0.0039   | 99.57     |
|           | 1.3230     | 0.0009   | 99.93     |
|           | 1.2541     | 0.0001   | 99.99     |
| M 400     | 0.7871     | 0.0013   | 99.83     |
|           | 0.9139     | 0.0038   | 99.58     |
|           | 0.8060     | 0.0035   | 99.57     |

Summary:

| <b>Substrates:</b>      |  | Titanium            |        |             |                                     |               |
|-------------------------|--|---------------------|--------|-------------|-------------------------------------|---------------|
| <b>Contaminants:</b>    |  | Fluxes              |        |             |                                     |               |
| Company Name:           |  | Product Name:       | Conc.: | Efficiency: | Effective:                          | Observations: |
| Church & Dwight Co Inc. |  | Armakleen M Aero    | 5      | 99.69       | <input checked="" type="checkbox"/> |               |
| Church & Dwight Co Inc. |  | Armakleen M Aero NS | 5      | 99.83       | <input checked="" type="checkbox"/> |               |
| Church & Dwight Co Inc. |  | Armakleen M-400     | 5      | 99.66       | <input checked="" type="checkbox"/> |               |

Conclusion: The supplied products will be tested on the sixth supplied soil using manual wiping at room temperature.