

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2004
DateRun: 07/08/2004
Experimenters: Jason Marshall
ClientType: Bicycle Manufacturer
ProjectNumber: Project #1
Substrates: Titanium
PartType: Coupon
Contaminants: Cutting/Tapping Fluids
Cleaning Methods: Immersion/Soak
Analytical Methods: Gravimetric

Purpose: To evaluate client requested products on the second supplied soil.

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

Nine preweighed titanium coupons were coated with client supplied tapping fluid, Master Chemical Corp Trim C270 (102-71-6, 63231-48-1, 141-43-5), using a hand held swab 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 | 0.1628 | 0.0001 | 99.94 |
| | 0.1813 | 0.0002 | 99.89 |
| | 0.2526 | 0.0005 | 99.80 |
| M Aero NS | 0.1688 | 0.0001 | 99.94 |
| | 0.2086 | 0.0003 | 99.86 |
| | 0.1696 | 0.0005 | 99.71 |
| M 400 | 0.1642 | 0.0015 | 99.09 |
| | 0.2559 | 0.0015 | 99.41 |
| | 0.1983 | 0.0015 | 99.24 |

Summary:

| | | | | | |
|-------------------------|------------------------|---------------|--------------------|-------------------------------------|----------------------|
| Substrates: | Titanium | | | | |
| Contaminants: | Cutting/Tapping Fluids | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Church & Dwight Co Inc. | Armakleen M Aero | 5 | 99.88 | <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 | 99.25 | <input checked="" type="checkbox"/> | |

Conclusion: The three products will be tested on the third supplied soil under the same conditions.