

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 first soil

Experimental Procedure: Three cleaners were requested from the client. Six aqueous based cleaners 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, Castrol Industries Moly Dee Tapping fluid (63449-39-8, 64741-96-4), 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: Two of the three products removed over 85%. The third product removed just under the 85%. 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 | 0.2398 | 0.0276 | 88.49 |
| | 0.2288 | 0.0381 | 83.35 |
| | 0.3865 | 0.0562 | 85.46 |
| M Aero NS | 0.2533 | 0.0440 | 82.63 |
| | 0.2507 | 0.0011 | 99.56 |
| | 0.4063 | 0.0015 | 99.63 |
| M 400 | 0.2437 | 0.0316 | 87.03 |
| | 0.2773 | 0.0456 | 83.56 |
| | 0.2295 | 0.0376 | 83.62 |

Summary:

| Substrates: | Titanium | | | | |
|-------------------------|------------------------|--------|-------------|-------------------------------------|---------------|
| Contaminants: | Cutting/Tapping Fluids | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| Church & Dwight Co Inc. | Armakleen M Aero | 5 | 85.77 | <input checked="" type="checkbox"/> | |
| Church & Dwight Co Inc. | Armakleen M Aero NS | 5 | 93.94 | <input checked="" type="checkbox"/> | |
| Church & Dwight Co Inc. | Armakleen M-400 | 5 | 84.74 | <input type="checkbox"/> | |

Conclusion: The three client requested products will be tested on the second supplied soil under the same operating conditions.