

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1995
 DateRun: 06/06/1995
 Experimenters: Donald Garlotta, Jay Jankauskas
 ClientType: Plating Job Shop
 ProjectNumber: Project #1
 Substrates: Aluminum, Brass, Copper, Steel
 PartType: Coupon
 Contaminants: Waxes
 Cleaning Methods: Mechanical Agitation
 Analytical Methods: Gravimetric
 Purpose: Test effectiveness of ND -17 in removing wax

Experimental Procedure: There were two goals for this trial, first, to test the effectiveness of MacDermid ND-17 for Plating Job Shop's needs. The second was to determine to most effective way to reduce wax drag out from the cleaning bath. For each substrate three different methods of removing the coupons from the cleaner bath was used. The first method (removal #1) was to quickly remove the coupons while the air sparging was still activated. The second method (removal #2) was to turn off the air sparging and then quickly remove the coupons. The final method (removal #3) was to keep the coupons in the solution after cleaning and allowing the solution to cool until the wax solidified and could easily be skimmed off the top. Parts were weighed before and after contamination. Cleaning in the air sparged beaker would last for 20 minutes at 160 F. Rinsing was performed for 5 minutes in a tap water bath at 160 F. The coupons were then dried under air knives for two minutes and then placed in a convection oven set at 120 F for 90 minutes. The coupons were then allowed to cool for 2 hours and weighed once again. To minimize the time of the trial, all 24 coupons were cleaned in a total of eight beakers. 3 coupons of the same material were used in each beaker. In each beaker 2 coupons were removed with either method #1 or #2 while the third coupons was removed with method #3.

Results: SURFACE CLEANING LAB

GRAVIMETRIC ANALYSIS

| sample # and substrate | removal method | clean mass (g) | mass with contamination (g) | mass after cleaning (g) | contaminant removed (g) | Percent Removal |
|------------------------|----------------|----------------|-----------------------------|-------------------------|-------------------------|-----------------|
| 61 - Steel | 1 | 188.5192 | 190.6576 | 188.5282 | 2.1294 | 99.58% |
| 65 - Steel | 1 | 221.6276 | 223.9264 | 221.6356 | 2.2908 | 99.65% |
| 16 - Steel | 2 | 172.9255 | 174.9124 | 172.9260 | 1.9864 | 99.97% |
| 28 - Steel | 2 | 146.6684 | 148.3150 | 146.6696 | 1.6454 | 99.93% |
| 1 - Steel | 3 | 166.8401 | 168.4727 | 166.8416 | 1.6311 | 99.91% |
| 5 - Steel | 3 | 186.0529 | 188.1641 | 186.0515 | 2.1126 | 100.07% |
| 16 - Al | 1 | 21.0087 | 22.3233 | 21.0143 | 1.309 | 99.57% |
| 17 - Al | 1 | 21.0274 | 22.3866 | 21.0320 | 1.3546 | 99.66% |
| 13 - Al | 2 | 20.9922 | 22.4662 | 21.0001 | 1.4661 | 99.46% |
| 15 - Al | 2 | 20.9727 | 22.5154 | 20.9849 | 1.5305 | 99.21% |
| 14 - Al | 3 | 21.0111 | 22.4593 | 21.0181 | 1.4412 | 99.52% |
| 18 - Al | 3 | 21.0122 | 22.2181 | 21.0139 | 1.2042 | 99.86% |
| 3579 Cu | 1 | 35.3583 | 36.6686 | 35.3628 | 1.3058 | 99.66% |
| 3988 Cu | 1 | 35.3999 | 36.3755 | 35.4007 | 0.9748 | 99.92% |
| 5096 Cu | 2 | 35.5109 | 36.3669 | 35.5348 | 0.8321 | 97.21% |
| 5581 Cu | 2 | 35.5584 | 36.3573 | 35.5627 | 0.7946 | 99.46% |
| 3545 Cu | 3 | 35.3558 | 36.0879 | 35.3602 | 0.7277 | 99.40% |
| 4076 Cu | 3 | 35.4079 | 36.4492 | 35.4093 | 1.0399 | 99.87% |
| 5251 Brass | 1 | 34.5273 | 35.4646 | 34.5266 | 0.938 | 100.07% |
| 6577 Brass | 1 | 34.6592 | 35.5675 | 34.6580 | 0.9095 | 100.13% |

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The ND-17 did not create a lot of foam even under intense agitation. Removal was alright, just as good as the Daraclean 283 but not nearly as good as the Daraclean 294xx. The ND-17 would not be a desirable due to the intense discoloration of the brass coupons.

Summary:

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|-------------------------------|--------------------------------|---------------|--------------------|--------------------------|----------------------|
| Substrates: | Aluminum, Brass, Copper, Steel | | | | |
| Contaminants: | Waxes | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| MacDermid Industrial Products | ND 17 | 10 | 97.21 | <input type="checkbox"/> | |

Conclusion:

Some recommendations for further trials would be to test several cleaners (Oakite 3800, Oakite 4000T, Calgon Geo-Guard 5210, and Chemtech CT-1), to find a chemistry that is compatible. Some sort of agitation should be used on the rinse tank. The temperature of the rinse and the cleaner tank must be over 140 F so that the wax melts but a slightly lower temperature of 150 might be tried to minimize the possibility of etching onto brass.