

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1998
 DateRun: 08/11/1998
 Experimenters: Jason Marshall
 ClientType: Aerospace Industry
 ProjectNumber: Project #2
 Substrates: Copper, Nickel
 PartType: Coupon
 Contaminants: Coatings, Resins/Rosins
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric
 Purpose: To replace acetone in the coating removal process

Experimental Procedure: Six chemistries were selected from SCL's previous trials and from vendor supplied information. Four of the six were diluted to 5% in 400 mL beakers using DI water. The remaining two here used at full strength. Five chemistries were heated to 150 F on a hot plate. Prewighed coupons were coated with the supplied lacquer using a handheld swab. The coating was allowed to dry at room temperature. A second weight was recorded. Three coupons were cleaned in each cleaner for a total of 10 minutes. Observations were made at 5, 7.5 and 10 minutes. After the final observations, the coupons were rinsed in tap water at 120 F for 30 seconds. Once the coupons were dry, final weights were determined. Two sets of final weights were performed. One was before the coating was peeled off and the second was after the coating was peeled off.

SUBSTRATE MATERIAL: Copper/Nickel (70/30) coupons ---did not have Nickel coupons (100%)
 CONTAMINANTS: Coating-Styrene Butadiene

Results: Two types of cleaning were observed during the trial. One cleaning action involved the dissolving of the contaminant and the other method lifted the coating off of the coupon. The 4 aqueous cleaners allowed the coating to be lifted/peeled off of the coupons. The other 2 started to dissolve the contaminant. The results of cleaning with the aqueous cleaners are in Table 1.

| Without Peeling | @T = 130 | @T = 130 | @T = 150 | @T = 150 | @T = 150 |
|-----------------|----------|------------|----------|-----------|----------|
| | Luminox | Shopmaster | SWR One | Daraclean | Water |
| Coupon 1 | 1.2 | 1.43 | -0.623 | -0.288 | 6.56 |
| Coupon 2 | 2.27 | 0.627 | 0.499 | -1.13 | |
| Coupon 3 | 0.0536 | 0.728 | 0.337 | 1.23 | |
| Ave | 1.17 | 0.928 | 0.071 | -0.0627 | 6.56 |
| Std Dev | 1.11 | 0.437 | 0.606 | 1.2 | |
| | | | | | |
| With peeling | @T = 150 | @T = 150 | @T = 150 | @T = 150 | @T = 150 |
| | Luminox | Shopmaster | SWR One | Daraclean | Water |
| Coupon 1 | 100 | 98.4 | 100 | 99.8 | 99.8 |
| Coupon 2 | 99.8 | 100 | 100 | 99.8 | |
| Coupon 3 | 99.9 | 100 | 100 | 99.8 | |
| Ave | 99.9 | 99.5 | 100 | 99.8 | 99.8 |
| Std Dev | 0.1 | 0.924 | 0 | 0 | |

All of the selected cleaners were shown to remove almost all of the contaminant after the coating was peeled off of the substrate. Since this occurred, one coupon was cleaned using hot water only. The hot water proved to be just as effective in lifting the contaminant off of the coupon.

For the other 2 chemistries tested, one showed good removal of the contaminant. Table 2 lists the results of the dissolving cleaners.

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Table 2. Dissolving Chemistries

| Product | HTF 50 | | Resineater | |
|----------|--------|-------|------------|-------|
| | 10 min | 30min | 10 min | 30min |
| Coupon 1 | -6.88 | -14.9 | -11.4 | 88.3 |
| Coupon 2 | -11.1 | -10.3 | 3.79 | 90.6 |
| Coupon 3 | -11.1 | -9.99 | -25.6 | 86 |
| Ave | -9.69 | -11.7 | -11.1 | 88.3 |
| Std Dev | 2.43 | 2.75 | 14.7 | 2.34 |

Summary:

| | | | | | | |
|-----------------------|---------------------------|-------------------------|--------------------|-------------------------------------|----------------------|--|
| Substrates: | | Copper, Nickel | | | | |
| Contaminants: | | Coatings, Resins/Rosins | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: | |
| Alconox Inc | Luminox | 5 | 1.17 | <input type="checkbox"/> | | |
| Buckeye International | Shopmaster | 5 | 0.93 | <input type="checkbox"/> | | |
| Magnaflux | Daraclean 232 | 5 | -0.06 | <input type="checkbox"/> | | |
| SWR Corporation | SWR One | 5 | 0.67 | <input type="checkbox"/> | | |
| Finger Lakes Chemical | FLSC-12 Resineater Sample | 100 | 88.30 | <input checked="" type="checkbox"/> | | |
| Tarksol Inc | Tarksol HTF-50 | 100 | -9.69 | <input type="checkbox"/> | | |

Conclusion:

Lifting and dissolving mechanisms were compared in the removal of a coating material. It was determined that the lifting action could be done using just hot water. The temperature of the cleaning solution was determined to be the key to the removal of the coating. At 130 F, adequate lifting was not possible with the 2 noted chemicals; However, at 150 F, the coating came off without any problems. The dissolving was completed using Fine Organics' Resineater. Next the sample parts will be cleaned using hot water and Fine Organics' Resineater.