

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1998
 DateRun: 06/03/1998
 Experimenters: Jason Marshall, Prashant Trivedi
 ClientType: Printing Company
 ProjectNumber: Project #1
 Substrates: Aluminum
 PartType: Coupon
 Contaminants: Inks
 Cleaning Methods: Immersion/Soak
 Analytical Methods: Gravimetric
 Purpose: Replace current cleaner w/ safer non-TURA chemical

Experimental Procedure: Twenty-four preweighed coupons were coated with the red ink using a swab. The ink was allowed to dry for 3 hours at room temperature. Eight chemistries were selected for testing based on previous laboratory trials and vendor information. The chemistries were heated to 130 F. Three coupons were placed into each cleaner for 3 minutes with stir-bar agitation. Coupons were rinsed in tap water at 120 F for 30 seconds and dried using air-blow off. After sitting for 1 hour, the coupons were weighed to obtain their clean weights. Percent efficiencies were calculated for each cleaner.

SUBSTRATE MATERIAL: Aluminum 6061 T-4
 CONTAMINANTS: Ink-Poly 2700 Process Red
 CONTAMINATING PROCESS USED: Coupons were painted using swab

Results: None of the chemistries selected performed very well. Table 1 list the individual coupons and the average cleaning efficiencies.

TABLE 1 CLEANING EFFICIENCIES

| Chemistry | AG ENV | Brulin | Buckeye | Chrisal | Mirachem | Star Clean | Sunshine | WR Grace |
|-----------|--------|--------|---------|---------|----------|------------|----------|----------|
| Coupon 1 | -11.06 | 2.79 | 3.40 | 3.98 | 1.92 | -1.37 | 3.81 | 2.51 |
| Coupon 2 | 0.00 | 2.44 | 2.53 | 3.13 | 1.96 | 2.76 | 7.27 | 2.40 |
| Coupon 3 | -11.48 | 6.15 | 3.74 | 1.71 | 0.79 | 3.57 | 1.75 | |
| AVE | -7.51 | 3.79 | 3.22 | 2.94 | 1.56 | 1.65 | 4.28 | 2.45 |
| Std Dev | 6.51 | 2.05 | 0.62 | 1.15 | 0.66 | 2.65 | 2.79 | 0.08 |

From the table, three cleaners were selected to be tested at full strength. These three cleaners were, Brulin, Buckeye and Sunshine Makers. They were selected because of their higher cleaning efficiencies. It was noted the Soy Gold 1000 appeared to be dissolving the ink. The extra weight gained by the coupons may be cleaner that has gotten under or dissolved into the ink. Soy Gold will also be tested again for a longer period of time to determine if the cleaner is effective in removing the ink.

Summary:

| | | | | | |
|---------------------------|--|---------------|--------------------|--------------------------|----------------------|
| Substrates: | Aluminum | | | | |
| Contaminants: | Inks | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| AG Environmental Products | Soy Gold 1000 | 100 | -7.51 | <input type="checkbox"/> | |
| Brulin Corporation | Compliance | 5 | 3.79 | <input type="checkbox"/> | |
| Buckeye International | Shopmaster | 5 | 3.22 | <input type="checkbox"/> | |
| Chrisal USA Inc | Super CMF 240 | 5 | 2.94 | <input type="checkbox"/> | |
| Mirachem Corporation | Mirachem 500 | 5 | 1.56 | <input type="checkbox"/> | |
| By Pas and Star Products | Star Cleaning Miracle # 50 | 5 | 1.65 | <input type="checkbox"/> | |
| Simple Green | Concentrated Industrial Strength Cleaner and Degreaser | 5 | 4.28 | <input type="checkbox"/> | |
| Magnaflux | Daraclean 232 | 5 | 2.45 | <input type="checkbox"/> | |

Conclusion: In order to determine if the selected cleaners were effective in removing the ink, an additional test will be conducted. Concentrations will be at full strength and the time of cleaning will be increased to intervals of five minutes.