

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1997
 DateRun: 07/08/1997
 Experimenters: Jason Marshall, Prashant Trivedi
 ClientType: Machine Construction Company
 ProjectNumber: Project #1
 Substrates: Stainless Steel
 PartType: Coupon
 Contaminants: Inks
 Cleaning Methods: Manual Wipe
 Analytical Methods: Gravimetric, Visual
 Purpose: To determine a replacement for ink removal

Experimental Procedure: Eight steel coupons were weighed after preclean treatment. The coupons were then contaminated with an excess amount of ink. The drying process was sped along through the use of an oven set at 100 C for approximately one hour.
 Eight cleaning chemistries (including the customer supplied cleaner) were tested to determine an appropriate replacement. Paper towels were used to apply the cleaners. The time to remove the ink was recorded. In order to keep the experiment practical, a cut off time of five minutes was used. Once the ink was removed, a dry paper towel was used to remove the excess cleaner and ink residue. The samples were allowed to sit overnight and were then reweighed to determine their effectiveness at removing the ink.
 SUBSTRATE MATERIAL: stainless steel
 CONTAMINANTS: ink---Steel Blue DX-100 solvent based dye
 CONTAMINATING PROCESS USED: manual application of ink, dry for 1 hour at 100 C

Results: Of the eight chemistries used, only three showed success in removing the ink. Cleaner number one (cleaner to be replaced) was completely successful in removing the ink. It should be noted that the weight of the coupon after treatment with cleaner number 1 was lower than the pre-cleaned coupon, which may indicate substrate damage. Of the remaining two, number 7 produced a lot of foam and would not be useful to the client. Cleaner number 2 was a terpene based cleaner and had marginal result; however, the cleaner did not produce any foam. The remaining chemistries had no positive cleaning effects.

| coupon # | wt | remaining | %cont. | comments |
|----------|--------|--------------|-----------|----------|
| | contam | contaminated | remaining | |
| 1 | 0.0225 | -0.0017 | -7.56 | damage |
| 2 | 0.0200 | 0.0135 | 67.50 | |
| 3 | 0.0114 | 0.0174 | 152.63 | |
| 4 | 0.0112 | 0.0118 | 105.36 | foamy |
| 5 | 0.0107 | 0.0099 | 92.52 | foamy*** |
| 6 | 0.0128 | 0.0140 | 109.38 | foamy |
| 7 | 0.0181 | 0.0089 | 49.17 | foamy |
| 8 | 0.0093 | 0.0093 | 100.00 | foamy |

***some of cleaner #1 cleaned a spot on coupon. #1 was splashed on during experiment, thus removing some of the ink.

Summary:

| | | | | | |
|--------------------------------|--|----------------------------|---------------|--------------------|--------------------------|
| Substrates: | | Stainless Steel | | | |
| Contaminants: | | Inks | | | |
| Company Name: | | Product Name: | Conc.: | Efficiency: | Effective: |
| Accurate Manufactured Products | | Safety Layout Blue Remover | 100 | | <input type="checkbox"/> |
| Tarksol Inc | | Tarksol HTF 321 | 100 | | <input type="checkbox"/> |
| Oakite Products | | Inproclean 1300 | 100 | | <input type="checkbox"/> |
| Man Gill Chemical Company | | Gillite 0650 Cl | 100 | | <input type="checkbox"/> |
| MacDermid Industrial Products | | ND 17 | 100 | | <input type="checkbox"/> |

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|----------------------|---------------|-----|--|--------------------------|--|
| Nalge Company | Nalgene L 900 | 100 | | <input type="checkbox"/> | |
| Mirachem Corporation | Mirachem 500 | 100 | | <input type="checkbox"/> | |
| CRC Industries | Complex Blue | 100 | | <input type="checkbox"/> | |

Conclusion:

Of the eight chemistries tested, only three showed success in cleaning the ink from the coupons. One cleaner was the client supplied cleaner to be replaced, another produced unwanted foaming action and the final one did not clean a majority of the ink from the coupon. It was determined from these results to run another experiment using terpene based cleaners that have ink cleaning capabilities.