

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2003
DateRun: 05/30/2003
Experimenters: Jason Marshall
ClientType: Printing Company
ProjectNumber: Project #1
Substrates: Stainless Steel
PartType: Coupon
Contaminants: Inks
Cleaning Methods: Immersion/Soak
Analytical Methods: Gravimetric

Purpose: To identify alternatives to methylene chloride for ink removal.

Experimental Procedure: Nine products were selected from the SSL's databases based on client supplied information. Even though the substrate to be cleaned was designated as a textile (cloth t-shirts) the initial testing was conducted on a metal substrate so that a quantitative assessment could be made on the selected cleaners. Six of the cleaners were used at full strength, one was used at 20% as recommended by the vendor and the last two were diluted to 10%. The dilutions were made using DI water. All nine products were poured into 600 ml glass beakers. All solutions were used at room temperature.

Twenty-seven preweighed stainless steel coupons were coated with one of the supplied inks, PolysOne Kennesaw Wiflex MX Mixing Colors -pink (85-68-7, 9002-86-2) using a hand held swab and allowed to dry. After drying, coupons were weighed again to determine the amount of ink applied to each coupon. Three coupons were immersed into each solution and cleaned for five minutes using stir-bar agitation. Coupons were rinsed in tap water at 120 F for 15 seconds and dried using a Master Appliance Heat Gun at 500 F for 1 minute. When coupons cooled to room temperature, final weights were measured and product efficiencies were calculated.

Results: Only one of the products tested removed over 80% of the ink using immersion cleaning alone. However, several of the products allowed for the ink to be easily wiped off after soaking for five minutes. The following table lists the amount of soil added and removed for immersion cleaning and immersion and wipe cleaning.

| Cleaner | Initial wt | Final wt | % Removed |
|-------------------------|------------|----------|-----------|
| Soy Clear 1500 | 0.3350 | 0.3731 | -11.37 |
| | 0.1579 | 0.1905 | -20.65 |
| | 0.3726 | 0.4192 | -12.51 |
| Metabolix E3HB | 0.5002 | 0.4223 | 15.57 |
| | 0.4014 | 0.3432 | 14.50 |
| | 0.3064 | 0.2163 | 29.41 |
| Bio T Max | 0.4396 | 0.0783 | 82.19 |
| | 0.4054 | 0.0365 | 91.00 |
| | 0.3312 | 0.0920 | 72.22 |
| Misprint Stencil | 0.3054 | 0.1947 | 36.25 |
| | 0.2610 | 0.1602 | 38.62 |
| | 0.5549 | 0.4100 | 26.11 |
| EP 921 | 0.3303 | 0.2468 | 25.28 |
| | 0.5514 | 0.4690 | 14.94 |
| | 0.4398 | 0.3606 | 18.01 |
| Ink Zapper | 0.6794 | 0.6594 | 2.94 |
| | 0.6682 | 0.6452 | 3.44 |
| | 0.5475 | 0.5561 | -1.57 |
| California Parts Washer | 0.4498 | 0.4254 | 5.42 |
| | 0.2631 | 0.2668 | -1.41 |
| | 0.3906 | 0.3882 | 0.61 |
| SC 1000 | 0.3911 | 0.3802 | 2.79 |
| | 0.4471 | 0.4379 | 2.06 |
| | 0.2728 | 0.2730 | -0.07 |

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|-----------------|--------|--------|------|
| Valtron SP 2201 | 0.3527 | 0.3487 | 1.13 |
| | 0.1992 | 0.1925 | 3.36 |
| | 0.6456 | 0.6370 | 1.33 |

Summary:

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|---------------------------|-------------------------------------|-----------------|--------------------|-------------------------------------|----------------------|--|
| Substrates: | | Stainless Steel | | | | |
| Contaminants: | | Inks | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: | |
| AG Environmental Products | Soy Clear 1500 | 100 | -14.84 | <input type="checkbox"/> | | |
| Metabolix Inc | Metabolix E3HB | 100 | 19.83 | <input type="checkbox"/> | | |
| Bio Chem Systems | Bio T Max | 100 | 81.80 | <input checked="" type="checkbox"/> | | |
| Kyzen Corporation | Misprint Stencil Remover | 100 | 33.66 | <input type="checkbox"/> | | |
| Inland Technologies Inc | EP 921 | 100 | 19.41 | <input type="checkbox"/> | | |
| Vertec BioSolvents | Ink Zapper | 100 | 1.61 | <input type="checkbox"/> | | |
| Phase III Inc | California Parts Washer Solution | 20 | 1.54 | <input checked="" type="checkbox"/> | | |
| Gemtek Products | SC 1000 Aqueous Cleaner Concentrate | 10 | 1.59 | <input type="checkbox"/> | | |
| Valtech Corporation | Valtron SP 2201 | 10 | 1.94 | <input type="checkbox"/> | | |
| AG Environmental Products | Soy Clear 1500 | 100 | 96.71 | <input checked="" type="checkbox"/> | Wipe | |
| Vertec BioSolvents | Ink Zapper | 100 | 97.67 | <input checked="" type="checkbox"/> | Wipe | |
| Phase III Inc | California Parts Washer Solution | 20 | 99.27 | <input checked="" type="checkbox"/> | Wipe | |
| Gemtek Products | SC 1000 Aqueous Cleaner Concentrate | 10 | 82.89 | <input checked="" type="checkbox"/> | Wipe | |
| Valtech Corporation | Valtron SP 2201 | 10 | 92.35 | <input checked="" type="checkbox"/> | Wipe | |

Conclusion:

The successful cleaners will be evaluated on the second supplied ink.