CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2002
DateRun:	08/12/2002
Experimenters:	Jason Marshall, Heidi Wilcox
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Steel
PartType:	Coupon
Contaminants:	Adhesive, Cutting/Tapping Fluids, Inks, Oil
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric
Purpose:	To evaluate supplied cleaner for four contaminants.
Experimental Procedure:	Four contaminants were selected based on past testing and from clients requests. Contaminants selected were: Oil - Citgo Quenching Oil 22 (64741-89-5, 8052-42-4) Cutting Fluid - Steco Corp, Tap Magic Protap (112-80-1, 112-62-9) Ink - Essilor Yellow Ink Y368 Akyl resin printing ink (107-87-9, 123-86-4, 108-65-6, 1330-20-7) Adhesive/Resin - Emerson & Cuming 2651-1 Black (1675-54-3, 14808-60-7, 122-60-1, 330-54-1, 1333-86-4). Each contaminant was applied to three preweighed steel coupons using a hand held swab. Contaminants were aged using a Master Appliance Heat Gun at 500 F for 10 minutes. Coupons were allowed to sit for 2 hours at 68 F and then weighed again to determine the amount of contaminant added. Four 600 ml beakers were filled with Metabolix E3HB and degassed in a Crest 40 kHz ultrasonic tank for 5 minutes. Four additional beakers were filled with water to be used as a control. Cleaning lasted for two minutes, followed by a 15 second tap water rinse at 68 F and 30 second drying with the heat gun at 500 F. The coupons were allowed to cool to room temperature and weighed again. Efficiencies were calculated for the different contaminant removals.
Results:	The Metabolix product was very successful in removing the four contaminants. Efficiencies were over 99% for three of the four contaminants. Even though the last contaminant from Emerson & Cuming only had an efficiency of 78%, two of the three coupons had over 85% of the adhesive removed. The third coupon had an efficiency of 45%. Upon review of the initial amount of adhesive added to the coupons, it was noted that the coupon with the low efficiency had more adhesive than the other two coupons combined. Cleaning in two minutes removed the same amount of adhesive, approximately 0.85 grams for the two coupons with over 1 gram initially. The table below shows the amount of contaminant added and remaining for each coupon cleaned. Water was found to remove very little of the contaminants as shown in Table 2.

Table 1. Cleaning Efficiencies

Cleaner	Initial wt of cont.	Final wt of cont.	%Cont Removed		
Quench Oil	0.1713	0.0019	98.89		
	0.3113	-0.0003	100.10		
	0.3898	0.0044	98.87		
Cutting Fluid	0.2761	0.0016	99.42		
	0.6049	0.0023	99.62		
	0.6711	0.0001	99.99		
Ink	0.7771	-0.0004	100.05		
	0.3944	-0.0003	100.08		
	0.5697	0.0000	100.00		
Adhesive	1.861	1.0091	45.78	0.8519	Adhesive removed
	0.595	0.0011	99.82		
	1.0081	0.1197	88.13	0.8884	Adhesive removed

Table 2. Water Efficiencies

Quench Oil	0.1009	0.0362	64.12

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	0.1161	0.0742	36.09
	0.0782	0.0244	68.80
Cutting Fluid	0.1444	0.1028	28.81
	0.1787	0.0651	63.57
	0.2512	0.1064	57.64
Ink	0.1774	0.1661	6.37
	0.2419	0.2033	15.96
	0.2091	0.1894	9.42
Adhesive	0.4029	0.2388	40.73
	0.2658	0.1736	34.69
	0.4029	0.2003	50.29

Summary:

Substrates:	Steel
Contaminants:	Adhesive, Cutting/Tapping Fluids, Inks, Oil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Metabolix Inc	Metabolix E3HB	100	99.29	☑	Quench oil
Metabolix Inc	Metabolix E3HB	100	99.68	☑	Cutting Fluid
Metabolix Inc	Metabolix E3HB	100	100.04	☑	Ink
Metabolix Inc	Metabolix E3HB	100	77.91	☑	Adhesive
Water	Water	100	56.34	☐	Quench Oil
Water	Water	100	50.01	☐	Cutting Fluid
Water	Water	100	10.58	☐	Ink
Water	Water	100	41.90	☐	Adhesive

Conclusion: The supplied product was found to be successful on the four contaminants.