CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2001

DateRun: 03/30/2001

Experimenters: Todd MacFadden

ClientType: Adhesive Manufacturer

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Adhesive

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric

Purpose: To identify a suitable, non- or less-toxic substitute cleaner for toluene and toluene-based solvents for this industry sector.

Experimental Procedure: In this trial, the coupons were tested wet, only 30 minutes after they were contaminated. The procedure was the same as that for Trial 5: The BYK-Gardner Abrasion Tester was used with a stiff nylon brush. Dry, clean stainless steel coupons were weighed, then contaminated with one of the two adhesives identified above. Coupons were secured two at a time length-wise, end-to-end into the Abrasion Tester holding tray. The nylon brush was dipped in the respective cleaning solution for several seconds, inserted into the Abrasion Tester, and the machine was turned on and run for 10 cycles. The coupons were then immediately rinsed by immersion into warm (130 F) water for 30 seconds, hung to dry, and then re-weighed to determine the cleaning efficiency.

SUBSTRATE MATERIAL: SS (202-410 B85) and SS (302-B86)
CONTAMINANTS:
a. AC-059 adhesive (108-883),
b. Morton 717 adhesive (108-883, 108-05-4, 110-54-3, 142-82-5, 67-63-0)

Results: Table 2 highlights the results of this experiment.

Table 2. Cleaning Efficiencies

	1a	1b	2a	2b	3a	3b	4a	4b
	HC-059	Morton717	HC-059	Morton717	HC-059	Morton717	HC-059	Morton717
Coupon 1	28.83	23.17	16.72	0.81	28.74	0.86	8.77	46.47
Coupon 2	33.70	29.19	13.86	6.07	27.60	4.70	64.00	74.87
Coupon 3	28.44	22.33	12.13	5.98	91.63	2.01	60.67	74.07
Average	30.32	24.90	14.23	4.28	49.32	2.52	44.47	65.14

Observations: The cleaning efficiencies are overall better than in previous trials. This is not surprising, since the tests were run while the coupons were still wet, that is, only having been allowed to dry for 30 minutes, rather than for 24 hours as was the method in Trial 4. Therefore, it should be expected that the adhesives would be easier to remove.

The cleaners generally performed better on the HC-059 adhesive than the Morton-717 adhesive, except in the case of Today and Beyond, which removed 65% of the Morton adhesive and only 44% of the HC-059.

The biggest discrepancy between the cleaners was with Solvent Kleen, which removed almost half the HC-059 adhesive, but only 2.5% of the Morton adhesive.

As in trial 3, the gravimetric results for the Savogran cleaner may be misleading. This is a highly viscous cleaner (about 1700 cP, compared with water which is about 1 cP) and also rather immiscible in water. Therefore, this cleaner was not completely removed during the rinse stage and some of its constituents remained on the coupon after drying, which would add to the mass of the coupon. Nevertheless, this residue is easily wiped away, and from a visual and tactile inspection after cleaning, the adhesive was definitely softened after the trial.

In three instances, (trials 3a, 4a, and 4b) the standard deviation was greater than 15%. These trials will be rerun to assure consistency.

Summary:

Substrates:	Stainless Steel				
Contaminants:	Adhesive				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Dysol	DS 104 Wipe Solvent	100	30.30	☐	

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Savogran Company	SI #4 Coating Remover	100	14.20	☐	
Transene Company, Inc.	D Greeze 500 LO	100	49.30	☐	
Today & Beyond	Beyond 2009	100	65.00	☑	

Conclusion: The cleaners tested in this trial were chosen based on relatively promising results they yielded from Trials 3 and 4. The surface abrasion provided by the testing machine was meant to simulate the real-world situation of wipe cleaning, and definitely had a noticeable effect on the adhesive that is not entirely captured by the gravimetric results.