CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2001
DateRun:	03/20/2001
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:

The BYK-Gardner Abrasion Tester used in this experiment is a benchtop instrument that draws an abrasion device back and forth across the substrate a specified number of cycles. One cycle is two strokes. The abrasion device used in this experiment was a stiff nylon brush. Dry, clean stainless steel coupons were weighed, then contaminated with one of the two adhesives identified above and allowed to dry for 24 hours. Coupons were then 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

	Dynamold	Dynamold	Savogran	Savogran	Solvent Kl	Solvent Kl	Today&Be	Today&Be
	HC-059	Morton717	HC-059	Morton717	HC-059	Morton717	HC-059	Morton717
Coupon 1	13.09	-0.42	-0.58	-6.42	19.31	-4.80	0.02	-0.26
Coupon 2	16.13	0.39	-0.20	-6.27	9.80	-1.05	0.63	0.00
Coupon 3	14.06	0.85	1.06	-6.59	20.87	-1.12	0.23	0.44
Average	14.43	0.28	0.09	-6.42	16.66	-2.32	0.29	0.06

Observations: All cleaners performed comparatively better on the HC-059 adhesive than the Morton-717 adhesive, with efficiencies ranging from 0.089% to 14.4% for the former, and –6.4% to 0.28% for the latter. This observation is consistent with results from previous experiments, suggesting that the Morton-717 adhesive is more aggressive than the HC-059 adhesive.

Solvent Kleen yielded the best results of all the cleaners for the HC-059 adhesive, with an efficiency of 16.7%. From a visual inspection, Solvent Kleen had a noticeable effect on the HC-059 adhesive, appearing to soften it substantially. This same cleaner had a negative efficiency on the Morton adhesive; from previous trials, it may be possible that the cleaner is penetrating the adhesive, thereby adding mass to the coupon.

Regarding the Savogran cleaner, the gravimetric results 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.

The Dynamold cleaner also yielded promising results, with an efficiency for the HC-059 adhesive of 14%, and 0.6% for the Morton, which is generally better than trials conducted by simple immersion. It is important to note that both the Savogran and Today&Beyond cleaners reduced the “stickiness” of both types of adhesives, suggesting that perhaps they were beginning to break down the resins in the adhesive. Also, close observation during the abrasion testing showed clearly that the adhesives were being loosened by all the cleaners at least somewhat, especially by the Savogran and Dynamold.

Summary:

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Substrates:	Stainless Steel				
Contaminants:	Adhesive				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Dysol	DS 104 Wipe Solvent	100	14.00	☑	
Savogran Company	SI #4 Coating Remover	100	0.08	☐	
Transene Company, Inc.	D Greeze 500 LO	100	16.60	☐	
Today & Beyond	Beyond 2009	100	0.29	☐	

Conclusion:

The cleaners tested in this trial were chosen based on relatively promising results they yielded from Trial 3, an immersion experiment. 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. A possible modification for this experiment for the next trial would be test the adhesives in the Abrasion Tester before they dry completely.