CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2001

DateRun: 04/25/2001

Experimenters: Todd MacFadden

ClientType: Adhesive Manufacturer

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Adhesive

Cleaning Methods:

Analytical Methods: Gravimetric, Timing

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

Experimental Procedure: Identical procedure to previous trial, using different cleaners.
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 cleaning efficiencies of this experiment.
Table 2.

Abrasion	1a	1b	2a	2b	3a	3b	4a	4b
Coupon 1	59.19	62.65	75.39	42.83	72.95	28.28	58.59	22.48
Coupon 2	83.92	37.4	89.48	44.19	66.07	34.04	19.08	25.61
Coupon 3	65.76	31.48	73.07	13.19	58.49	30.09	14.64	24.33
Average	69.62	43.84	79.31	33.4	65.84	30.8	30.77	24.14

Handwipe	1	2	3	4
Coupon 1	112	235	132	532
Coupon 2	107	279	88	496
Coupon 3	109	368	137	353
Average	109.33	294	119	460.33

Abrasion	5a	5b	6a	6b	7a	7b
Coupon 1	33.78	-25.73	188.21	44.59	91.33	40.37
Coupon 2	47.19	-19.67	11.17	25.5	86.78	62.43
Coupon 3	23.59	16.39	52.5	43.95	89.24	45.24
Average	34.85	-9.67	83.96	38.01	89.12	49.35
Handwipe						
Coupon 1	42	75	116	116	19	176
Coupon 2	39	186	114	113	23	197
Coupon 3	32	106	106	106	22	205
Average	37.67	122.33	112	111.67	21.33	192.67

Observations: The results of the abrasion test provided relatively consistent results, in that each cleaner performed better on the HC-059 than the Morton adhesive. This is consistent with previous findings that Morton is the more aggressive adhesive. The best cleaning efficiencies were obtained with isopropyl alcohol and Citrisafe with 84%, and 79% efficiencies, respectively. EP 921 (70%) and HFE-71DE (66%) were also highly efficient on HC-059. Compared to toluene (89%) these cleaners performed comparatively well.

Likewise with the Morton adhesive, toluene established a baseline for comparison of about 49%; the most effective alternative cleaners on this adhesive were EP 921 (44%), isopropyl alcohol (48%) and Citrisafe (33%).

Nevertheless, it is important to note the standard deviation of these values, in which 5 cleaners had a S.D. of greater than 15%, and in one case, Trial 6a, the S.D. was 93%! Moreover, Trial 5b provided an overall negative efficiency, whereas Trial 5a provided a relatively favorable value of 34%. Therefore, inconsistencies still abound, and these trials will all have to be rerun.

Still, some useful information can still be gleaned from the data, especially when compared to the handwipe results. For example, it is apparent that isopropyl alcohol and the methyl ester products work well on both adhesives, especially when the handwipe results are examined and compared with those of toluene. Both of these alternative cleaners worked faster on the Morton adhesive than toluene!

Summary:

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Substrates:	Stainless Steel				
Contaminants:	Adhesive				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Inland Technologies Inc	EP 921	100	69.62	☑	
Inland Technologies Inc	Citrasafe	100	73.07	☑	
3M	HFE 71DE	100	65.84	☑	
3M	HFE 7100	100	24.33	☐	

Conclusion: While several frustrating inconsistencies are still being observed, it is heartening to note that several alternative cleaners do appear to show promise. Further testing, with careful attention to consistency, will hopefully verify these initial findings.