CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2001
DateRun:	01/30/2001
Experimenters:	Jason Marshall, John Brunelle
ClientType:	Tool Manufacturer
ProjectNumber:	Project #2
Substrates:	Steel
PartType:	Coupon
Contaminants:	Abrasive, Buffing/Polishing Compounds, Greases
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric
Purpose:	To identify additional cleaning alternatives to current cleaner.

Experimental Procedure:

Two cleaners were selected from the lab's database of effective testing. A third cleaner was supplied by the client. The two lab selected products were diluted to 5% using DI water. The client product was diluted to 10% according to their current use. All three were heated to 130 F on a hot plate. Nine preweighed coupons were contaminated with the mix of the three contaminants supplied and dried for 20 minutes in an oven. Once the coupons cooled to room temperature, a second weighing was performed. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation. Coupons were rinsed with tap water at 120 F for 30 seconds and dried using a Master Appliance Corp, Hot-air gun model HG at 500 F for one minute. A final clean weight was recorded and the efficiencies of the products were calculated. After cleaning using immersion agitation, the same coupons were then cleaned in same cleaners using a Crest 40 kHz ultrasonic tank model 4Ht 1014-6 for five minutes. Rinsing and drying were duplicated. Efficiencies were calculated based on ultrasonic and immersion/ultrasonic cleaning.

SUBSTRATE MATERIAL: Steel Coupons
CONTAMINANTS: Mix: Grease Stick (M.P. Iding Co, Fatty acid soap with Tallow), buffing compound (Jackson Lea Plastibrade F-18, 1332-58-7, 1344-09-8, 1344-28-1, 9000-70-8), Gritite (M.P. Iding Co.)
CONTAMINATING PROCESS USED: The three supplied contaminants were mixed together and applied to coupons using swab. Contaminants/coupons were dried for 20 minutes at 212 F.

Results:

Immersion cleaning of the contaminant mix did not prove to be very effective. All three cleaners removed around half of the contaminant mix. Table 1 lists the results of immersion cleaning.

Table 1. Immersion Cleaning Efficiencies

Immersion	E-Kleen 196 A	815 GD	SP 2250 LF
Coupon 1	39.24	40.3	48.66
Coupon 2	43.08	42.16	52.68
Coupon 3	46.12	34.7	58.27
Ave	42.81	39.05	53.2
Std Dev	3.45	3.88	4.83

Ultrasonic cleaning added to the cleaning process and removed the remaining amount of contaminants from 40 to 80%. The Valtech product was the most successful cleaner removing 83% of the remaining contaminant mix. Table 2 lists the ultrasonic cleaning results.

Table 2. Ultrasonic Cleaning Efficiencies
Ultrasonic

E-Kleen 196 A	815 GD	SP 2250 LF
45.57	68.92	79.98
23.26	66.01	87.61
66.79	56.75	81.55
45.21	63.89	83.05
21.77	6.35	4.03

Combining the two cleaning process resulted in one cleaner removing over 90%, a second removing nearly 80% and the final cleaning 70%. Table 3 lists the combined efficiencies of immersion and ultrasonic cleaning.

Table 3. Combined Results

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E-Kleen 196 A	815 GD	SP 2250 LF
66.93	81.44	89.72
56.32	80.34	94.14

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82.11	71.76	92.3
68.45	77.85	92.05
12.96	5.3	2.22

Summary:

Substrates:	Steel				
Contaminants:	Abrasive, Buffing/Polishing Compounds, Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Brulin Corporation	Formula 815 GD	5	39.05	☐	immersion
Valtech Corporation	Valtron SP 2250 2LF	5	53.20	☐	immersion
Electrochemical Products Inc	E Kleen 196 A	10	42.81	☐	immersion
Electrochemical Products Inc	E Kleen 196 A	10	45.21	☐	ultrasonic
Brulin Corporation	Formula 815 GD	5	63.89	☐	ultrasonics
Valtech Corporation	Valtron SP 2250 2LF	5	83.05	☑	ultrasonics

Conclusion:

From the results calculated, it appears that ultrasonic cleaning would be the more effective cleaning method. Valtech Valtron SP 2250 LF was the better cleaning chemistry evaluated followed by Brulin 815 GD and EPI EKleen 196A.
Products evaluated in this trial and the previous trials (Matchless MC-132, EMKAY Safet Wash) will be used to clean the supplied parts. Each solution will also be tested for surfactant levels before and after cleaning the parts.