CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2001
DateRun:	01/31/2001
Experimenters:	Jason Marshall
ClientType:	Tool Manufacturer
ProjectNumber:	Project #2
Substrates:	Steel
PartType:	Part
Contaminants:	Abrasive, Buffing/Polishing Compounds, Greases
Cleaning Methods:	Ultrasonics
Analytical Methods:	Surfactant Titration, Visual
Purpose:	To evaluate selected cleaners on supplied parts.

Experimental Procedure:

Five cleaners from the previous testing performed at SCL were diluted to the concentrations listed below using DI water in 250 mL beakers. Each solution was heated to 130 F in a Crest 40 kHz ultrasonic tank model 4Ht 1014-6 filled with water. One rachet was cleaned in each solution for 3 minutes. The part was rinsed with a tap water spray for 30 seconds at 120 F. Parts were dried using a white paper towel. The towel was then evaluated for any signs of the contaminant mix.

Each of the solutions was subjected to a nonionic surfactant titration before and after the cleaning to determine the levels of surfactant in the solutions. The dirty solutions were mixed with a stir bar for 10 seconds prior to evaluation. The following procedure was used for the titration:

NONIONIC DETERGENT TEST KIT PROCEDURE SHEET
BAMA CHEM
1. Add approximately 25 ml of water to mixing vial
2. Add 8 drops of indicator solution to vial. Color should be green.
3. Add 15 drops of 20% sulfuric acid to vial (20 drops if strongly alkaline detergents are tested) and swirl. Color should now be purple. (Caution: handle this solution with care. It is corrosive and may cause burns.)
4. Add 0.5ml of nonionic detergent solution to vial and swirl, color should now turn back to green or yellow-green.
5. Add titrating solution dropwise while counting until the color changes to a wine-red or purple. (About halfway to the endpoint the color will be tan or light brown). Note the number of drops needed and multiply by 0.5 to get % by volume of nonionic detergent. Each drop is equivalent to 0.0028 grams of surfactant. Choose sample size that will require 10-20 drops of titrant for better accuracy. For very concentrated surfactant solutions use a 0.10ml sample so as to conserve reagents. For a 0.10ml sample use a factor of 2.5.

SUBSTRATE MATERIAL: Steel Rachet handles
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.)

Results:

All five chemistries were very effective in removing the contaminant from the rachet handle. There was one area that caused problems for each of the five cleaners. The area inside the rachet head at the top of the rachet did not get completely cleaned after the three minutes. See Figure 1 for comparison of the difficult area before and after cleaning.

Figure 3. Area of Difficulty

Surfactant testing revealed that only one cleaner had a significant change in the amount of surfactant. The EPI E-Kleen dropped from 1% down to 0.3%. Table 1 lists the surfactant levels for clean and dirty solutions. Three of the solutions remained relatively constant after cleaning one part. One solution, Emkay, was not evaluated using the surfactant testing.

Table 1. Surfactant Measurement

Mfr	EPI			Brulin		
Product	Clean Ekleen	Dirty Ekleen	Dirty Ekleen	Clean 815 GD	Dirty 815 GD	Dirty 815 GD
Conc. %	10	10	10	5	5	5
Volume	25	50	25	5	5	5
Wt of Surf	0.028	0.0196	0.0084	0.0308	0.0364	0.0308
% Surf.	0.1	0.035	0.03	0.55	0.65	0.55
Total Surf %	1	0.35	0.3	11	13	11

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Mfr	Valtech			Matchless Chemical		
Product	Clean Valtron	Dirty Valtron	Dirty Valtron	Clean MC-132	Dirty MC-132	
Conc. %	5	5	5	5	5	
Volume	10	10	5	1.5	5	
Wt of Surf	0.028	0.0252	0.014	0.0084	0.0308	
% Surf.	0.25	0.225	0.25	0.5	0.55	
Total Surf %	5	4.5	5	10	11	

Summary:

Substrates:	Steel
Contaminants:	Abrasive, Buffing/Polishing Compounds, Greases

Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Electrochemical Products Inc	E Kleen 196 A	10	0.00	☐	
Brulin Corporation	Formula 815 GD	5	0.00	☑	
Valtech Corporation	Valtron SP 2250 2LF	5	0.00	☑	
Matchless Metal Polish Company	MC 132	5	0.00	☑	
Emkay Chemical Company	Safety Wash	5	0.00	☑	

Conclusion:

Ultrasonic cleaning was found to be an effective method for removing the contaminant mix. The EPI E-Kleen appears to have its surfactant component drastically altered after cleaning one part. The other three, Brulin 815 GD, Valtech Valtron SP 2250 LF and Matchless Chemical MC-132 were not affected as severely. Additional testing could be done to determine how long these products can be used before surfactant levels show signs of decreasing.