CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2001
DateRun:	02/11/2001
Experimenters:	Jason Marshall
ClientType:	Tool Manufacturer
ProjectNumber:	Project #2
Substrates:	Steel
PartType:	Part
Contaminants:	Abrasive, Buffing/Polishing Compounds, Greases
Cleaning Methods:	Ultrasonics
Analytical Methods:	Visual
Purpose:	To evaluate selected cleaners on supplied parts.

Experimental Procedure:

Three products supplied by the client were diluted to 3% using tap water in 600 ml beakers. The solutions were heated to 180 F in a Crest 25 kHz ultrasonic tank. One part was cleaned in each solution for a total of three minutes. Three cleaning cycles were used: 3-minute ultrasonic cleaning; 2-minute immersion followed by 1-minute ultrasonic cleaning; and 1 minute ultrasonic followed by 2-minute immersion cleaning. Parts were visually inspected for cleanliness. Following cleaning, the solutions were evaluated for surfactant levels using Bama Chem Nonionic Surfactant test kit. Rinse water was also evaluated to determine the amount, if any, of surfactant remaining on the parts. 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.
The cleaning solutions were then loaded with the melted grease stick to determine how fast separation took place.

SUBSTRATE MATERIAL: Steel Ratchet 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:

The three minutes of ultrasonic cleaning resulted in the cleanest looking parts. Using the ultrasonic cleaning for one minute at the beginning of the cleaning was more effective than using ultrasonics at the end of cleaning. Only two of the cleaners were evaluated using the surfactant testing. The Tomadyne 101LF was not evaluated due to the separation of the cleaning components and the water that took place. See Figure 1 for visual.

Figure 4. LF Separation
Surfactant levels did not change for the clean or the dirty solutions. Evaluation of the rinse water revealed that the amount of surfactant remaining on the parts after cleaning was very little if any at all. The first rinse bath was found to contain 0.03% surfactant, and the second rinse bath had slightly less, 0.025%. The control sample of tap water resulted in a 0.02% level of surfactant.
Both solutions were found to separate from the grease stick relatively quickly. It was also found the grease stick altered the amount of surfactant available in the cleaning solution. Levels dropped around 50% from the initial dirty level.

Summary:

Substrates:	Steel				
Contaminants:	Abrasive, Buffing/Polishing Compounds, Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Tomah Products Inc	Tomadyne 101 LF	3	0.00	☐	
Tomah Products Inc	Tomadyne 102	3	0.00	☑	
Tomah Products Inc	Tomadyne Mix	3	0.00	☑	

Conclusion:

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Two solutions, Tomadyne 102 and the Toamah mix, were determined to provide adequate cleaning without significant loss of surfactant. The third sample tested Tomadyne 101 LF did not perform to a level that would be acceptable due to the separation of the water and cleaning formulation. It was determined that the grease stick could affect the amount of surfactant available in the solutions.