CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2008
DateRun:	06/17/2008
Experimenters:	Jason Marshall, Shweta Bansal
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Stainless Steel
PartType:	Coupon
Contaminants:	Carbon Deposits, Cutting/Tapping Fluids, Greases, Lubricating/Lapping Oils, Metal fines, Oil
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric
Purpose:	To evaluate supplied product for GS 34 performance using ultrasonic cleaning.

Experimental Procedure:

Two types of soils were prepared individually. The first soil, maintenance soil, consisted of 10 grams of carbon black, 10 grams iron oxide, 100 ml WD-40, 100 ml hydraulic oil, and 100 ml gear oil. Each component was placed in a 750 beaker and mixed for 20 minutes at room temperature using a magnetic stirrer. The second soil, production soil, was made by mixing 200 ml Quench Oil and 200 ml cutting oil for 20 minutes at room temperature using a magnetic stirrer in a second 750 ml beaker.

Approximately 100 mg of each soil was applied to a precleaned and preweighed stainless steel coupon onto one side only with a handheld swab. No soil was applied to the two control coupons. The maintenance soil for all three coupons was baked in an oven for 30 minutes at a temperature of 40° C (105 F). For the production soil, all three coupons were baked in an oven for thirty minutes at 105° C (220 F). The coupons were then allowed to cool to room temperature and weigh a second time (soiled mass = B).

The cleaning product was diluted to 12.5% and preheated to 46 C (115 F). Four beakers were filled with enough fresh degreaser solution to completely submerge the coupons in the degreasing solution without any overflow. The four beakers were suspended in the heated tank allowing the temperature in the cleaning bath and beakers to equilibrate. The product was degassed in the 40 kHz ultrasonic tank.

Each coupon was suspended in a beaker, allowing the entire contaminated surface to be submerged in the cleaning solution. The coupons were washed using 40 kHz ultrasonic energy for 20 minutes. The washing was followed by two rinse steps. The coupons were drained for 30 seconds prior to each rinse step. For each rinse step a 20-minute cycle was utilized. After the two rinse steps, all coupons were first allowed to air dry for 30 minutes and then dried in an oven at 105° C for 30 minutes. The coupons were then cooled to room temperature and final weights were measured (mass of the coupon after cleaning = C).

The control coupons were examined to determine if there were any visible signs of corrosion. Next, the control coupons were weighed to determine if there was any lost mass, which might occur if corrosion was in progress; or gained mass, which might occur if the degreaser had left a residue on the coupons. The following equation was applied:

For the cleaned coupons, the amount of residual soil per surface area was calculated, using the following formula: RS = (C-A)/ Ar

If the average residual maintenance soil loading, and the average residual performance soil loading are each less than 2,000 mg/m2, the degreaser meets the cleaning performance criteria.

Results:

Ultrasonic cleaning at 12.5% concentration was found to be effective at removing the maintenance soil from the stainless steel coupons.

Coupon	Initial mass -g (A)	After soiling - g (B)	After cleaning - g(C)	Residual soil (mg/ m2)	Mass control (mg)
M1	62.3598	62.4619	62.3677	1975	-
M2	64.2743	64.3749	64.2768	625	-
M3	64.007	64.0975	64.0072	50	-
MC		64.0076	64.0077	-	0.1000
Average				883	
P1	64.0728	64.1817	64.0908	4500	-
P2	63.8099	63.8952	63.8241	3550	-
P3	63.8472	63.9776	63.8654	4550	-
PC		64.0815	64.0814	-	0.1000
Average				4200	

Summary:

Substrates:	Stainless Steel

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Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Keteca USA	Water Works Heavy Duty Degreaser	12.5	96.52	☑	

Conclusion:

The supplied product at 12.5% was found to meet the GS 34 requirement of 2000mg/m2 residual soil when using ultrasonic cleaning on the maintenance soil. The product at 33% was able to meet the same level for the process soil when cleaned using immersion cleaning. The overall product residual soil average was calculated to be 1383 mg/m2. The final evaluation will be conducted on the oil water separation.