

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999
 DateRun: 11/23/1999
 Experimenters: Jason Marshall
 ClientType: Cleaning Equipment Mfr
 ProjectNumber: Project #1
 Substrates: Steel
 PartType: Coupon
 Contaminants: Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil
 Cleaning Methods: Ultrasonics
 Analytical Methods: Gravimetric, OSEE

Purpose: To evaluate standard ultrasonic cleaning system and water for cleaning oil from steel.

Experimental Procedure: Weights of nine steel coupons were recorded prior to contamination using the supplied oil. OSEE Readings were used also recorded before and after contamination. (Measured during previous trial.) Three coupons cleaned in a Crest 40 kHz ultrasonic tank model 4Ht 1014-6 with tap water at room temperature for each time period. Cleaning took place for one, three and five minutes. Coupons were rinsed in tap water at room temperature for 30 seconds and then dried for two minutes using a Master Appliance Corp, Hot-air gun model HG-301A also at room temperature. Once parts were dried, final gravimetric and OSEE measurements were made.
 SUBSTRATE MATERIAL: Hot Rolled Steel ASTM A-56
 CONTAMINANTS: Oil-Chem Ecol Insoluble Cutting Oil
 CONTAMINATING PROCESS USED: Parts received clean. Baseline samples coated using swab.

Results: The five minute cleaning time yielded the most oil removal, over 96%. The three minute cleaning was determined to be about 88% and the one minute only removed 74% of the oil from the coupon. Table 1 lists the results.

Table 1. Calculated Gravimetric Results

Time	1 minute	3 minute	5 minute
Coupon 1	76.95	89.41	93.36
Coupon 2	78.04	79.56	98.32
Coupon 3	65.62	95.14	98.00
Average	73.54	88.04	96.56

The final clean readings were much lower than the base line levels determined during the first experiment. As the cleaning time increased, the OSEE readings decreased further. The values were significantly higher than the readings recorded for the parts cleaned off site. The OSEE readings are listed in Table 2 for parts cleaned in this trial.

Table 2. Overall Average vs Cleaning Times

Base	Dirty	1 min	3 min	5 min
344.3	283.4	274.7	260.2	252.3

Summary:

Substrates:		Steel			
Contaminants:		Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil			
Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Water	Water	100	96.56	<input checked="" type="checkbox"/>	

Conclusion:

OSEE readings have been found to be inconclusive for determining the level of cleanliness. Gravimetric analysis yielded more concrete, easily understandable values for effective cleaning.