CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2020

DateRun: 09/07/2020

Experimenters: Justin Kiander

ClientType: Metal Finishing

ProjectNumber: Project #1

Substrates: Steel

PartType: Coupon

Contaminants: Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric, Visual, Contact Angle (Surface Tension)

Purpose: The purpose of this experiment was to determine the effectiveness of 4 cleaners in removing Vanishing Oil from TURI general steel coupons using heated immersion and comparing the contact angle of cleaned coupons to that of solvent cleaned cold rolled steel coupons provided by the company.

Experimental Procedure: Three general steel TURI coupons were obtained for each of the four cleaners tested. Cleaners were prepared to the following concentration: Liquinox 1%, Surface Cleanse 930 5%, Sta Sol ESS 160 100%, Smart Solve 605 100%. Cleaners were heated to a temperature of 100°F. An initial weight was obtained for all coupons, then coupons were soiled with the Vanishing Oil and a soiled weight was obtained. Once solutions reached the proper temperature, coupons were submerged into their respective cleaners for 15 minutes. After 15 minutes had passed, coupons were submerged into a deionized water bath at 100°F for 30 seconds. Coupons were then dried with an air gun on the cool setting. A clean weight was obtained then the contact angle was determined for each coupon. Contact angles were also obtained for the solvent Cleaned Cold Rolled Steel coupons provided by the company. Effectiveness of the cleaners was then determined.

Results:

Cleaner	Initial wt of cont	Final wt of cont	%Cont Removed	%AVG	Contact Angle	Average Contact Angle
Liquinox	0.0136	-0.0011	108.09	90.72	41.06	49.2
	0.0259	0.0011	95.75		48.45	
	0.018	0.0057	68.33		58.08	
Surface Cleanse 930	0.0314	-0.0023	107.32	80.98	4.66	4.01
	0.0128	-0.0012	109.38		4.99	
	0.008	0.0059	26.25		2.37	
Sta Sol ESS 160	0.0222	-0.0013	105.86	101.59	53.04	50.85
	0.0442	0.0036	91.86		50.96	
	0.0354	-0.0025	107.06		48.55	
Smart Solve 605	0.0214	0.0019	91.12	93.28	4.48	3.42
	0.0288	0.0021	92.71		N/A	
	0.0226	0.0009	96.02		2.35	

TCE Cleaned

Cold Rolled Steel	Contact Angle	Average Contact Angle	Total Average
1	95	85.96	75.16
	74.02		
	88.86		
2	56.82	61.01	
	63.5		
	62.7		
3	73.64	78.52	
	75.06		
	86.85		

Summary:

Substrates:	Steel				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**

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Alconox Inc	Liquinox	1%	90.72	☐	Ineffective based on contact angle of 49.2
International Products Corporation	Surface Cleanse Concentrated Neutral 930	5%	80.98	☐	Ineffective based on contact angle of 4.01
JR Hess & Co., Inc.	Sta-Sol ESS 160	100%	101.59	☐	Ineffective based on contact angle of 50.85
United Laboratories International	Smart Solve 605	100%	93.28	☐	Ineffective based on contact angle of 3.42

Conclusion: Sta Sol ESS 160 had the best % soil removal with an average of 101.59%. However, none of the cleaners had an average contact angle value to surpass solvent cleaned coupons. Next steps would be to test the cleaners on company cold rolled steel to determine if contact angle could be increased.