CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2023

DateRun: 04/04/2023

Experimenters: Amelia Wagner

ClientType: Lab

ProjectNumber: Project #8

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Greases, Lubricating/Lapping Oils

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate the effectiveness of a FAME + Methyl Lactate mixture in removing several production oils and greases from stainless steel coupons as a potential replacement for TCE using heated immersion.

Experimental Procedure: Three stainless steel coupons were used for each of the five soils being tested for a total of 15 coupons. The initial weights of each coupon were recorded. The bottom third of every coupon was soiled by applying the corresponding soil with a swab. The dirty weights of each coupon were then recorded. The coupons were then subjected to heated immersion cleaning in a solution of Fatty Acid Methyl Ester 93% + Ethyl Lactate 7% for 15 minutes at 130 F, with a stir bar set to 200 rpm. After the coupons were cleaned, they were left to air dry overnight. The next morning, the clean weights of each coupon were taken

Soil	Use	CAS
Milform OAK 7a International	Stamping and drawing fluid	64742-53-6 / 68909-65-9
Milform Oak 529	Evaporative lubricant	68551-17-7 / 123-95-5 / 127087-87-0
Milform Oak 15a	Metalworking oil	64742-44-5 / 64742-52-5 / 64742-55-8
Milform Oak 15c	Metalworking oil	64742-52-5 / 64742-53-6
M4		

Results:

Solvent	Substrate	Soil	Initial wt of cont.	Final wt of cont.	%Cont Removed	% AVG	% Overall
Fatty Acid methyl ester 93% + Ethyl lactate 7%	Stainless Steel	Oak 7a international	0.0436	0.0382	12.39	5.67	-23.57
		Oak 7a international	0.0701	0.0710	-1.28		
		Oak 7a international	0.0711	0.0669	5.91		
		M4	0.9774	0.0732	92.51	87.95	
		M4	0.4029	0.0445	88.96		
		M4	0.3993	0.0703	82.39		
		Oak 15C	0.0755	0.1044	-38.28	-5.36	
		Oak 15C	0.0781	0.0613	21.51		
		Oak 15C	0.0880	0.0874	0.68		
		Oak 15A	0.1857	0.0645	65.27	65.94	
		Oak 15A	0.1610	0.0560	65.22		
		Oak 15A	0.1818	0.0594	67.33		
		Oak 529	0.0381	0.0545	-43.04	-272.07	
		Oak 529	0.0192	0.1843	-859.90		
		Oak 529	0.0264	0.0035	86.74		

After being allowed to air dry over night, it was observed that the coupons were still completely wet the next morning. The FAME + Methyl Lactate solution was unable to air dry, which is reflected in these measurements. In some cases, a larger amount of cleaner remained on the coupon than the amount of soil it removed, leading to a heavier clean weight than dirty weight for particular coupons.

Summary:

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Substrates:	Stainless Steel				
Contaminants:	Greases, Lubricating/Lapping Oils				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
TURI Cleaning lab	SB-1		88.00	☑	On Soil M4
TURI Cleaning lab	SB-1		6.00	☐	on soil Oak 7a international
TURI Cleaning lab	SB-1		-5.00	☐	on soil Oak 15C
TURI Cleaning lab	SB-1		66.00	☐	on soil Oak 15A
TURI Cleaning lab	SB-1		-272.00	☐	on soil Oak 529

Conclusion: In the application of heated immersion with an air drying overnight period, Fatty Acid Methyl Ester 93% + Methyl Lactate 7% was not an effective cleaner for removing production oil and grease. In future testing, a drying step may be needed to gather more accurate measurements.