CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2024
DateRun:	09/18/2024
Experimenters:	Amelia Wagner
ClientType:	Metal Finishing
ProjectNumber:	Project #1
Substrates:	Carbon Steel
PartType:	Coupon
Contaminants:	Cutting/Tapping Fluids, Greases, Lubricating/Lapping Oils, Oil, Silicones
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Colorimeter, Visual
Purpose:	To test the efficacy of modified alcohols on provided carbon steel parts

Experimental Procedure:

Pre soiled carbon steel flags and caps were provided to the TURI lab by the client. The parts were soiled with corrosion preventatives, silicon based lubricants, water based oil, and grease. Three of each part were tested together as a 'coupon' set. The analytic results of each individual part in a set were averaged together to provide the analytical data point for the coupon sets. Before cleaning, each coupon set were visually observed and had their dirty visual rankings recorded. Each coupon set was analyzed using a cleanospector to measure the amount of fluorescence emitted. The dirty fluorescence levels of each coupon set were recorded. The coupon sets were then subjected to 10 mins of heated immersion at 180F in PnB glycol Ether (stir bar set to 300 rpm). Once removed, each coupon set was dried using a heat gun for about 30 seconds to evaporate the remaining cleaning chemistry. After dried, each coupon set had their clean visual rankings and clean fluorescence levels recorded.

Fluorescence Rankings:

The RFU values from the Cleanospector represent the difference in fluorescence, or the amount of light that is reflected from a surface. Percent detergency demonstrates the amount of restoration to the original that has occurred after the cleaning test has been performed. A higher average percent detergency indicates that the cleaner has been effective and has restored the dirty substrate and cleaned it so that it now is much closer to how it originally was measured.

Data recorded from the readings can be calculated as percent detergency in the following equation to determine the cleaning efficacy of each formulation:

% DET = R(cleaned) - R(soiled) / R(unsoiled) - R(soiled) X 100

The unsoiled RFU value was estimated to be 5.0 based on the measured RFU of carbon steel coupons from trial #0.

Visual Rankings:

1= 100% soil removed

2= 75% soil removed

3= 50% soil removed

4= 25% soil removed

5= 0% soil removed

Results:

Part Sample	% DET based on carbon steel	AVG % DET	Overall % DET
Carbon Steel Flags	91.38%	91.80%	88.48%
	94.58%		
	89.43%		
Carbon Steel Caps	90.74%	85.15%	
	86.99%		
	77.73%		

Cleanospector

Part Sample	Visual	AVG Visual	Overall Visual
Carbon Steel Flags	1.7	1.9	1.5
	1.8		
	2.3		
Carbon Steel Caps	1	1	
	1		

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Visual

Observations: While the flat outside surfaces of both the flags and caps were visually very clean, there was visible soil left in the ridges/threading of the flags and a minimal amount of visible soil left inside the caps.

Summary:

Substrates:	Carbon Steel				
Contaminants:	Cutting/Tapping Fluids, Greases, Lubricating/Lapping Oils, Oil, Silicones				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Dow Chemical Company	PnB Glycol Ether	98%	88.48	☑	Struggled to remove soil from blind holes and threading.

Conclusion:

While the PnB Glycol Ether was effective in removing a majority of soil from the supplied parts, it struggled to remove soil from the intricate threading and holes. This is most likely due to the immersion method, which is not specifically designed for complex pieces.

Further testing will be conducted at an increased time frame.