CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2020

DateRun: 11/22/2020

Experimenters: Nicole Kebler

ClientType: Bolt, Screw & Nut Manufacturer

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Greases

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric, Visual

Purpose: To evaluate the effectiveness of cleaners and solvents for the removal of grease on aluminum coupons using a stir bar with increased agitation to 500 rpm with unheated immersion for 30 minutes

Experimental Procedure: Five of eight cleaning products were diluted with tap water at room temperature to vendor recommended concentrations, SC-Aircraft increased concentration to 1:1. Two cleaning products were used at the recommended 100% dilution and the solvent option was also used at 100% concentration for industrial testing; all cleaners and solutions were measured for 200 mL and poured into beakers. Pre-weighed aluminum coupons were coated over 1/3 of the surface with grease that has been provided by the company by using a metal spatula; three coupons were used for each cleaner/solvent. They were allowed a 72-hour dry time at room temperature; their dirty weights were recorded. A stir bar was added to each beaker and was set to 500 RPM. The coupons were immersed in the cleaners/solvents at room temperature for 30-minutes, then were taken out and placed on trays with paper towels; they were blown dry for 2 minutes and then left to finish drying till the following week. Final weights and observations were recorded and evaluated. The removal goal based on client needs is between 70-90%.

Cleaner/Solvents used and their concentration:

1. Liquinox (1%)
2. Dimethyl Glutarate (100%)
3. Mirachem (20%)
4. Super Solve (50%)
5. Micro 90 (1%)
6. Smart Solve (100%)
7. SC-Aircraft (50%)
8. Ozzy Juice 3 (100%)

Results: Increasing the amount of agitation for unheated immersion increased the percentage of removal significantly for Dimethyl Glutarate, Ozzy Juice, and Smart Solve. Smart Solve was within the desired amount of 70-90% removal at 73.6% removal effectiveness and ranged from 50% to 85% removal. The coupons had minimal grease left on the coupon surface. Ozzy Juice also had minimal grease left on the coupon and showed 60.7% removal but varied from 51% to 75% removal effectiveness. The residual grease on these coupons was easily wiped away. Dimethyl Glutarate had 32.7% removal and grease was still on the coupon but did not appear to be as thick as before the cleaning stage. This was not effective enough for the removal of grease on aluminum. The rest of the cleaners were under 10% removal and were not effective for the removal of grease and showed no visual changes.

Summary:

Substrates:	Aluminum				
Contaminants:	Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Alconox Inc	Liquinox	1%	5.04	☐	This was not effective for the removal of grease on aluminum coupons.
Fisher Scientific	Dimethyl glutarate (CAS:1119-40-0)	100%	32.68	☐	This was not effective for the removal of grease on aluminum coupons.
Mirachem Corporation	Mirachem 500	20%	7.20	☐	This was not effective for the removal of grease on aluminum coupons.
AW Chesterton	278 Super Solv	50%	2.32	☐	This was not effective for the removal of grease on aluminum coupons.
	Micro 90 Conc.	1%	6.63	☐	

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International Products Corporation					This was not effective for the removal of grease on aluminum coupons.
United Laboratories International	Smart Solve 605	100%	73.57	☑	This was effective for the removal of grease on aluminum coupons.
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	50%	3.03	☐	This was not effective for the removal of grease on aluminum coupons.
Chem Free Corporation	SW-3 Ozzy Juice (Improved Low Odor)	100%	60.74	☑	This was effective for the removal of grease on aluminum coupons.

Conclusion:

Both Ozzy Juice and Smart Solve were considered effective for the removal of grease on aluminum coupons and percentage removal increased significantly with more agitation. The rest of the cleaners/solvents had too low of percentage removal to be considered effective, but Dimethyl Glutarate did increase the most out of these to 32%. Since agitation increased removal, the next step will be to simulate the company's current cleaning system by moving the coupons up and down (dunking) in beakers for agitation instead of adding agitation with a stir bar for the solvent Dimethyl Glutarate and cleaners Ozzy Juice and Smart Solve.