CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2017
DateRun:	03/16/2017
Experimenters:	George Liang, Vinh Tran
ClientType:	Maintenance Shop
ProjectNumber:	Project #1
Substrates:	Nickel, Steel
PartType:	Part
Contaminants:	Greases, Lubricating/Lapping Oils, Dirt
Cleaning Methods:	Ultrasonics
Analytical Methods:	Visual
Purpose:	To evaluate the supplied product for bike chain soil removal by agitating it with ultrasonic under two circumstances: unheated (23 C) and heated (50 C).
Experimental Procedure:	The following experimental procedure follows TURI's cleaning standard for contaminant removal using ultrasonic agitation.

Soiling Process:

The bike chains were pre-soiled and used as is. The bike chains can be seen in Figure 1 and Figure 2.

Figure 1 – Dirty Bike Chain Before Cleaning

From Figure 1, the initial bike chain's contaminant level is medium. The chain itself is rigid. However, the soil can easily be manually removed with the use of a paper towel.

Figure 2 – Dirty Bike Chain Before Cleaning

From Figure 2, the initial bike chain's contaminant level is high. The chain itself is rigid. The soil was a lot harder to remove by manual cleaning with the use of a paper towel alone.

Unheated Ultrasonic Cleaning Process: Two cleaning solutions were made: 25% and a 35% concentrated cleaner. 500 mL of cleaning solution was made for both cleaner concentrations and placed into a 1L beaker. The 25% cleaner concentration was a mixture of water (375mL) with the addition of the supplied cleaner (125 mL). The 35% cleaner concentration was a mixture of water (325 mL) with the addition of the supplied cleaner (175 mL). The cleaner with the higher dilution was used to clean the dirtier bike chain (Figure 2). Whereas the cleaner with the lower concentration was used to clean the bike with less soil on the bike chain (Figure 1).

An ultrasonic machine was first filled with water and thereafter, the cleaning solution was placed into the ultrasonic machine. Then the bike chains from Figure 1 and Figure 2 were placed into its respective cleaning solution and followed with 30 minutes of agitation in the machine without any heat. The bike chains were then rinsed three times in a water bath and followed by a manual wipe with a paper towel.

Heated Ultrasonic Cleaning Process: The heated ultrasonic cleaning process is the same as the unheated ultrasonic cleaning process with the exception of first heating the cleaning solution in the machine to 50 ^{o}C before placing the bike chains into its respective cleaning solution and followed with 30 minutes of agitation in the machine with heat. The bike chains were then rinsed three times in a water bath and followed by a manual wipe with a paper towel.

Results: Visual Results: Table pertaining to the amount of contaminant visually removed from its initial level of soil.

Cleaner Conc. (%)	Temp. (^{o}C)	Cleaning Time (min)	Observations
25	23	5	It had a visual removal rate of 75%, and it was slightly less rigid than the initial uncleaned chain.
		30	It had a visual removal rate of 90% from its initial contaminant level, and it was slightly less rigid than before. There was no change in visual removal after cleaning the

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			bike chain for 20 minutes.
	50	5	It had a visual removal rate of 50%, and it was slightly less rigid than the initial uncleaned chain.
		30	It had a visual removal rate of 85% from its initial contaminant level, and it was slightly less rigid than before.
35	23	5	It had a visual removal rate of 50%. But there was no significant difference in rigidness.
		30	It had a visual removal rate of 85% from its initial contaminant level, and there was no change in rigidness. There was no change in visual removal after cleaning the bike chain for 25 minutes.
	50	5	It had a visual removal rate of 50%, and it was slightly less rigid as compared to the initial uncleaned chain.
		30	It had a visual removal rate of 75%, and there was no change in rigidness after the initial 5 minutes cleaning.

Comparative Analysis

There was no visual difference between the dirtied bike chains after 5 minutes of agitation in the ultrasonic machine for the heated and unheated concentrated cleaning solution at 35%, with visual removal rate observed to be 50%. Similarly, the 25% concentrated cleaning solution with heated agitation was also observed to have a visual removal of 50% after 5 minutes in the ultrasonic machine. Whereas the cleaner concentration at 25% with unheated agitation had a visual removal rate of 75% after 5 minutes.

The sampled cleaner: Oranj Peelz at a concentration of 25% was observed to be more effective at room temperature than at a heated temperature of 50 ^{o}C, with respective visual removal rating of 90% and 85% after thirty minutes of agitation in the ultrasonic machine. In addition, the unheated sampled cleaner was observed to have removed 90% after just 20 minutes with agitation in the ultrasonic machine as compared to taking 30 minutes in the heated sampled cleaner to remove 85% of the contaminant from the bike chain.

Whereas the sampled cleaner at a concentration of 35% was observed to be slightly more effective at room temperature in removing the soil from the bike chains as compared to the heated cleaning solution at a temperature of 50 ^{o}C, with respective visual removal ratings of 85% and 75%. The sample cleaner: Oranj Peelz was observed to be less effective with the heated ultrasonic agitation as compared to the unheated ultrasonic agitation.

Summary:

Substrates:	Nickel, Steel				
Contaminants:	Greases, Lubricating/Lapping Oils, Dirt				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Pedro's	Oranj Peelz	25	0.00	☑	It is effective in removing soil from the bike chain.

Conclusion:

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The objective of the experiment is to evaluate the following cleaner: Oranj Peelz at different concentrations of 25% and 35% with the use of unheated (23 ^{O}C) and heated (50 ^{O}C) ultrasonic agitation. In conclusion, it is observed that the unheated cleaning solution at a concentration of 25% worked the best with the use of ultrasonic agitation.