

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2020  
 DateRun: 09/14/2020  
 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 the new set of cleaners in removing Vanishing Oil from company provided cold rolled steel coupons.

**Experimental Procedure:** One cold rolled steel coupon provided by the client was tested for each of the four cleaners. Cleaners were prepared to the following conditions: Metalnox 6386 100% concentration at room temperature, Mirachem 500 20% concentration at 110°F, SC Aircraft & Metal Cleaner 20% concentration at 130°F, and Shopmaster LPH 20% concentration at 130°F. Cold rolled steel coupons were weighed to obtain an initial measurement, then soiled with the Vanishing Oil and a dirty weight was recorded. Once solutions reached the proper temperatures, coupons were submerged into their respective cleaners for 15 minutes. After 15 minutes, coupons were submerged into a deionized water bath at 115°F for 20 seconds. Coupons were then dried using an air gun on the hot setting. Once dry, the coupons were allowed to cool, and a clean weight was recorded. Finally contact angle analysis was conducted on each coupon. Three different angles were obtained at different spots along the cleaned coupon and averaged together. Effectiveness of the cleaners was then determined.

**Results:**

| Cleaner             | Initial wt of cont | Final wt of cont | %Cont Removed | Contact Angle | AVG Contact Angle |
|---------------------|--------------------|------------------|---------------|---------------|-------------------|
| Metalnox 6386       | 0.0385             | -0.0011          | 102.86        | 74.77         | 79.28             |
|                     |                    |                  |               | 87.99         |                   |
|                     |                    |                  |               | 75.07         |                   |
| Mirachem 500        | 0.0523             | -0.0024          | 104.59        | 81.16         | 83.17             |
|                     |                    |                  |               | 94.88         |                   |
|                     |                    |                  |               | 73.47         |                   |
| SC Aircraft & Metal | 0.0294             | -0.001           | 103.4         | 62.05         | 65.82             |
|                     |                    |                  |               | 62.82         |                   |
|                     |                    |                  |               | 72.58         |                   |
| Shopmaster LPH      | 0.0509             | 0.0035           | 93.12         | 92.48         | 86.70             |
|                     |                    |                  |               | 85.17         |                   |
|                     |                    |                  |               | 82.44         |                   |

**Summary:**

| <b>Substrates:</b>    | Steel   |        |             |                                     |                                |
|-----------------------|---|--------|-------------|-------------------------------------|--------------------------------|
| <b>Contaminants:</b>  | Oil   |        |             |                                     |                                |
| Company Name:         | Product Name:                                 | Conc.: | Efficiency: | Effective:                          | Observations:                  |
| Kyzen Corporation     | Metalnox M6386                                | 100%   | 102.86      | <input checked="" type="checkbox"/> | Average Contact Angle of 79.28 |
| Mirachem Corporation  | Mirachem 500                                  | 20%    | 104.59      | <input checked="" type="checkbox"/> | Average Contact Angle of 83.17 |
| Gemtek Products       | SC Aircraft & Metal Cleaner Super Concentrate | 20%    | 103.40      | <input checked="" type="checkbox"/> | Average Contact Angle of 65.82 |
| Buckeye International | Shopmaster LPH                                | 20%    | 93.12       | <input checked="" type="checkbox"/> | Average Contact Angle of 86.70 |

**Conclusion:** In terms of soil removed, all cleaners were effective with Mirachem 500 being the most effective removing 104.59% of soil. In terms of contact angle, Shopmaster LPH was the most effective with an average contact angle of 86.70. Mirachem was the second most effective with an average contact angle of 83.17. Note that the average contact angle for solvent cleaned coupons was 75.16. Next steps would be to test on parts provided by the company.