# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1998

DateRun: 03/24/1998

Experimenters: Jason Marshall

ClientType: Coatings Manufacturer

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Part

Contaminants: Coatings

Cleaning Methods:

Analytical Methods: Goniometry, Gravimetric, OSEE

Purpose: Determine effectiveness of coating to repel water

Experimental Procedure: Three stainless steel coupons were pre-weighed using an electronic balance. Initial OSEE and LCAG readings were taken. In OSEE measurements, eight readings were taken for the coupons. Each recording is taken from a different location on the samples surface due to the nature of the test. The surface readings vary with time. Readings were made when the number displayed peaked and settled briefly. For LCAG readings, a small (2microL) drop of water is placed on the surface. The laser is directed toward the water-substrate interface and the resulting angle of deflection is recorded from the image produced on the protractor-like screen. Eight readings were taken on the surface in order to insure a proper distribution. For both tests, the average for each coupon is calculated.
The coupons were coated following the procedure provided by the client. Before the coupons were placed in the oven, a second weighing was performed. After the samples were removed from the oven and allowed cooled down to ambient conditions, the final weights were recorded. OSEE and LCAG readings were also taken again at eight different locations on each coupon.

SUBSTRATE MATERIAL: Stainless Steel
COATING: 7426 + 2A (white) zirconium and chrome, 1.4%solids
COATING PROCESS USED: Applied coating onto a glass rod using a plastic pipet. Ran glass rod across surface of the metal coupon. Dried coating for four minutes at 105 F in a conventional oven.

Results: The coating was not applied evenly across the coupons which caused difficulties in recording the OSEE and LCAG readings; however, the values obtained did reveal usable results. The average values from the OSEE and LCAG readings were determined and recorded in Table 1.

Table 1 OSEE and LCAG Readings

| | OSEE | | LCAG | |
|---|---|---|---|---|
| COUPON # | PRE | POST | PRE | POST |
| 25 | 17.5 | 10.3 | 21.3 | 75.3 |
| 26 | 34.6 | 13 | 34.5 | 69.3 |
| 27 | 22.3 | 7 | 22.3 | 75.9 |

For the OSEE readings, the coated samples readings decreased from the initial readings. For the LCAG measurements, before the coating was applied, the drop of water initially appeared to be very flat and resulted in a small angle. After the coating, the drop of water retained a round shape and resulted in a much larger angle. Gravimetric analysis calculations determined the amount of coating that was applied to each coupon. A comparison of the wet and dry weight of the applied coating can be found in Table 2.

Table 2 Coating Weight

| WET | DRY |
|---|---|
| 0.03 | 0.0018 |
| 0.026 | 0.0007 |
| 0.071 | 0.0012 |

It was interesting to note that the coupon with the lowest dry coating weight had a higher average OSEE reading than the other two coupons. Also, the bubble on this coupon resulted in less of an angle in the LCAG measurements.

Summary:

Conclusion: The amount of coating applied to the substrate will affect the overall surface characteristics. The more coating applied on the stainless-steel coupons resulted in higher water resistivity as shown in the LCAG test.
LCAG readings will be made on the supplied paper cardboard samples provided by the client for this coating.

Testing of the second coating will follow the same format as this trial.

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