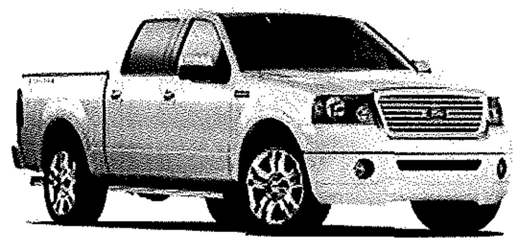
Ford Dearborn Assembly Plant
Dearborn, Michigan



Environmental Testing Program – March 2015

Prime Transfer Efficiency
Prime Oven Capture Efficiency
Prime Booth Capture Efficiency

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1.0 Executive Summary

JLB Industries, LLC completed a compliance environmental testing program during the weeks of February 23 and March 2, 20215 at the Ford Dearborn Assembly Plant (DAP) facility in Dearborn, Michigan. The testing program included Transfer Efficiency (TE) testing, Oven Capture Efficiency (OCE) testing and Booth Capture Efficiency (BCE) testing. Determination of TE and CE were conducted in accordance with all applicable procedures contained in USEPA document *Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-Duty Truck Topcoat Operations*. The test results will be used to demonstrate compliance with Auto MACT requirements and in monthly emissions compliance calculations.

Transfer Efficiency values were derived for the Ford F150 truck model, which currently accounts for the majority of production volume at the facility. Personnel from the paint shop, Ford environmental staff and JLB Industries, LLC conducted the testing. These groups worked together at each stage of testing to ensure that the results were representative of production conditions.

JLB Industries used highly accurate weighing systems to determine the vehicle and panel weights before and after coating application. Calibrated volumetric flow meters, located on each applicator, were used to measure paint usage.

Material samples were collected from the paint circulation tanks directly after vehicle spray out. Determination of percent solids by weight and density was performed by Advanced Technologies of Michigan laboratories, located in Livonia, Michigan.

Table 1 – Testing Results Summary

Tested Coating	Solids Transfer Efficiency (%)	Booth Capture Efficiency (%)	Oven Capture Efficiency (%)
Smoke Prime	**70.4%**	**24.4%**	**42.6%**

2.0 Introduction

JLB Industries, LLC (JLBI) was contracted by Ford Dearborn Assembly Plant (DAP) to perform a Transfer Efficiency (TE) and Capture Efficiency (CE) testing program on the Prime system at the Dearborn Assembly Plant located in Dearborn, Michigan. This testing was conducted on Ford F150 truck model during the weeks of February 23 and March 2, 2015.

3.0 Sampling and Analytical Procedures

Transfer Efficiency Test

Transfer Efficiency testing was conducted in the Prime Spraybooth where Smoke Exterior Prime and Black Interior Prime were applied. Applicator and environmental conditions were monitored to ensure that the testing accurately reflected production conditions. Measured parameters included: Vehicle weight gain, material usage, material analysis (percent solids by weight and density), applicator settings, film build and oven heat settings.

A total of five vehicle bodies were used in testing. Three vehicles were processed as normal production vehicles, while two vehicles were dedicated as no-paint, control vehicles in conjunction with the testing. All units were production vehicles with sealer.

An on-line vehicle weigh station (VWS) was constructed to measure the weight of the test units before and after each painting process. Test vehicles were routed to a dedicated conveyor spur. A fixed stop was secured to assure repeatable positioning of the vehicles. Test vehicles were lifted free from their carriers by two lift-table mounted scale bases. Ultra-high molecular weight (UHMW) plastic blocks were strategically placed on the scale bases to lift the vehicle at the center of gravity locations. The UHMW blocks minimized friction loading on vehicles and scale bases.

Vehicle weights were measured several times and recorded. All test vehicles were weighed with production fixtures (door hooks and hood props) installed. The vehicle weigh station scales were calibrated using Class-F calibration weights conforming to the National Bureau of Standards handbook 105-1. A two-pound avoirdupois, Class F stainless steel weight was added periodically during pre- and post-process weighing to verify scale linearity.

Coating thickness was measured on a representative test vehicle to verify paint film-build was within the production specification. The data was taken with a handheld Elcometer gauge.

Coating material usage was monitored via volumetric flow measurement devices located on each applicator. A verification of each applicator was performed by Ford and Fanuc personnel to ensure accurate usage measurement. Material samples of applied coatings were collected from the respective systems directly after testing. Samples were sent to Advanced Technologies of Michigan for analysis to determine density by ASTM D1475 and weight solids content by ASTM D2369 (referenced in EPA Method 24). The laboratory results were used in calculating the Transfer Efficiency and Capture Efficiency values.

Production vehicles with paint shop sealer were prepared with e-coat and processed through the Prime Spraybooth. The test sequence for the Transfer Efficiency test was:

Smoke Prime with Black Interior Prime

1. Test Unit ID TE 1
2. Test Unit ID TE 2
3. Test Unit ID TE 3

No-Paint, Control Vehicles

4. Test Unit ID TE 4
5. Test Unit ID TE 5

Test Vehicles were routed through the bake oven and back to the vehicle weigh station. After cooling, the test vehicles were weighed and released to production.

Capture Efficiency Tests

A panel weigh station (PWS) was assembled at the Prime Spraybooth. A precision balance with measurement capability to 0.001 gram was placed on an isolation platform inside an enclosure to minimize vibration and air movement.

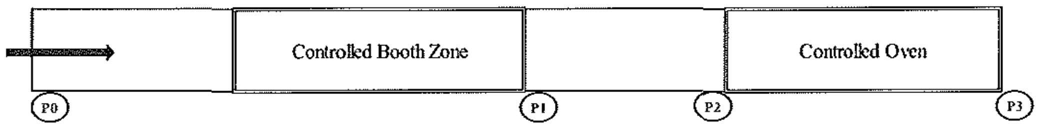
The testing conformed to the methods described in ASTM 5087-02 for solvent borne coatings. Capture Efficiency values for the controlled booth zones were calculated using the procedures outlined in the 40 CFR, Part 63.

Test panels were placed on Ford F150 cab and processed with normal production spray programming.

Four electrocoated panels were used for the tests. Each group of test panels was weighed in four locations (see panel test diagram) to determine the relative distribution of VOC that is released in the controlled booth zone and bake oven. The panels were attached to test vehicles by magnet, which allowed for removal of the wet panels with minimal disturbance to the coating during handling. Panel mounting locations were chosen to achieve a representative coating film based on the observation of normal vehicle production.

Before the panels were coated, they were marked (1, 2, 3, 4, blank) and weighed to establish the initial unpainted panel weights (P0). The panels were then attached to a test vehicle and routed through the Spraybooth. After coating, the panels were carefully removed from the test vehicle and brought to the balance for weighing immediately upon exit from the controlled booth zone (P1). Panels were weighed again before entering the controlled bake oven (P2). The panels were then placed on the test vehicle for travel through the curing oven. Upon exiting the oven, the panels were allowed to cool and then weighed a final time (P3).

Diagram 1 – Panel Testing Diagram



4.0 Test Equipment and Calibration

Vehicle Weigh Station (VWS)

A dedicated vehicle weigh station (VWS) equipped with two 1,000 lb. capacity scale bases was used to obtain pre- and post-process vehicle weights. The VWS is accurate to better than 0.05 pounds.

The scales were calibrated as directed by the operating instruction manual. Scales were powered up and exercised by placing 300 pounds of Class F calibration weights on each scale platform. Then, the VWS was calibrated with 600 pounds of Class F calibration weights. VWS linearity was checked using a two-pound, Class F stainless steel calibration weight. The two-pound weight was also added to each test vehicle during pre- and post-process weighing to verify scale linearity.

Material Usage

Coating material usage was monitored via volumetric flow measurement devices located on each applicator. A verification of the applicators was performed by Ford and Fanuc personnel before testing to ensure accurate usage data. Paint usage was measured at each applicator in a graduated cylinder and compared to the expected volume. Verification data is included in section 7 of this report.

A sample of each material was taken after each test and analyzed by Advanced Technologies of Michigan, located in Livonia, Michigan. These values were used in calculating the paint solids sprayed and the transfer efficiency. ASTM Method D-2369 was used to determine paint solids. ASTM Method D-1475 was used to determine paint density.

Panel Weigh Station

A panel weigh station (PWS) with measurement capability to 0.001 gram was used to measure panel weights. The balance was warmed up and then calibrated with a 300 gram test weight. The balance was tested with 100, 20, 10 and 2 gram weights before commencing weighing operations. A blank panel weight was measured at the beginning of the testing program and again at the time of each subsequent panel weight measurement. The balance was placed on an isolation platform and inside an enclosure to minimize vibration and airflow at the measurement point.

5.0 Discussion of Test Results

There were no significant disruptions to the testing program. No-paint control vehicle weights were used to correct for sealer weight loss in the bake oven.

6.0 Summary of Results