MESILLA VALLEY TRANSPORTATION SOLUTIONS CERTIFIED
Fuel Economy Experts

TEST REPORT

MVT SOLUTIONS CERTIFIED™ FUEL ECONOMY TEST

OCTOBER 23, 2019

ROCKETAIL PACKAGE

- ROCKETAIL
- GREENWING SKIRTS
- ECOFLAPS

11.12	0.99	9.98%
gal/1000 miles	MPG	

1.0: INTRODUCTION

Mesilla Valley Transportation Solutions (MVTS) certifies the fuel savings from this product are as described in this report. **Note:** this report was designed for carriers and providing information relevant to their needs. Therefore, the format varies from traditional fuel economy and technical reports. The report Summary provides the reader a quick synopsis of the product's fuel savings. Following the Summary is the body of the report and further details on the subjects. This fuel economy test was performed using MVTS proprietary fuel economy test methods. These test methods were developed from race car engineering and advanced vehicle test methods, which the Mesilla Valley Transportation (fleet) has relied on since 2012 to identify substantial fuel savings. The MVTS methods provide highly accurate and reliable answers on real-world fuel savings in comparison to other test methods, which enables carriers to make the best decisions for their company. Contact MVTS with any questions regarding the product or test. As part of an MVTS Certified™ test, MVTS supports product inquiries, which we encourage carriers to utilize. **Note:** blue text indicates a link to the topic. Click to follow. Alt + ← returns the reader to the initial location.

2.0: TEST SUMMARY

The Rocketail Package showed a fuel savings of **11.12 gal/1000 miles (9.98%)** on a modern Class-8 truck with a 53' van trailer. The package included three different components: the Rocketail which is an aerodynamic tail at the back of the trailer, GreenWing trailer skirts, and EcoFlaps aerodynamic mud flaps. Results are shown below in Table 1.

Table 1: Fuel Economy Test Results

	Fuel Economy Improvement		
	Gal/1000 miles	MPG	Percent
Rocketail Package	**11.12**	0.99	9.98%
Accuracy	**+/-0.20**	+/-0.03	+/-0.35

Contents

1.0: Introduction 1
2.0: Test Summary 1
3.0: Test Procedure 4
3.1: Test Vehicles 4
3.1a: Run 1: Baseline (No Aerodynamic Technologies) 5
3.1b: Run 2: Rocketail Package (Rocketail + GreenWing + EcoFlaps) 6
3.2: Vehicle Fuel Economy Test Equipment 7
4.0: Test Results 9
4.1: Units of Measurement 10
4.2: Weather Conditions Summary 10
4.3: Measurement Accuracy 10
5.0: Conclusion 12
6.0: Appendix 13
6.1: Modified Truck/Trailer Vehicle Details 13
6.2: Compare Truck/Trailer Vehicle Details 15
6.3: Test Route 17
6.4: Savings Calculations 18
6.4a: Fuel Savings Calculations 18
6.4b: Financial Savings Calculations 18
6.4c: Technology Payback and Return-On-Investment 18
6.5: Weather Conditions 19
6.6: Product Details 21
6.7: Test Personnel 21
6.7a: MVT Solutions 21
6.7b: Drivers 21
6.7c: Rocketail 21
6.8: MVT Solutions Contact Info 21

Figures

Figure 1: Test Vehicles with MVT Trailers 4
Figure 2: Test Trailer (No Tail) 5
Figure 3: Test Trailer (No Skirts, Solid Mud Flaps) 5
Figure 4: Installing Rocketail Side Fairing 6
Figure 5: Installing Rocketail Top Fairing 6
Figure 6: Installing GreenWing Trailer Skirts 6
Figure 7: Installing EcoFlaps Aerodynamic Mud Flaps 6
Figure 8: Rocketail Package (Rocketail + GreenWing + EcoFlaps) 6
Figure 9: Aerodynamic Sensors 7
Figure 10: Data Acquisition System 7
Figure 11: Fuel Flow Meter 8
Figure 12: Tire Temp. Sensor 8
Figure 13: Rocketail Package Fuel Consumption Bell Curve 11
Figure 14: Vehicle Info, Modified Vehicle 13
Figure 15: Tire Info, Modified Vehicle 14
Figure 16: Vehicle Info, Compare Vehicle 15
Figure 17: Tire Info, Compare Vehicle 16
Figure 18: Pecos Test Track 17

Tables

Table 1: Fuel Economy Test Results 1
Table 2: Test Runs 9
Table 3: Test Run Times 19
Table 4: Weather Data, Oct. 23 20

3.0: TEST PROCEDURE

The two (2) vehicles ran simultaneously at 65 mph on the 9-mile circle track near Pecos, Texas. The vehicles were 1-minute apart, avoiding any aerodynamic influence on either vehicle during testing. The vehicles were termed “Compare Vehicle” and “Test Vehicle”. The Compare Vehicle remained unchanged throughout testing; it was used solely for comparison. The Test Vehicle had modifications made during the test (*i.e.* Rocketail and other components installed).

The test procedure may appear similar to the SAE J1321 method traditionally used in the trucking industry; however, the MVTS methods are a much more advanced and precise form of on-road and track testing. The vehicles are equipped with sensors and data recording systems that collect data on fuel consumption, aerodynamics, rolling resistance, driver behavior and many other variables that affect fuel consumption. The data is analyzed using MVTS proprietary methods, which provide very accurate answers on fuel savings. Additionally, the test results can be scientifically translated to a carrier’s real-world daily operations and long-term savings, which is a feature unique to these methods. Overall, the MVTS test methods are a much more advanced and reliable tool for predicting fuel savings than the trucking industry has used previously.

3.1: TEST VEHICLES

Test vehicles were 2019 International LT’s with Cummins X15 15-Liter engines and Eaton 10-Speed Automated Manual Transmissions (AMT). Trailers were 53’ Hyundai dry vans. Gross Vehicle Weight (GVW) was 45,000 lbs. Both trucks were equipped with Ex-Guard grill guards, which were previously tested and showed no negative influence on fuel consumption. The Compare trailer was equipped with Michelin Energy Guard skirts. The Compare vehicle remained unchanged throughout all tests. The Test vehicle configuration was changed between test runs. Trucks and trailers used dual tires. Tire pressures were set at 110 psi in the morning, prior to incurring any effect of daytime heat. Vehicle info can be found in the Appendix.

Vehicles were thoroughly inspected and received regular maintenance prior to testing. It should also be noted, for the reader’s piece of mind, Mesilla Valley Transportation (MVT) and MVT Solutions are 100% confident in the reliable condition of the test vehicles. MVT fleet uses the same vehicle data and test procedures for their own internal purchase decisions.

Figure 1: Test Vehicles

3.1a: RUN 1: BASELINE (NO AERODYNAMIC TECHNOLOGIES)

During the first test run (Run 1) the test vehicle had no aerodynamic products installed (Figure 2 - Figure 3). This served as the Baseline run, which the following test run was compared against.

Figure 2: Test Trailer (No Tail)

Figure 3: Test Trailer (No Skirts, Solid Mud Flaps)

3.1b: RUN 2: ROCKETAIL PACKAGE (ROCKETAIL + GREENWING + ECOFLAPS)

The second test run (Run 2) consisted of the test vehicle being equipped with Rocketail (Figure 4 - Figure 5), GreenWing trailer skirts (Figure 6), and EcoFlaps (Figure 7).

Figure 4: Installing Rocketail Side Fairing

Figure 5: Installing Rocketail Top Fairing

Figure 6: Installing GreenWing Trailer Skirts

Figure 7: Installing EcoFlaps Aerodynamic Mud Flaps

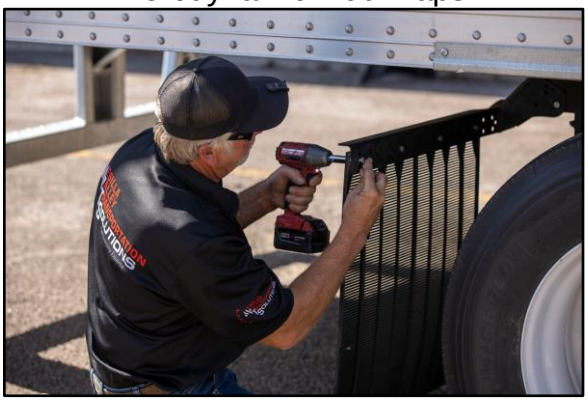


Figure 8: Rocketail Package (Rocketail + GreenWing + EcoFlaps)

3.2: VEHICLE FUEL ECONOMY TEST EQUIPMENT

MVT Solutions fuel economy testing utilizes a data acquisition system and sensors specifically for this testing. This style of testing is derived from race car engineering where reliable sensor data is critical to understanding vehicle modifications.

MVTS test sensors include:

- Data acquisition system (records sensor data)
- Fuel flow meter (accurate to 0.2%)
- Fuel temperature sensor
- Tire temperature sensor (infrared, mounted on left-front drive tire)
- Ground/road temperature sensor (infrared, mounted ahead of left-front drive tire)
- Wind speed air pressure sensor (truck hood)
- Wind direction sensor (truck hood)
- Ambient air temperature sensor (truck hood)
- Ambient air pressure sensor (truck cab)
- High Precision GPS (latitude, longitude, altitude, time)

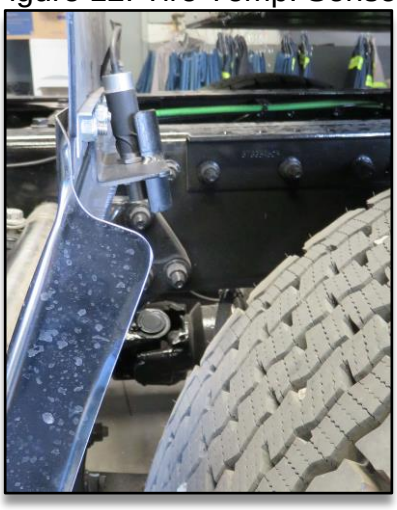
Click this link to see a video of MVTS sensors and testing: How We Test

Figure 9: Aerodynamic Sensors

Figure 10: Data Acquisition System

Figure 11: Fuel Flow Meter

Figure 12: Tire Temp. Sensor



4.0: TEST RESULTS

As shown below two (2) runs were completed (Table 2). Run 1 consisted of the Baseline run (i.e. no aerodynamic devices installed). Run 2 consisted of the complete Rocketail Package being installed on the test vehicle (Figure 4 - Figure 8). To find the total savings of the Rocketail package, its test run (Run 2) was compared to the Baseline run (Run 1), which showed a fuel savings of **11.12 gal/1000 miles (9.98%)** as shown above in Table 1.

Table 2: Test Runs

	Run Name
Run 1	Baseline (No aerodynamic devices)
Run 2	Rocketail Package

The magnitude of the Rocketail Package does not surprise MVT Solutions and the reader is encouraged recognize them as realistic. MVTS has experienced many times an improvement of over 10 gal/1000 miles with trailer aerodynamics –approximately 1 MPG.

4.1: UNITS OF MEASUREMENT

The reader may not be familiar with units of gal/1000 miles (gallons per 1000 miles) since it is not traditionally used in the trucking industry. The following paragraphs briefly explain the reasons for these units and how they help carriers better calculate fuel savings.

Units of gal/1000 miles more reliably calculate fuel savings when compared to other units such as miles-per-gallon (MPG) and percent (%). Those units are prone to error from changing variables such as vehicle baseline fuel economy, load, driver behavior, and duty cycle. For example, gal/1000 miles values are not affected by load for an aerodynamic product. Any empty Class-8 unit at 34,000 lbs. will save the same fuel in gal/1000 miles as one loaded to 80,000 lbs. However, when viewed in percent (%) or MPG the values change with load. This causes a carrier to experience varied results in real-world operation and difficulty predicting the financial benefits of the product unless units of gal/1000 miles are used.

Units of gal/1000 miles are the most reliable units of measurement for aerodynamic fuel savings due to their scientific and mathematical relationship to fuel consumption. Further detail is beyond the scope of this report and the reader is encouraged to contact MVT Solutions if more information is desired.

4.2: WEATHER CONDITIONS SUMMARY

Temperatures ranged from 73.0°F to 84.0°F. Winds ranged from 5 mph to 13 mph. It should be noted that the MVTS test methods account for these variables and their effects on fuel savings. Therefore, the range in climate conditions did not impede the test results shown in this report. Complete weather data can be found in the Appendix.

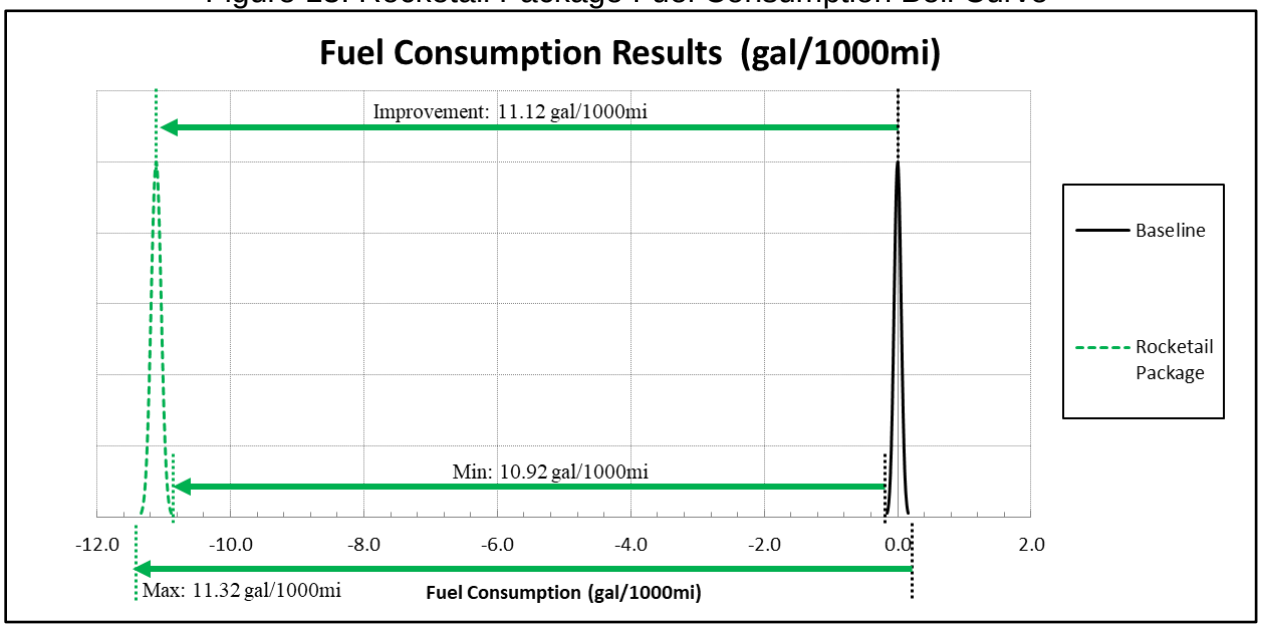
4.3: MEASUREMENT ACCURACY

The accuracy of fuel economy measurements is critical in determining the trustworthiness of test results. Historically, this has been a major difficulty in the trucking industry with fuel economy testing, which has led to confusion and misleading results. The MVTS test methods overcome this issue by achieving better accuracy, which is one of the ways it provides more reliable test results.

Accuracy for all the tests was calculated using a 95% confidence interval, a common standard for testing measurement. 95% confidence interval indicates that if the test was repeated 100 times, values would fall within the range in 95 out of the 100 tests (*i.e.* the reader would be 95% confident the value would be within that range).

Figure 13 below shows the statistical bell curves of the Rocketail Package. The Baseline test and the Rocketail test clearly show two separate bell curves, indicating the test had valid accuracy and Rocketail results were reliable. The graph shows the arrow pointing to the left illustrating less fuel used (fuel saved). The distance between the peaks of the bell curves is the test result average, which was a fuel savings of 11.12 gal/1000 miles. Minimum and maximum values were calculated as the test result plus or minus the accuracy values (11.12 +/- 0.20), which were 10.92 and 11.32 gal/1000 miles.

Figure 13: Rocketail Package Fuel Consumption Bell Curve



5.0: CONCLUSION

Testing proved the fuel saving of the Rocketail Package with answers that were clear and precise.

The Rocketail Package included: Rocketail, GreenWing trailer skirts, and EcoFlaps aerodynamic mud flaps. These resulted in a combined fuel savings of **11.12 gal/1000 miles (9.98%)** when compared against a vehicle with no trailer aerodynamics installed. This test proved that the Rocketail Package is a major fuel savings option of approximately one mile-per-gallon (1 MPG) at highway speeds.

The test values shown can be used to estimate a carrier's savings in real-world operations. More precision can be obtained by using a carrier's vehicle and duty cycle information. Contact MVT Solutions for assistance or more information.

6.0: APPENDIX

6.1: MODIFIED TRUCK/TRAILER VEHICLE DETAILS

Figure 14: Vehicle Info, Modified Vehicle

Date	October 23, 2019					
Company	Mesilla Valley Transportation					
Location	Pecos, Texas					
Test Route	Pecos 9-mile Test Track					
TRUCK ID:	**3050P**					
Brand	International					
Year	2019					
Model	LT					
Engine	Cummins X15					
VIN	3HSKZAPR8LN359852					
Mileage (miles):	831					
Transmission	Eaton Endurant					
Rear Gear	2.31					
Fuel Load	Full					
Fuel Type & Batch	No. 2 Diesel					
Axle Weights	11,740		17,740		17,160	
Total weight	46,640					
Photo/Video/Audio folder name:						
TRAILER ID:	**7543**					
Model	Hyundai 53' Dry Van					
VIN	3H3V532C0LT401199					
Year	2019					
Size	53'					
Trailer Gap (inches)	Extender to trailer: 36"					
Add-ons	Other aero items varied by test run including skirts, mud flaps, tails.					

Figure 15: Tire Info, Modified Vehicle

TIRES					
		Truck	3050P		
LF:		Front Axle Tires			RF: Same
Michelin X Line Energy		Type			Michelin X Line Energy
275/80R22.5		Size			275/80R22.5
19/32		Tread Depth (32nds)			19/32
110		Pressure (psi)			110
LF-Outer Drive:	LF-Inner Drive:	Drive Axle Tires		RF-Inner Drive:	RF-Outer Drive
Michelin XDA Energy +	Michelin XDA Energy +	Type		Michelin XDA Energy +	Michelin XDA Energy +
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
22/32	22/32	Tread Depth (32nds)		22/32	22/32
110	110	Pressure (psi)		110	110
LR-Outer Drive:	LR-Inner Drive:	Drive Axle Tires		RR-Inner Drive:	RR-Outer Drive
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
		Trailer	7543		
LF-Outer Trailer:	LF-Inner Trailer:	Tandem Front		RF-Inner Trailer	RF-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
LR-Outer Trailer:	LR-Inner Trailer:	Tandem Rear		RR-Inner Trailer	RR-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110

6.2: COMPARE TRUCK/TRAILER VEHICLE DETAILS

Figure 16: Vehicle Info, Compare Vehicle

Date	October 23, 2019			
Company	Mesilla Valley Transportation			
Location	Pecos, Texas			
Test Route	Pecos 9-mile Test Track			
TRUCK ID:	**3032P**			
Brand	International			
Year	2019			
Model	LT			
Engine	Cummins X15			
VIN	3HSKZAPR0LN375253			
Mileage (miles):	907			
Transmission	Eaton Endurant			
Rear Gear	2.31			
Fuel Load	Fuel			
Fuel Type & Batch	No. 2 Diesel			
Axle Weights	11,740	17,740	17,160	
Total weight	46,640			
TRAILER ID:	**7445**			
Model	Hyundai 53' Dry Van			
VIN	3H3V532C6LT401126			
Year	2019			
Size	53'			
Trailer Gap (inches)	Extender to trailer: 36"			
Add-ons	Michelin Energy Guard skirts.			

Figure 17: Tire Info, Compare Vehicle

TIRES					
		Truck	3032P		
LF:		Front Axle Tires			RF: Same
Michelin X Line Energy		Type			Michelin X Line Energy
275/80R22.5		Size			275/80R22.5
18/32		Tread Depth (32nds)			18/32
110		Pressure (psi)			110
LF-Outer Drive:	LF-Inner Drive:	Drive Axle Tires		RF-Inner Drive:	RF-Outer Drive
Michelin XDA Energy +	Michelin XDA Energy +	Type		Michelin XDA Energy +	Michelin XDA Energy +
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
22/32	22/32	Tread Depth (32nds)		22/32	22/32
110	110	Pressure (psi)		110	110
LR-Outer Drive:	LR-Inner Drive:	Drive Axle Tires		RR-Inner Drive:	RR-Outer Drive
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
		Trailer	7445		
LF-Outer Trailer:	LF-Inner Trailer:	Tandem Front		RF-Inner Trailer	RF-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
LR-Outer Trailer:	LR-Inner Trailer:	Tandem Rear		RR-Inner Trailer	RR-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110

6.3: TEST ROUTE

Pecos, Texas 9-mile circle track. Counter-clockwise direction, middle lane (of 3).

Figure 18: Pecos Test Track

6.4: SAVINGS CALCULATIONS

Below is a brief outline of how to use the test results to calculate savings. For more detail or assistance contact MVT Solutions.

6.4a: Fuel Savings Calculations

Fuel savings resulting from this test can be calculated as follows:

Test result (gal/1000 miles) x Thousands of miles travelled per year, per vehicle

Example: Rocketail Package fuel savings = 11.12 gal/1000 miles. If a vehicle travels 125,000 miles per year, fuel savings are:

11.12 x 125 = 1,390 gallons saved annually

6.4b: FINANCIAL SAVINGS CALCULATIONS

Financial calculations can be made by multiplying the fuel saved by the fuel price. Using the U.S. average retail price of diesel fuel in 2018, $3.178 /gal:

1,390 gallons/year x $3.178 /gal = $4,417 /year in fuel savings

To continue calculating the net financial savings requires input of the product investment, fleet trailer-to-truck ratio and other pertinent variables unique to each carrier. Contact MVTS for assistance if required.

6.4c: TECHNOLOGY PAYBACK AND RETURN-ON-INVESTMENT

Buyers of fuel economy technologies are most interested in saving money. For a technology supplier to be successful, their technology must save their potential customers money.

a) Fuel savings (per year) = (gal/1000 miles) x (vehicle miles per year) / 1000

b) Dollar savings (per year) = (Fuel savings (per year)) x (Price of fuel per gallon)

c) Payback (months) = (Product cost) / (Dollar savings per month)

6.5: WEATHER CONDITIONS

Weather during testing was relatively warm with moderate wind. Weather data was acquired from a local Weather Underground weather station. Source shown below.

The reader should be aware that MVTS methods include instantaneous and constant weather data acquisition on each vehicle, and this testing has minimal dependency on external weather data collection. MVTS test data accounts for changes in wind, temperature, and other pertinent variables instantaneously. Note, darkened rows pertain to test times.

Table 3: Test Run Times

	Begin	End
Baseline (No aerodynamic devices)	1:33 P.M.	3:19 P.M.
Rocketail Package	5:17 P.M.	7:11 P.M.

Table 4: Weather Data, Oct. 23

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
11:53 PM	61 F	32 F	34 %	S	9 mph	0 mph	27.06 in	0.0 in	Fair
12:53 AM	60 F	32 F	35 %	S	8 mph	0 mph	27.04 in	0.0 in	Fair
1:53 AM	59 F	31 F	35 %	SSW	8 mph	0 mph	27.04 in	0.0 in	Fair
2:53 AM	58 F	31 F	36 %	S	9 mph	0 mph	27.03 in	0.0 in	Fair
3:53 AM	57 F	32 F	39 %	S	10 mph	0 mph	27.02 in	0.0 in	Fair
4:53 AM	56 F	32 F	40 %	S	9 mph	0 mph	27.01 in	0.0 in	Fair
5:53 AM	54 F	32 F	43 %	S	7 mph	0 mph	27.01 in	0.0 in	Fair
6:53 AM	51 F	32 F	48 %	S	5 mph	0 mph	27.02 in	0.0 in	Fair
7:53 AM	55 F	36 F	49 %	SSW	6 mph	0 mph	27.04 in	0.0 in	Fair
8:53 AM	63 F	44 F	50 %	S	15 mph	0 mph	27.04 in	0.0 in	Fair
9:53 AM	69 F	45 F	42 %	SSW	13 mph	0 mph	27.04 in	0.0 in	Fair
10:53 AM	74 F	44 F	34 %	S	14 mph	0 mph	27.03 in	0.0 in	Fair
11:53 AM	78 F	40 F	25 %	SW	15 mph	20 mph	27.01 in	0.0 in	Fair
12:53 PM	81 F	35 F	19 %	SSW	12 mph	0 mph	26.97 in	0.0 in	Fair
1:53 PM	83 F	32 F	16 %	WSW	12 mph	21 mph	26.94 in	0.0 in	Fair
2:53 PM	84 F	28 F	13 %	SW	13 mph	23 mph	26.92 in	0.0 in	Fair
3:53 PM	85 F	28 F	13 %	SW	9 mph	0 mph	26.91 in	0.0 in	Fair
4:53 PM	84 F	30 F	14 %	SSW	10 mph	0 mph	26.90 in	0.0 in	Fair
5:53 PM	80 F	28 F	15 %	SW	7 mph	0 mph	26.91 in	0.0 in	Fair
6:53 PM	73 F	29 F	20 %	S	5 mph	0 mph	26.93 in	0.0 in	Fair
7:53 PM	71 F	44 F	38 %	S	8 mph	0 mph	26.94 in	0.0 in	Fair
8:53 PM	70 F	49 F	47 %	S	8 mph	0 mph	26.95 in	0.0 in	Fair
9:53 PM	70 F	52 F	53 %	SSE	12 mph	0 mph	26.96 in	0.0 in	Fair
10:53 PM	66 F	52 F	60 %	SSE	8 mph	0 mph	26.96 in	0.0 in	Fair

Source: https://www.wunderground.com/history/daily/us/tx/midland/KMAF/date/2019-10-23

6.6: Product Details

Product Company Contact: Jesse Regan, jregan@rocketail.com
12651 High Bluff Drive, Suite 350
San Diego, CA 92130
www.rocketail.com

6.7: Test Personnel

6.7a: MVT Solutions

- Daryl Bear, Lead Engineer & COO
- Drew Cassidy, Test Engineer

6.7b: Drivers

- Allan Dahringer
- Carlos Aragon
- Jack Burchell
- Seth Knight

6.7c: Rocketail

- Jesse Regan, Founder & CTO
- Michael Militello, CEO
- Bren Marshell, Sales

6.8: MVT Solutions Contact Info

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