UTILITY TRAILER MANUFACTURING CO., LLC
www.utilitytrailer.com

The First Name In Trailers

February 7, 2024

Via FedEx and Email

Ryan Posten
Associate Administrator for Rulemaking
National Highway Traffic Safety Administration
1200 New Jersey Avenue
Washington, DC 20590

Re: Ex-Parte Meeting with Advocates for Side-Underride Guards
Docket No. NHTSA-2023-0012
ANPRM – Side Underride guards on trailer and semitrailers – RIN:2127-AM54

Dear Associate Administrator Posten,

This letter corrects a number of inaccuracies and adds needed context regarding certain statements made by Perry Ponder, the representatives from the Carolina Trucking Academy, Mr. Lee Jackson, and Mr. Andrew Young as part of the November 9, 2023 teleconference advocating for the withdrawal of the April 2023 ANPRM,

Perry Ponder presentation

Mr. Ponder appeared in the teleconference noting that he developed the AngelWing device to protect against side-underride crashes and commented on the low cost of producing a guard. [1]

The cost estimates Mr. Ponder presented as attributable to an unnamed trailer manufacturer (which actually is Strick Trailers) – $0.80 per pound for a 700-lb. guard – are based on handwritten notes generated in December 2000 by Strick Trailers, which never manufactured such a guard for commercial application. What is astonishing is that the document Mr. Ponder put on the screen during the teleconference was enlarged to omit the top of the document, which shows that the estimate is 24 years old: from December 2000. A screen shot from the teleconference showing the trimmed document is attached, as is a PDF of the actual cost estimate from Strick that, according to Mr. Ponder's deposition testimony was prepared in 2000. Also, the 20-foot guard that is the subject of those notes was designed only

[1] Mr. Ponder gave a deposition on December 11, 2023, on the subject of side underride. The criticisms of Mr. Ponder's presentation in this letter are based on the testimony he provided in that deposition, as is certain information concerning the trailer operated by the Carolina Trucking Academy.

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for a chassis trailer, not a van trailer. Mr. Ponder has acknowledged that nobody has actually developed a side-underride guard that weighs only 700 lbs.

Regarding his design and manufacture of a side-underride guard (the AngelWing), Mr. Ponder testified his December 2023 deposition that his organization had manufactured fewer than 20 AngelWing devices, and that roughly 10 of these remain in a warehouse unsold. Of the roughly 10 AngelWing devices actually sold, at least 6 and possibly more were purchased by trailer manufacturers (including Utility Trailer Manufacturing Company, which bought 2 sets of guards) for testing, and it appears that teleconference participant Carolina Trucking Academy purchased at least one and possibly two sets to place on its training trailer(s).

Even with these limited sales, Mr. Ponder did not provide the cost of the AngelWing today. When Utility Trailer purchased its sets of guards in 2018, it paid approximately $7,000.00 for each for them.

Utility Trailer Manufacturing Company has developed its own prototype guard – the SIG – that uses less steel than the AngelWing and rectifies the significant safety concerns that Utility Trailer's testing of the AngelWing revealed.[2] Utility Trailer has outfitted this guard on approximately 67 trailers, of which approximately 51 are on trailers already sold to customers. To my knowledge, Utility Trailer is the only trailer manufacturer that has designed and manufactured a guard, and it is the only manufacturer placing a side-impact guard on trailers as OEM equipment.

As a result, Utility Trailer has experience concerning what it actually costs to manufacture a guard, even with economies of scale. For example, steel – which by and large comprises the entire component of the guard – is purchased by Utility Trailer in bulk as part of its manufacturing operations; there wouldn't be any additional economy of scale for this component were Utility Trailer to manufacture additional guards. The cost to manufacture the guard exceeds $6,000.00, and Utility Trailer's guard weighs over 900 lbs.

Mr. Ponder also claims that the cost should be estimated based on the per-pound cost of the entire trailer. Mr. Ponder, as admitted in his most recent deposition, is not a trailer manufacturer; he has never designed or manufactured a trailer. But the cost of a trailer is not determined by the average cost of all materials included in a trailer without considering the actual cost of manufacturing a particular option or component.

Carolina Trucking Academy presentation

The Carolina Trucking Academy representatives noted that Carolina Trucking had installed an AngelWing on one of its training trailers and had not experienced any high-centering incidents. Given the limited experience with the AngelWing on what appears to be a single training trailer, this isn't surprising. Also, the trailer that was used was not the standard

[2] I have attached a copy of the test report Utility Trailer generated showing the failures and dangers presented by the AngelWing as revealed in Utility Trailer's testing.

53-foot trailer, and the AngelWing had to be modified even to fit that trailer.[3] Importantly, the trailer does not have the sliding tandem-wheel assembly at the rear of the trailer, which has created so many of the engineering challenges for the AngelWing and other guards.

As noted above, Utility Trailer conducted extensive tests of the AngelWing, demonstrating that a trailer fitted with the AngelWing high-centered, causing substantial damage to the AngelWing and trailer. So much so that Utility Trailer believes that the AngelWing presents significant safety concerns. Importantly, these high-centering situations occurred during tests that mimic real-world conditions. The test environment Utility Trailer uses to test high-centering and related conditions is based on situations Utility Trailer's customers face every day; in fact, Utility Trailer uses that same test environment to test its aerodynamic side skirts to make sure they can survive those conditions.

In response to these concerns, Utility Trailer developed and patented its own side-impact guard – the SIG. Utility Trailer's SIG minimizes the problems associated with high centering by increasing the height of the guard above the ground to a nominal 27" (compared with 22" for the rear guard, per FMVSS 223 / 224), and changing the way the guard is attached to the trailer. Utility Trailer's SIG does not present a high-centering problem in Utility Trailer's tests, although it does not solve other problems associated with side-underride guards, such as failing to protect against passenger compartment intrusion for impacts between the trailer wheels and the guard, BS failing to prevent passenger compartment intrusion in 30% overlap tests similar to those used by the Insurance Institute for Highway Safety in testing the rearguards. In field testing, Utility Trailer also has seen increases in the incidence of damage to attached aerodynamic side skirts.

Utility Trailer is still evaluating its SIG, including it as a prototype on approximately 67 trailers, of which 51 have been sold to customers. Of note – Utility Trailer has been nearly giving the prototypical guard away to customers, leasing it for $1/year on a 10-year lease with the understanding that the customer will provide feedback concerning how the guard performs in the field and alert Utility Trailer of damage it sustains, among other things. But despite these extremely favorable terms, Utility Trailer's experience is that it can't even give its guard away. Customers are not asking for trailers equipped with the SIG.

<u>Lee Jackson Presentation</u>

Mr. Jackson is a retired police officer who said, based on an unspecified number of inspections, that relatively few trailers are loaded to the maximum weight. Mr. Jackson's unscientific observations, however, do not match generally accepted industry experience, and they do not account for the difference between refrigerated trailers – which are far more likely to be fully loaded (both because of the density of the products they carry, and the economics of needing to cool down an entire trailer) than dry vans that may carry, as Mr. Jackson notes, mattresses or potato chips. But regardless of the exact percentages on the road that are fully

[3] See Carolina Trucking Academy | AnnaLeah & Mary (annaleahmary.com): https://annaleahmary.com/tag/carolina-trucking-academy/ (last accessed February 5, 2024).

loaded, what is undeniable is that including side guards will cause additional trailers to be on the highways and additional miles to be driven, and that there is a correlation between miles driven and road fatalities.

Andrew Young presentation

Mr. Young mentioned that the TTMA worked on a draft recommended practice for side-underride guards but abandoned it because of the determination that such guards would only save 17 lives a year. This is not accurate. The number of lives saved played no role in the decision not to adopt the recommended practice; rather, the primary reasons the members of the TTMA decided against adopting the recommended practice were lack of agreement concerning the appropriate height of the guard, high-centering concerns, lack of necessary data about real-world side-underride crashes since the IIHS tests had been limited to 90-degree centered crashes at 35 mph, and the absence of real data on longitudinal forces exerted during crashes. To my knowledge, the TTMA consistently expressed its view that it "would support the implementation of side-impact guards if they ever become justified and technologically feasible."[4]

Thank you for your consideration of this matter and allowing these inaccuracies to be corrected. As Utility noted in its January 10, 2022 submission to NHTSA's OID re DP21-004, Utility shares the desire of safety advocates seeking to mitigate the injuries and deaths caused in side-impact accidents and supports implementation of side-impact guard technology when appropriate study demonstrates the chosen guard is effective and technologically and economically feasible.

Sincerely,

Paul G. McNamara
Chief Legal Officer
Utility Trailer Manufacturing Company, LLC

Attach:

1. Screenshot from Perry Ponder presentation during November 9, 2023 teleconference.
2. December 2000 cost estimate from Strick trailer.
3. Utility Trailer's "Testing and evaluation of AirFlow Deflector's AngelWing™ Side-Impact Guard – July 2019."

[4] TTMA submission to Docket No. NHTSA-2015-0118m, "Rear Impact Guards / Rear Impact Protection"

Cc (via email only):

James Myers
Sophie Shulman
Callie Roach
Terrence Sommers
Sean Puckett
Larry Linoe
Lina Valivullah

SCREENSHOT – MR. PONDER'S PRESENTATION RE COST OF SIDE-UNDERRIDE GUARD – STRICK COST ESTIMATE – TOP PORTION OMITTED

2000 Strick Underride Guard Design.pdf - Adobe Acrobat Pro (32-bit)

1	3/8 bolt & nut	3/8x1		60	.05	—	3.00
8	DIAGONAL BRACE	4"I x 45" (48")	12.8	4	3.20	1.60	19.20
9	CLIP	2½ x 5 x 10g	.50	8	.11	.50	4.88
10	3/8 bolt & nut	3/8x1		24	.05	—	1.20
	Paint						15.00
	WELD 20 GUSSETS			20		1.00	20.00
	WELD CLIPS			28		.15	4.20
	WELD CROSS TIES & LONG 7pc			5+2		.50	3.50
	INSTALL BOLTS			72		.10	7.20
	POSITION & INSTALL 4 guys 30 MIN			2hrs			70.00
						Σ	+370.58
	Deduct						
	Xmbr 12191	10g x 8	19.0	5	4.22	.96	<25.90>
	Gusset 13223	7g x 12 x 12	3.65	6	.84	.64	<9.88>
	WELD GUSSETS			6		1.00	<6.00>
	Xmbr WELDING SAME						
						Σ	(-40.78)
						TOTAL	329.82 COST

11:15 / 34:18

STRICK TRAILER COST ESTIMATE –

DECEMBER 2000

17295 E. Railroad St., City of Industry, CA 91748 phone 626.965.1541 fax 626.965.2790

12/21/2000 [signature]

SIDE GUARD ESTMATE

Sht @ 22¢/# I @ 25¢/#
Tubing 28¢/# L{@@ 35/lb

ITEM	DESCRIPTION	SIZE	WEIGHT EA	QUAN	MAT'L COST EA	LABOR & BUR EA	TOTAL
1	CROSS TIE	4"I 3.2# x 68"	18.1	5	4.53	—	22.65
2	SUPPORT	4"I x 21.7 ave	6.4	10	1.60	1.60	32.00
3	Longtudinal Guard	4x4x3/16x216"(9A)	170	2	47.60	—	95.20
4	Xmbr	8x3½x10g	21.6	5	4.75	1.60	31.75
5	GUSSET B590007	7g x12x12 (13223)	3.65	20	.84	.64	29.60
6	CLIP	7g x 1½ x 3½	.27	20	.06	.50	11.20
7	3/8 BOLT & NUT	3/8x1		60	.05	—	3.00
8	DIAGONAL BRACE	4"I x 45" (48")	12.8	4	3.20	1.60	19.20
9	CLIP	2½ x 5 x 10g	.50	8	.11	.50	4.88
10	3/8 Bolt & nut	3/8x1		24	.05	—	1.20
	Paint						15.00
	WELD 20 GUSSETS			20		1.00	20.00
	WELD CLIPS			28		.15	4.20
	WELD CROSS TIES & LONG 7pc			5+2		.50	3.50
	INSTALL BOLTS			72		.10	7.20
	POSITION & INSTALL 4 guys 30 MIN			2hrs			70.00
						Σ	370.58
	DEDUCT						
	Xmbr 12191	10g x 8	19.0	5	4.22	.96	<25.90>
	Gusset 13223	7g x12x12	3.65	6	.84	.64	<9.88>
	WELD GUSSETS			6		1.00	<6.00>
	Xmbr WELDING SAME						
						Σ	<40.78
						TOTAL	329.80
							COST

NRM-240214-001

TESTING AND EVALUATION OF AIRFLOW DEFLECTOR'S ANGELWING™ SIDE-IMPACT GUARD – JULY 2019

17295 E. Railroad St., City of Industry, CA 91748 phone 626.965.1541 fax 626.965.2790

TESTING AND EVALUATION OF AIRFLOW DETECTOR'S ANGELWING™

SIDE UNDERRIDE IMPACT GUARD

Executive Summary

UTMC performed 25 tests over roughly 10 months on its refrigerated and dry-freight trailer models fitted with the AngelWing™ side-underride-impact guard ["**AW**"]manufactured by AirFlow Deflector ["**AirFlow**"]. Those tests cumulatively demonstrate that AW's current design raises sufficient safety and operational concerns that it is not suitable for mounting on UTMC's trailers for the following reasons:

- Because the AW design severely restricts the suspension travel of UTMC's standard refrigerated and dry-van trailers, operating trailers with the AW attached could be illegal in states such as California and Georgia.

- The AW restricts the trailer's minimum ground clearance to unreasonable levels, prohibiting it from traversing changes in grade that UTMC's trailers easily and routinely handle. This restriction can cause violations of federal and state traffic codes.

- Contact between the AW and the ground when the trailer is loaded in normal operation will likely significantly compromise the structural integrity of the trailer as well as the AW.

- When an AW is attached to UTMC's refrigerated and dry-van trailers, the AW mounting brackets fatigued and cracked well before the forklift floor-rating test completed.

- The AW's bumper strength is only a fraction of the strength that UTMC requires of its rear guards.

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- The tests of the AW performed by the Insurance Institute for Highway Safety ["**IIHS**"] and others are inadequate for approving the use of the AW; these tests use lesser loads than the IIHS uses for its rear-guard tests and do not test for offset impacts.

After completing its tests on the AW, UTMC has significant concerns about the overall safety of equipping all trailers with AW guards. The AW presents an unacceptable risk of damaging the trailer and guard in normal operations with the possibility of harming the motoring public who may be struck by parts detaching from a moving trailer, or may be in the vicinity of a trailer that fails catastrophically if an operator continues to operate a trailer in a damaged condition. These risks are in addition to the often-noted danger of a semi trailer with low ground clearance becoming stuck on railroad tracks and being struck by an on-coming train, which already occurs from time to time.[1]

These risks all result from an intrinsic element of the AW design: it intrudes into areas of the trailer that experience shows often contact the ground, bollards, or other obstructions. These may occur in loading docks, at steep driveways, at unexpected grade transitions, at railroad crossings, at fire hydrants, and around equipment protected by bollards such as standpipes, corners, and the like. Depending on the nature of the collision between the guard and these items, the guard's rigid structure transmits the force into the trailer, which, either as a result of that single impact or cumulatively, will weaken, bend, or break. If that damage does not itself result in catastrophic loss of the trailer at that time, it likely will weaken the trailer's structural components such that an unexpected catastrophic failure is possible.

UTMC also has reservations as to whether the trailer with an AW will perform as well over-the-highway as documented in the IIHS tests, since the AW side-underride crash test did not use the same weighting and loading criteria that the IIHS has used for all of its rear-impact tests. Additionally, there is no information from the IIHS concerning how the guard would

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[1] See, for example, the "California Commercial Driver's Handbook" (sections 2.7.5 and 2.15.5), the "Georgia Commercial Driver's Handbook" (sections 2.15.5 and 2.15.6.), and 49 C.F.R. §392.12. All three examples state that a driver of a commercial motor vehicle shall not drive onto a highway rail-grade crossing without having sufficient space to drive completely through the crossing without stopping. Both State handbooks refer specifically to trailers with low ground clearance and warn against rail crossings with steep approaches.

perform in either a 50%- or 30%-offset scenario, another criteria the IIHS has said is important in determining the performance of rear guards. UTMC's limited tests suggest the AW's performance in the 50%- or 30%-offset scenario is substantially weaker than current rear guards in those scenarios.

Finally, UTMC has significant concerns concerning the ability of AirFlow or the AW inventor – Perry Ponder – to stand behind the AW product. UTMC typically requires its suppliers to test their product extensively before marketing it; to UTMC's knowledge, AirFlow has not performed any of the tests performed by UTMC, and UTMC is unaware of tests showing the AW's performance in the real world. Nor has Airflow demonstrated any financial ability to back the product or to respond to claims that likely would result if someone were injured as a result of the AW's installation or failure on a trailer.

Although these safety and operational issues lead UTMC to conclude that the AW is not a suitable product ready for market at this time, UTMC is ready to continue discussions with AirFlow and to consider modifications to the AW – or other side-guard designs – that address the significant risk that incorporating the AW on many trailers will endanger the motoring public.

Background

In March 2016, the Truck Trailer Manufacturers Association ["**TTMA**"] submitted a comment to the National Highway Traffic Safety Administration Docket on "Rear Impact Guards / Rear Impact Protection"[2] that concluded, with respect to the possibility of implementing side-impact guards on trailers, that "TTMA would support the implementation of side-impact guards if they ever become justified and technologically feasible." UTMC agreed with that assessment when TTMA submitted it. It still does.

Roughly a year later, the IIHS tested a potential side-underride-impact guard developed by Perry Ponder and manufactured by AirFlow Deflector – the AW – by crashing a 2010 Chevrolet Malibu travelling 35 mph into the AW mounted on a 53-foot Vanguard trailer at a 90-degree angle. According

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[2] Docket No. NHTSA-2015-0118. In the July 10, 2014 notice announcing it was initiating rulemaking with respect to rear-impact guards, NHTSA also stated that the Petitioners had requested that NHTSA begin studies and rulemaking for side guards. In the 2014 notice, NHTSA noted that it was "still evaluating the Petitioners' request to improve side guards … and will issue a separate decision on those aspects of the petitions at a later date." (79 FR 15 39363.) TTMA submitted its comment in response to this statement. Since 2014, NHTSA has not issued any decision on side-impact guards.

to the IIHS, the AW prevented Malibu passenger-compartment intrusion and avoided significant injury to the crash-test dummy. In August 2017, the IIHS crashed a 2009 Malibu into the same trailer at 40 mph. According to the IIHS, the crash-test dummy again avoided significant injury.

When UTMC learned in the spring of 2017 of the IIHS's AW test, UTMC, consistent with the TTMA comment, decided to evaluate whether the AW was "technologically feasible" such that UTMC could offer it to its customers with the assurance that it was safe, did not risk damaging the trailer, and was backed by an organization with sufficient engineering and financial resources to stand behind the device. UTMC's extensive testing and evaluation of the AW demonstrates that the AW fails in each of these criteria.

UTMC's acquisition of AW for evaluation

UTMC contacted AirFlow, manufacturer of AW, to inquire about the device. After discussions with AirFlow's President and its Engineering Director to obtain information about the device, cost, availability, method of attachment, and similar issues, UTMC agreed to purchase two sets of AW for evaluation and testing – one each for UTMC's refrigerated trailer and dry-freight trailer.[3] UTMC provided information about each trailer model's measurements, the location and material used in the cross-members on which the AW would be mounted, and other information needed to make sure that the AW when delivered would fit the UTMC trailers.

AirFlow delivered the two sets of AW in January 2018. AirFlow did not supply any test or performance information, other than that associated with the IIHS tests, and it did not provide any information concerning the AW's warranty or the liability insurance maintained by AirFlow and its inventor, Perry Ponder, to back its device. This is information that UTMC traditionally requires of all its suppliers, but it went ahead with the acquisition without this information and assurance because UTMC was interested in determining the product's suitability for real-world applications.

When delivered, one AW mounting bracket for the dry-freight trailer was damaged, and the shipment was missing the "all-weather barrier water-proofing membrane" required to separate the aluminum from steel

[3] UTMC did not purchase an AW for UTMC's flat-bed trailers, as the engineering and geometry of the AW at that time is not workable with UTMC's flatbed. AirFlow Deflector's website claims that it now has an AW available for most flatbed models. UTMC has not yet evaluated the accuracy of that statement.

components to avoid corrosion. The damage consisted of a slightly bent horizontal member on the AW for the dry-freight trailer; a mounting bracket on the right side rear vertical of the AW for the dry-freight trailer was damaged; and a number of the pre-drilled holes did not line up. UTMC repaired the damaged AW by straightening the bent portion and welding the existing crack and installed the AW on the trailers following AW's installation instructions. UTMC supplied dissimilar-metal barrier tape to separate the steel from the aluminum components.

Potential safety concerns / DOT violations in prescribed installation

UTMC was not able to install the AW on UTMC's base-model trailers in a way that would avoid Department of Transportation safety violations. Without an AW mounted on a trailer, the cable and air hoses articulate and reside in the space forward of the suspension. But with the suspension forward of the roughly middle position, the cable and hoses enter the same space occupied by the AW's diagonal members. As a result, the cable and hoses rub against the diagonal, presenting a serious safety issue and a violation of DOT regulations. Additionally, California requires that the suspension be positioned with a maximum 40-foot distance between kingpin and rearmost-axle centerline. [4] Because of the AW's design, it is not possible to position the suspension as required by California regulations without the air hoses touching the AW cross braces. For the air hoses to clear the AW entirely, the suspension must be located approximately 45' from the kingpin to the center of the rear axle (or approximately 43' to the center of the rear tandem), which is within 18" of its most rearward position. This is not legal

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[4] Cal.Veh.Code § 35400(b) (4); if the trailer is a single axle trailer, the maximum distance is 38 feet. At least 18 other states have similar restrictions that would prohibit operation of the AW equipped trailer on some or all of its roads, according to *Vehicle Sizes and Weights Handbook*, J.J. Keller & Associates, Inc. (2018 ed.): Connecticut (43' to center of rear axle); Florida (41' to center of rear axle or rear group of axles); Illinois (42.5' to center of rear axle); Indiana (43' to rearmost axle); Maine (43' to center of rear axle); Maryland (41' to center of rear tandem axles); Michigan (37.5' to center of rear axle; 40.5' to center of rear axle assembly); New Hampshire (41' to center of rear axle or midpoint of rear tandem); New Jersey (41' to center of rear axle or rear axle group); New York (43' to center of rear axle); North Carolina (41' to rear axle or midpoint of rear tandem); Pennsylvania (41' to center of rear axle or rear axle group); Rhode Island (41' to center of rear axle); South Carolina (41' to center of rear axle assembly or tandem axle assembly); Tennessee (41' to center of rear axle or midpoint of rear tandem); Vermont (41' to center of rear axle); Virginia (41' to rear axle or midpoint of rear tandem); West Virginia (37' from rear axle of truck-tractor to front axle of semi-trailer).

in all states. UTMC believes that its customers will view this to be an unacceptable restriction.

Additionally, UTMC builds its trailers with a protrusion – commonly referred to as stinger – from the front of the suspension to hold the air hoses and electrical cable and prevent them from rubbing. When the suspension was moved forward, the stinger would hit the diagonal, preventing the trailer's suspension from being moved to the most forward position. Although this is not a safety violation, the inability to move the suspension into the most forward position likely would be a significant detriment to those operating the trailers in city environments, and it might affect the operator's ability to comply with bridge laws or weight-distribution limitations, and increases the trailer's turning radius, making it less maneuverable.

Since UTMC was not planning to operate the trailers on any public highway as part of the testing regimen, UTMC ignored the safety violation for purposes of the test, mounted the AW on the trailer as directed by AirFlow, and never put the suspension in the most forward position because the diagonals prevented the stinger from sliding all the way forward.

<u>Tests performed</u>

Over a ten-month period, UTMC performed the following tests at its Research and Development facility on its trailer(s) involving the AW, all described below in more detail with associated results:

1. Ramp-clearance test – trailer unloaded (9 tests conducted between April 25 – September 7, 2018)
2. Ramp clearance test – trailer loaded (3 tests conducted on December 12, 2018)
3. Static clearance impact simulation (test conducted August 23, 2018)
4. Track test (2 tests conducted between June 13 – October 4, 2018)
5. In-trailer forklift floor test (2 tests conducted between May 1 – November 26, 2018)
6. Bumper-strength test
    a. Bumper-strength test – center (test conducted January 8, 2019)
    b. Bumper-strength test – rear (2 tests conducted between May 11 – December 20, 2018)
    c. Bumper-strength test – front (test conducted May 17-18, 2018)

    d. Bumper-strength test – longitudinal (test conducted February 27, 2019)
7. Pull-down test (2 tests conducted on October 31, 2018, and March 7, 2019)
8. Fatigue test (test conducted between March 8-14, 2019)
9. Hoses and slider gear evaluation

Overall results

The AW performed *unsatisfactorily* on 7 of 10 tests performed on the refrigerated trailer. The AW performed *unsatisfactorily* on 12 of the 14 tests performed on the dry-freight trailer – including instances in which the presence of the AW damaged the trailer or the AW in the tests, or caused the trailer to come to a halt when it traversed a change in grade, with the likelihood that damage would occur if the trailer were forced over that terrain. Based on these results, UTMC has serious concerns that the AW, when exposed to real-world conditions, presents unacceptable risks of damaging the trailer with attendant safety risks to the motoring public resulting from trailer parts becoming detached during trailer operation or partial or catastrophic failure of the trailer during operation.

Specific Test Description and Results

1. Ramp clearance test – trailer unloaded

UTMC tested the AW using the same criteria it uses to test its aerodynamic side skirt. UTMC designs aerodynamic side skirts for and installs them on its trailers after it successfully demonstrates that the skirt – which typically are approximately 14" above the ground (with variance depending on trailer model and position along the skirt) – will survive with minimal damage when the trailer's bottom rail comes within 24" of the ground as the trailer traverses a change-in-grade such as that encountered in a loading ramp.

UTMC first performed this test on an asphalt ramp and adjusted the trailer so that the trailer's bottom rail would come within 24" of the asphalt in a change-of-grade situation. On the dry-freight trailer, the AW horizontal (at the 4th AW vertical) hit the ground approximately 2' before the ramp's apex. This occurred before the bottom rail came within 24" of the ground, and the trailer's rearward movement was stopped at that time. Because it appeared that, had the test continued, either the AW or the trailer would be damaged, or the trailer would hang up, UTMC stopped the test.

Because of differences in height and configuration between the dry-freight and refrigerated trailers, and the equipment available at the time of the test, the bottom rail of the refrigerated trailer never came within 24" of the ground during the tests on the asphalt grade. As the trailer traversed the ramp, the closest the bottom rail came to the ground was 25". At that point, the AW contacted the ground from the 7th vertical to the 4th vertical as the trailer passed over the ramp apex.

In approximately July 2018, UTMC constructed a concrete ramp that permitted it to perform the ground-clearance skirt and AW tests without trailer modifications. The ramp was constructed so that the bottom rail of UTMC's base-model trailer could come within 24" of the ground when the trailer traversed the grade, depending upon the location of the trailer's sliding suspension. UTMC performed a total of 7 tests of an unloaded dry-freight trailer with the following results – 5 with the trailer attached to a yard-goat, and 2 with the trailer attached to day-cab tractor.

Yard-goat tests: With the slider-tandem's center positioned 135" from the rear of the trailer (such that the bottom rail would come within 24" of the ground), UTMC first reversed the trailer down the ramp. The AW horizontal struck the ramp's apex at approximately the AW's 5th vertical, resulting in the trailer's becoming stuck. UTMC needed to raise the front of the trailer to remove it from the ramp. UTMC then moved the trailer up the ramp, and the AW horizontal hit the ground just forward of the AW's 3rd vertical, causing the trailer to become stuck on the ramp apex between the 3rd and 4th verticals. UTMC again raised the front of the trailer to remove it from the ramp. Next, UTMC moved the trailer up the ramp, attempting to maintain tractor/trailer speed/momentum as the trailer traversed the change in grade. The AW horizontal again hit the ground just forward of the AW's 3rd vertical, causing the trailer to become stuck on the ramp apex between the 3rd and 4th verticals. UTMC needed to raise the front of the trailer to remove it from the ramp.

UTMC then positioned the slider-tandem's center in its most rearmost position. As the trailer reversed down the ramp, the rear of the AW's horizontal at the 7th AW vertical contacted the ground approximately 1' before the ramp apex and the trailer ground to a stop. UTMC was able to drag the trailer free of the ramp without raising the front of the trailer. UTMC then moved the trailer up the ramp. The AW horizontal hit the ground at approximately the 3rd AW vertical, and the trailer became stuck on the ramp apex at the 4th AW vertical. UTMC needed to raise the front of the trailer to remove it from the ramp.

Day-cab-tractor tests: With the slider-tandem's center positioned 135" from the rear of the trailer (such that the bottom rail would come within 24" of the ground), UTMC moved the trailer up the ramp. The AW horizontal hit the ramp apex at approximately the 3rd AW vertical, and the trailer became stuck on the ramp apex just rear of the 4th AW vertical. UTMC used a forklift to raise the trailer so it could be moved off the ramp apex.

UTMC then positioned the slider-tandem's center in its most rearmost position. As the trailer moved forward up the ramp, the AW horizontal hit the ramp apex just rear of the 3rd AW vertical, and the trailer became stuck on the ramp just forward of the 4th AW vertical. Reversing the day-cab tractor allowed the trailer to be dragged off the ramp apex.

2. Ramp clearance test – trailer loaded

UTMC performed this test at its specially designed ramp that allows both dry-freight and refrigerated trailers to change grade so that the bottom rail reaches the desired measurement of minimum ground clearance. UTMC's aerodynamic side skirt is tested so that the trailer's bottom rail comes within 24" of the ground, the side skirt must successfully complete that test before UTMC offers its guard for sale.

For both the refrigerated and dry-freight trailers, UTMC set the suspension at a location that would permit the trailer's bottom rail to reach within 24" of the ground as the trailer traversed the change in grade. The tractor was located at the horizontal surface at the top of the ramp with the tractor's rear tires at the edge of the ramp, and the rear-suspension of the trailer was on the ramp incline. The tractor/trailer brakes were released, and gravity pulled the trailer/tractor down the ramp. The trailer's speed as it travelled down the ramp was less than 4 miles per hour.

For the refrigerated trailer, UTMC loaded the trailer to 58,971 GVW and the suspension was placed 125" from the rear to the slider tandem's center; this resulted in the bottom rail coming within 24" of the ramp's apex as the trailer traversed the ramp. As the trailer traversed the change in grade, the AW horizontal contacted the ground just forward of the 7th AW vertical and made continuous contact with the ramp apex until after the 2nd AW vertical cleared the apex. As a result, the AW horizontal on both sides of the trailer was severely deformed. Additionally, 6 of the 7 trailer cross-members that are attached to the AW vertical supports were severely damaged, and the middle cross members that attach to the verticals were almost completely crushed. The damage to the cross members severely compromised the trailer's structural integrity.

For the dry-freight trailer, UTMC loaded the trailer to 58,983 GVW. UTMC first ran the test with the suspension 135" from the rear to the slider tandem's center line such that the bottom rail would come within 24" of the ground. Although the AW grounded at the apex of the ramp, the trailer's side-wall flexed sufficiently to permit the trailer to traverse the peak. But cracks in the mounting brackets appeared, and existing cracks grew longer. Contact with the ramp apex gouged the AW horizontal member. UTMC then re-ran the test with the suspension moved all the way to the rear of the trailer. (This would cause the bottom rail to come within approximately 17" of the ground.) The AW horizontal grounded at the 7th AW vertical, contacting the ground approximately 1' before the ramp apex, and the trailer became stuck on the ramp apex at the 5th AW vertical. As a result of this contact, damage occurred to the trailer's bottom rails; the trailer's side-wall panels buckled approximately 3"; the AW horizontal deformed; and the AW mounting brackets that connect the AW to the trailer's cross members developed additional cracks. The damage compromised the integrity of the trailer. To remove the trailer from the ramp apex, UTMC blocked the trailer wheels, extended the landing-gear legs, removed the day-cab tractor, and a yard goat with an adjustable-height 5th wheel was used to lift the tractor.

This ramp-clearance test demonstrates that when an AW guard on either a loaded refrigerated or dry van trailer contacts the ground, the AW attachments and the trailer's structural integrity are critically impaired because the AW and its supporting structure are rigid. UTMC notes that non-rigid items – such as mud-flaps, tire-spray suppressors, and flexible aerodynamic devices – may themselves contact the ground when the trailer traverses changes in grade. To avoid damaging the structural integrity of the trailer, these non-rigid items must be sufficiently flexible to be able to contact the ground without damaging or becoming detached from the trailer. Although UTMC's aerodynamic side skirt meets this standard, the AW does not.

3. Static clearance impact simulation

The purpose of this test is to measure the amount of upward force the AW could absorb before damaging either it or the trailer. UTMC loaded the refrigerated trailer to 67,001 lbs GVW, and placed an I-beam under and perpendicular to the road-side AW at the third AW vertical from the front. A load cell placed under the I-beam measured the load. The trailer's legs then were retracted so that the weight of the trailer was transmitted through the AW to the I-beam. At 22,600 lbs load, the AW deflected 0.5625"; the bottom rail deformed; and the load crushed the cross member above the vertical at the rivet and AW mounting-bracket attachment, compromising the trailer's structural integrity.

4. <u>Track test</u>

UTMC performed a standard track test on both the refrigerated and dry-freight trailers. This test consisted of loading each trailer to a calculated weight of 67,001 lbs GVW and completing 1,100 laps around UTMC's specially designed test track for the refrigerated trailer, followed by 500 laps with the trailer unloaded except for approximately 10,000 lbs over the truck's tandem wheels to control bounce. For the dry-freight trailer, the test consisted of 900 laps around the test track. The AW did not suffer any noticeable damage, nor did the AW cause any noticeable damage to either trailer as a result of the track test. UTMC viewed this result as acceptable for both the refrigerated and dry-freight trailers.

5. <u>In-trailer forklift floor test</u>

UTMC performed its standard in-trailer floor test on both the refrigerated and dry-freight trailers. This test consists of driving a forklift with the front-axle loaded at the trailer floor's maximum rated load in and out of the trailer for a minimum of 10,000 full-length cycles. Following the completion of a minimum of 10,000 full-length cycles, UTMC repeats the test with a 25% front-axle overload for 100 cycles.

The refrigerated trailer tested by UTMC had an older duct-floor design with a 16,000 lbs. rating. Accordingly, UTMC used a forklift with a 16,000 lbs. front-axle load for the test, and a 20,000 lbs. front-axle load for the overload portion of test. For the dry-freight trailer, the floor rating was 20,000 lbs. UTMC used a forklift with a 20,000 lbs. front-axle load for the test, and a 25,000 lbs. front-axle load for the overload portion of the test. UTMC performed all floor tests with the suspension in the rear position because the AW diagonal members interfered with the suspension's stinger and prevented the suspension from moving to its forward position.

Multiple AW brackets that attach the verticals to the trailer cross-members on both the refrigerated and dry-freight trailers developed cracks before completing the floor testing.

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Specifically, at 9,400 cycles of the forklift in the refrigerated trailer, on the roadside, all the rear mounting brackets at verticals 4, 5, and 6 cracked. On the curb-side, the front mounting bracket at verticals 1 and 5 cracked. All cracks occurred in the in-board top radius. Additionally, some floor screws broke. Although the tested trailer had a floor rating of 16,000 lbs., UTMC's current duct-floor ratings for its refrigerated trailer are 20,000 lbs. (base model) and 24,000 lbs. (optional). Had UTMC attached the AW to its current refrigerated trailer design with the higher duct-floor rating, UTMC expects that the failures would have occurred significantly sooner since the higher-rated duct-floors have greater cross-member vertical deflection.

At approximately 6,385 cycles of the forklift in the dry-freight trailer (out of the scheduled 10,000), cracks in several AW-mounting brackets developed. These occurred at the lower radii on the roadside of the trailer at the 1st, 5th, and 7th verticals; on the trailer's curbside, the cracks occurred at the 1st and 2nd verticals. After 9,100 cycles, additional cracks appeared on the inboard top radius of both curbside and roadside mounting brackets. Additionally, a number of cross-members located at the forward end of the suspension's slider travel broke at approximately 10,100 cycles. UTMC views these cracks as unacceptable as they pose due to risks of structural failure and detachment of the guard.

6. Bumper-strength tests

Although the IIHS's AW test demonstrated that the AW would stop a 2010/2009 Chevrolet Malibu at 35 mph and 40 mph without passenger-compartment intrusion, the tests used by the IIHS departed significantly from the impact tests the IIHS used to test the strength of rear bumpers. For the rear impact tests, the IIHS loaded each trailer so that the GVW was 25,084 kg (55,301 lbs) distributed evenly throughout the trailer. For the side-impact tests, however, the IIHS put only 6 cement blocks with a 10,200 kg (22,487 lbs) mass in the rear of the trailer so that the weight was concentrated over the rear wheels. The tractor did not experience this payload. The mass of the loaded trailer was 16,584 kg (36,562 lbs), or only 56% of the trailer's 65,000 GVWR.

Because the impact load of the Malibu when it struck the side of the trailer is directly proportional to the mass of the trailer, the impact load was only 56% of the worst-case impact load and 66% of the impact load of the tests IIHS conducted on the rear bumper. As a result, for the AW side-impact test (a) the loading of the trailer was less likely to be consistent with what would be encountered in over-the-highway situations, (b) the trailer's lateral movement, as opposed to the side guard, would absorb more energy than would be the case in the IIHS's traditional rear-impact tests, and (c) it was not possible to directly compare the results of an IIHS 35 mph rear-impact test with an IIHS 35 mph side-impact test. Finally, although the IIHS tested the rear guards at 50% overlap and 30% overlap, it did not perform any such tests on the side guard, resulting in no information on the subject.

UTMC was interested in determining how the side guard would perform in resisting loads relative to its rear-guard's performance. It therefore performed dynamic and static tests on the side guard similar to those it performs when testing its rear guards for strength and compliance with federal regulations. Specifically, UTMC tested the side guard's strength in the center (similar to the IIHS 100% overlap test), at the rear edge of the guard (similar to an IIHS 30% overlap test); and when pulled longitudinally toward the front of the trailer.

For comparison purposes, UTMC's static tests on its bumper designed to comply with United States and Canadian regulations are performed as follows: In a series of tests, UTMC applies force at required locations on the rear horizontal, measuring the force alone or force and energy as the horizontal deflects forward. United States regulations require that the bumper withstand a static load of 11,240 lbs at an outboard location and also at the center location ("P1" and "P2"). Also, the bumper at the vertical ("P3") must withstand, in a dynamic test, a load of 22,481 lbs as the bumper moves from 0" to 5" of deflection, with a permanent energy of 4,167 ft-lb. The Canadian regulations are identical to the United States regulations for force at locations P1 and P2; Canada's dynamic test applies force across the entire width of the bumper. Within 5" of deflection, the bumper must withstand 78,683 lbs of force with permanent energy of 14,751 ft-lbs.

a. <u>Bumper strength test – center</u>

The test on the refrigerated trailer, which involved 2 runs, significantly compromised the trailer, resulting in bending and cracking the bottom rail, breaking a cross-member, and deforming and collapsing an AW cross-brace at the 4th AW vertical from the front. During the first run, which deflected the guard from 0" to 5", the maximum load was 32,350 lb. The maximum energy was 7,304 ft-lb, and permanent energy was 4,409 ft-lb. At that point, the trailer's bottom rails sustained some damage. During the second run, which deflected the guard from 5" to 10", the maximum load was 34,655 lbs. The maximum energy was 11,797 ft-lb, and the permanent energy was 9,232 ft-lb. The total combined energy for both runs, 0" to 10" of deflection, was 19,101 ft-lb, and the permanent energy was 16,536 ft-lb. For reference, 19,101 ft-lb equates to a 3,800 lb car travelling at 12.27 mph.

b. Bumper-strength test – rear

UTMC applied lateral force to the bottom rear of the AW on the refrigerated trailer. The test on the refrigerated trailer compromised the trailer at approximately 3.866" of travel, resulting in breaking a cross-member at the mounting-bracket location directly above the spot on the AW where force was applied. The mounting bracket ripped out the attachment's bolt hole and tore along the top flange. At that point, the maximum load was 20,408 lbs; the maximum energy was 4,914 ft-lb; the permanent energy was 3,809 ft-lb. For reference, 4,914 ft-lb equates to a 3,800 lb car travelling at 6.2 mph.

For the dry-freight trailer, applying 23,020 lbs of load resulted in approximately 3.488" of deflection. When the load was increased to 24,000 lbs, the rearmost diagonal AW mounting bracket, directly in line with the pull, broke at a previous repair.

c. Bumper-strength test – front

For the test on the dry-freight trailer, UTMC moved the bumper-strength test to the front curbside of the trailer to avoid areas that had already had sustained damage. This test, which involved 2 runs, significantly compromised the trailer, resulting in bending and distorting of the AW mounting bracket and vertical, welds cracking, deforming the bottom rail, and having the AW cross-brace on the opposite side break free from the AW vertical and mounting bracket. The trailer's structural integrity first was compromised during the first run when a maximum static load of 27,000 lbs was applied, as the trailer sustained damage when the curbside diagonal AW mounting bracket weld broke and detached from the diagonal; the roadside diagonal bracket deformed; both the curbside and roadside AW mounting brackets shifted; and the curbside AW horizontal deformed. At that point, the maximum energy was calculated to be 6,960 ft-lb; the permanent energy was calculated to be 4,930 ft-lb.

In the second run, a maximum static load of 33,050 lbs was applied. The AW diagonal cross brace broke off completely from its welded mounting bracket; the AW verticals and horizontal also were deformed. The trailer's bottom rail deformed at the AW vertical in line with the pull point. The holes drilled through the steel cross-members deformed at the AW mounting bracket. The maximum energy was calculated to be 13,503 ft-lb and permanent energy was calculated to be 9,192 ft-lb.

d. Bumper-strength test – longitudinal

Because not all impacts occur perpendicular to the side-guard, UTMC tested the resistance of the guard to longitudinal forces by applying force to the 1st AW vertical and pulled towards the front of the refrigerated trailer. The test was designed to test the guard's performance from 0" – 10" of displacement. The test compromised the trailer at approximately 6.25" of travel, as all 7 cross-members broke at the AW mounting bracket and all 7 verticals of the AW deformed. At that time, the maximum load was 26,073 lbs; the maximum energy was 13,670 ft-lb; the permanent energy was 12,318 ft-lb. Following approximately 6.25" of travel, the maximum load dropped by approximately 50% to approximately 13,500 lb.

None of these bumper-test results on the AW demonstrated energy levels near those that UTMC's rear bumpers can achieve. (UTMC has tested its rear bumper at P3 (at one vertical) to 40" displacement with 119,622 ft-lb plastic energy.)

7. Pull-down test

The static pull-down test consists of connecting hydraulic cylinders to rods that pass up through and are mounted to the trailer floor. For the refrigerated trailer, the cylinders are pulled directly down to simulate over-the-road 5.5g loads (approximately 274,250 lbs of water-level load simulation). Although the trailer's side walls and roof had permanent creases as a result of the test, the AW structure was not damaged. For the dry-freight trailer, 2.5g loads were applied. All strain readings were low.

8. Fatigue Test

The dynamic fatigue test consists of connecting hydraulic cylinders to rods that pass up through and are mounted to the trailer floor; this is the same set up as is used for the pull-down test. The cylinders are cycled from 1 – 3gs (approximately a 100,000 lb. load spread).

At approximately 15,000 cycles, the cross-member that the 1st AW vertical attaches to broke free from the floor on the road side of the trailer. At approximately 48,000 cycles, aluminum cross members attached to AW verticals 2-5 broke free from the trailer on the road side. All 5 cross members had been damaged from an earlier test. At the same time, skin cracks developed, and additional skin cracks developed at approximately 69,000 cycles, though the skin had been damaged from an earlier test. The test was stopped at 134,216 cycles.

Supplier Resources

AirFlow is a relatively new company, and it is unclear whether it has the capital structure and resources to stand behind its product in case of failure and resulting injury.

Although AirFlow had the AW crash tested by the IIHS, to UTMC's knowledge AirFlow has not conducted extensive, real-world testing of the AW to determine how it will react with the trailer in day-to-day operating environments, what damage it will cause to the trailer, and what danger its use on thousands of trailers would pose to the motoring public. AirFlow has stated that in the five years since AW's inventor, Perry Ponder, first advertised the AW for sale, the AW has been mounted on fewer than 10 trailers in actual use.

AirFlow has not provided UTMC with information to establish that it has the financial resources to stand behind its product should it fail and cause injury to the motoring public and damage to the trailers on which the device is mounted. The inventor of the AW, Perry Ponder, has stated that he would stand behind the AW. But Mr. Ponder, an individual, does not appear to have sufficient resources to back this commitment. He has stated that he does not have liability insurance to protect against claims arising from the device.