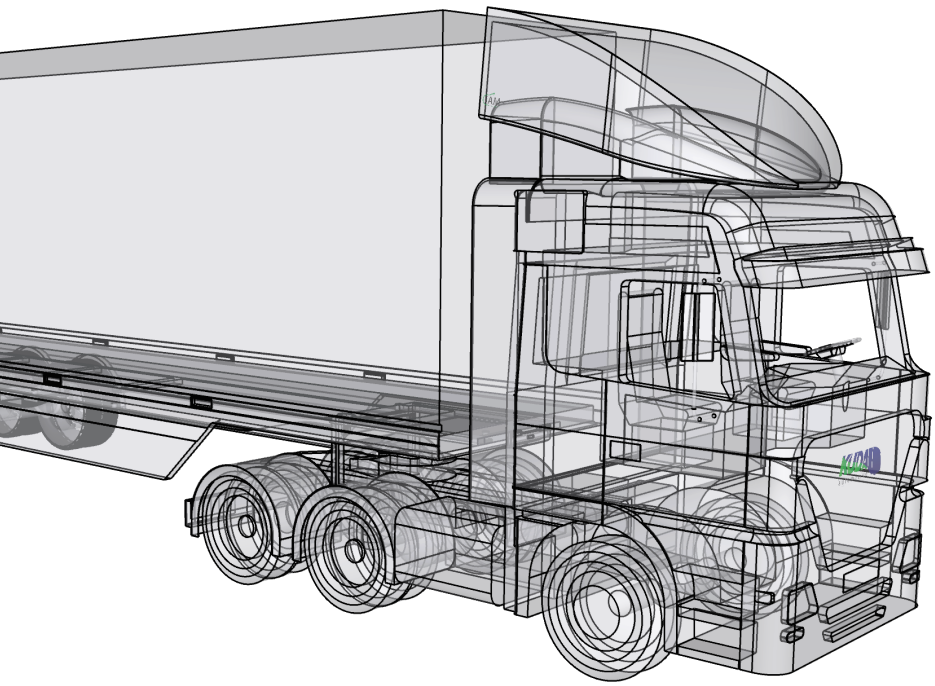


CFD Report

Computational Fluid Dynamics Assessment of
a Kuda iAM Air Management Kit fitted to a

Mercedes Actros StreamSpace 2.5m Tractor Unit coupled to a 4.2m tall, Box Body trailer.

Data captured using Laser Scanned components fitted to real vehicles.
CFD independently run by TotalSim on the Bramble Platform.

Overview

The purpose of this assessment was to obtain CFD (Computational Fluid Dynamics) data on the effects on the overall drag on the tractor unit and trailer combination both with and without a Kuda iAM Air Management kit fitted.

The model data was obtained using real world, 3D scanned parts and manufacturer supplied vehicle and trailer models. This was compiled and set up, independently by TotalSim and the simulations were run on their Bramble platform. In the interest of transparency for the results Kuda UK only supplied the physical parts to be scanned and advised on how these would be positioned in the real world when fitted to the vehicle.

Kinematic, Baseline Setup of the test

Kinematic setup units are in Meters (m).

Front RH (m)	Rear RH (m)	Velocity	Yaw	Roll	Steer
0.0	0.0	20.1168	0.5	0.0	0.0

Trailer	**Wheel 3 RHS**	**Front LHS**	**Wheel**	**Front RHS**
15.216134, 0.946246, 0	Rr3 Rhs Axle Inboard	2.737828, -0.89674, 0.4	Axle Inboard	2.737828, 0.89674, 0.4(
15.216134, 1.196246, 0	Rr3 Rhs Axle Outboard	2.737828, -1.164974, 0.	Axle Outboard	2.737828, 1.164974, 0.4
Trailer	**Wheel 2 RHS**	**Mid LHS**	**Wheel**	**Mid RHS**
13.906311, 0.966246, 0	Rr2 Rhs Axle Inboard	5.318197, -0.893607, 0.	Axle Inboard	5.318197, 0.893607, 0.4
13.906311, 1.196246, 0	Rr2 Rhs Axle Outboard	5.318197, -1.16184, 0.4	Axle Outboard	5.318197, 1.16184, 0.4(
Trailer	**Wheel 1 LHS**	**Rear LHS**	**Wheel**	**Rear RHS**
12.596466, -1.046246, (	Rr1 Lhs Axle Inboard	6.663798, -0.609692, 0.	Axle Inboard	6.663798, 0.609692, 0.4
12.596466, -1.126246, (	Rr1 Lhs Axle Outboard	6.663798, -1.224108, 0.	Axle Outboard	6.663798, 1.224108, 0.4
Trailer	**Wheel 3 LHS**			
15.216134, -0.946246, (	Rr3 Lhs Axle Inboard			
15.216134, -1.196246, (	Rr3 Lhs Axle Outboard			
Trailer	**Wheel 2 LHS**			
13.906311, -0.966246, (	Rr2 Lhs Axle Inboard			
13.906311, -1.196246, (	Rr2 Lhs Axle Outboard			
Trailer	**Wheel 1 RHS**			
12.596466, 1.046246, 0	Rr1 Rhs Axle Inboard			
12.596466, 1.126246, 0	Rr1 Rhs Axle Outboard			
Trailer	**Trailer**			
6.191999, -0.056338, 1.	Trailor King Pin			
5.882447, 0, 1.111122	Tractor Fifth Wheel			
Ground	**Ground**			
2, 0, -0.149159	Front Reference			
20, 0, -0.149769	Rear Reference			

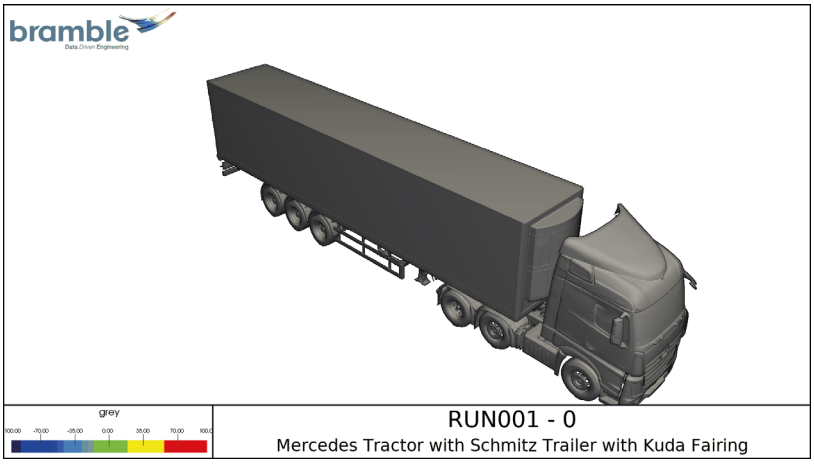


Image 1 - Showing Complete vehicle set up in place within the Bramble environment. With Kuda iAM Fitted.

Results

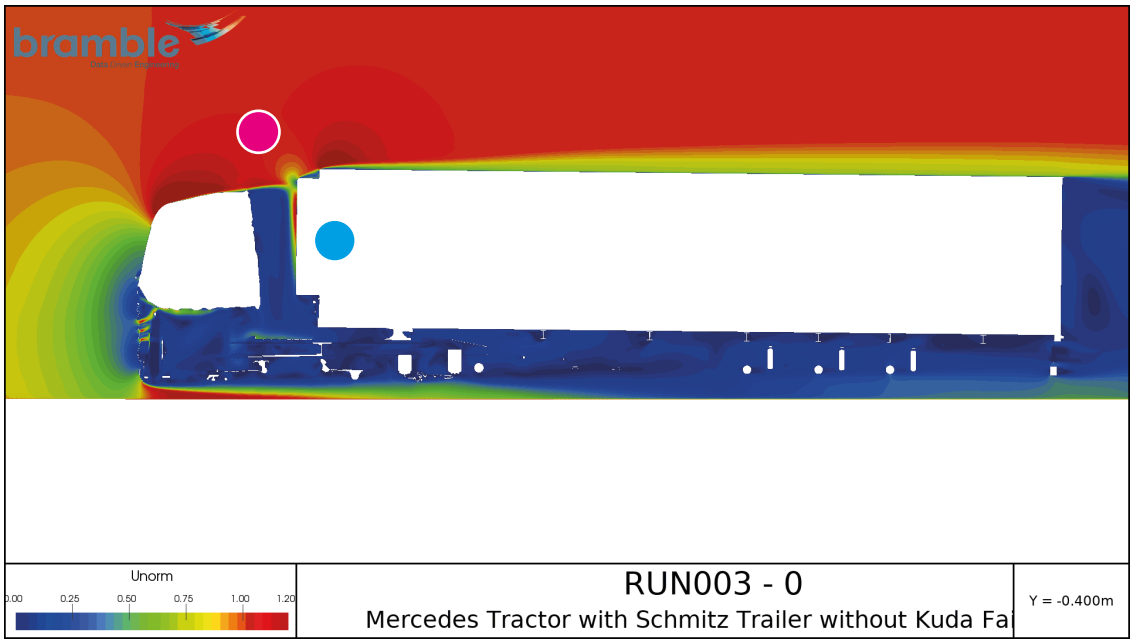
After running the CFD assessment it was found that the vehicle fitted with the Kuda iAM Air Management Kit had significantly lower Drag (N) to that of the vehicle which did not have the Kuda iAM fitted.

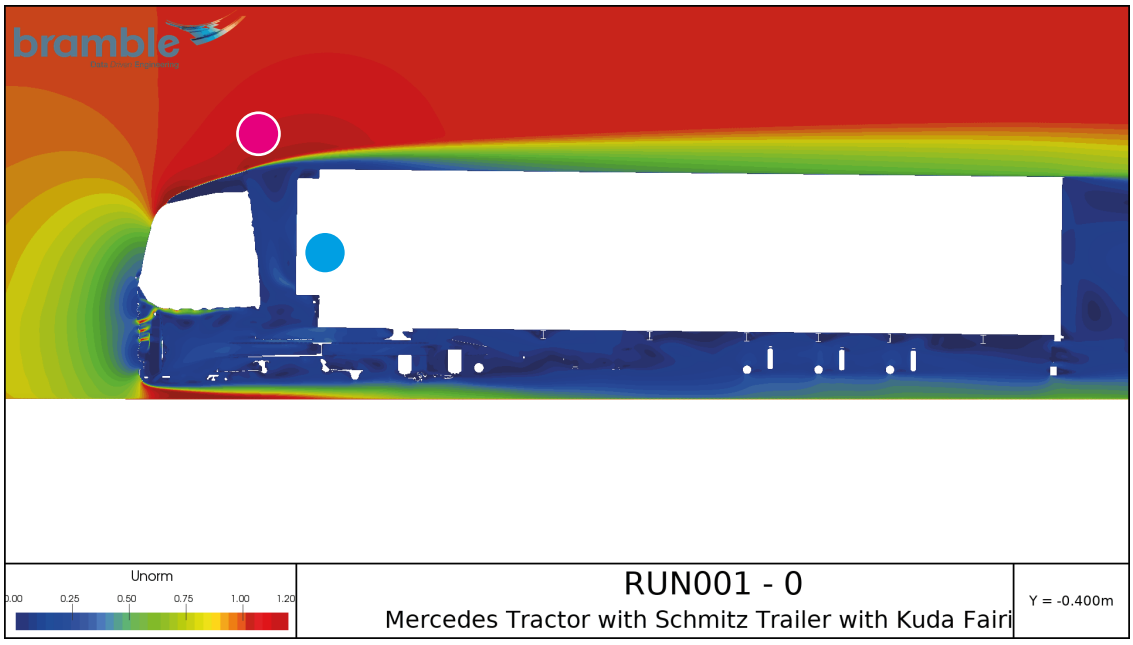
Results Table.

Name	Description	Status	Comment	Total Drag (N)
KU01-RUN003 - 0	Mercedes Tractor with Schmitz Trailer without Kuda Fairing	Completed		1437 (143)
KU01-RUN001 - 0	Mercedes Tractor with Schmitz Trailer with Kuda Fairing	Completed		1294

Overall there was a 143 (N) reduction in drag on the vehicle fitted with the Kuda iAM. This equates to a **10% reduction in drag** and therefore a **5% increase in fuel economy** for the vehicle.

Visual Representation.





The following images have been taken directly from the Bramble environment and then annotated with coloured circles to highlight interesting comparison points.

Comparison Point A

The orange / red areas on this image show areas of high pressure. This high pressure is directly related to the amount of drag on the vehicle.

It can be clearly seen that these areas of high pressure on top of the cab and in front of the trailer bulkhead are eliminated when the Kuda iAM is fitted. Replaced by an area of thrust generating low pressure (shown in blue).

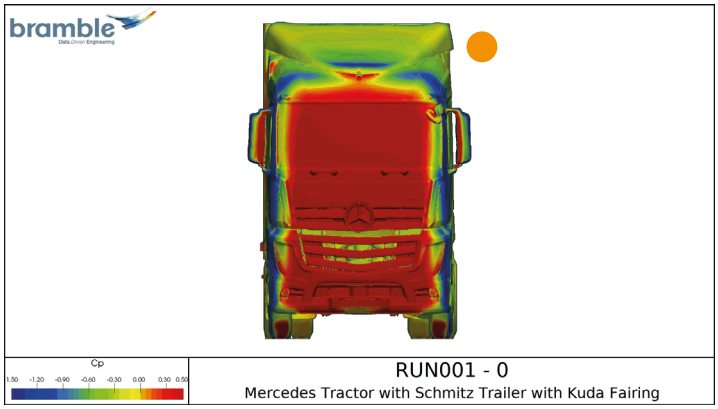
Comparison Point B

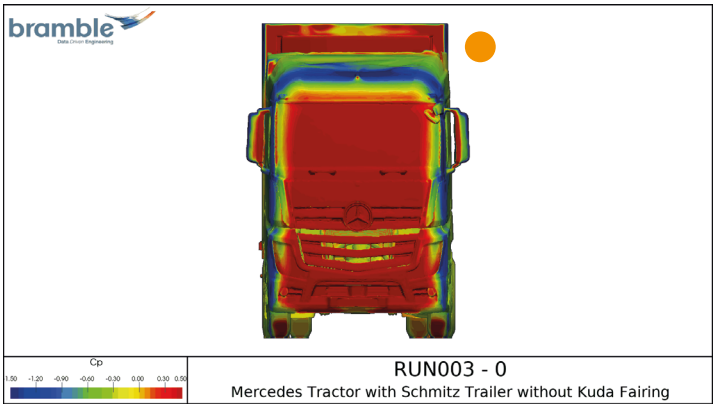
It should be noted that the installation of the Kuda iAM brings with it the reduction in high areas of pressure directly behind the cab, travelling down over the chassis and towards the fifth wheel. Shown on the image as a dark red area, running down the back of the cab and fading into a yellow and finally green colour.

This reduction in high pressure is likely down to the large upper ears of the Kuda iAM efficiently closing the gap between the trailer and the back of the cab.

Visual Representation Continued.

Front View

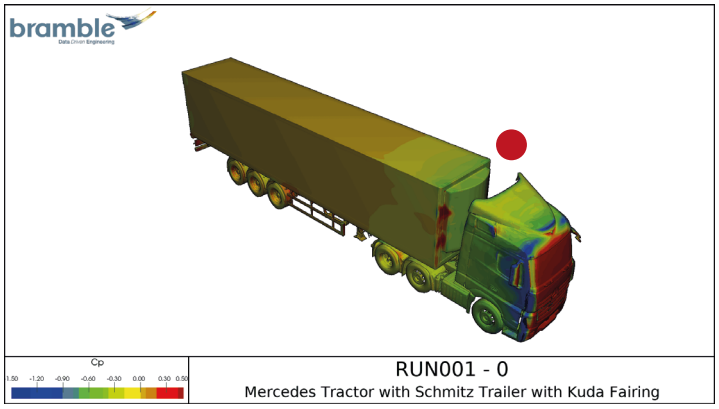


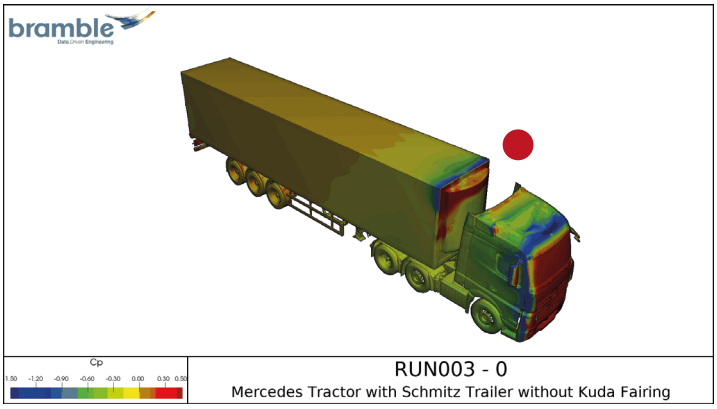


Comparison Point C

The red areas on the above images indicate areas of high drag, most clearly demonstrated on the large forward face of the tractor unit itself. However the second largest area of high drag is that of the trailer bulkhead. By installing the Kuda iAM Air Management system this large red area is replaced by an area of yellow and green, indicating an area of much lower drag than before.

Aerial View

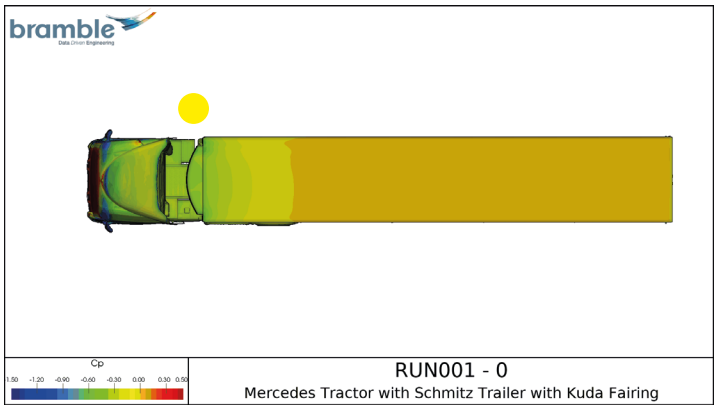


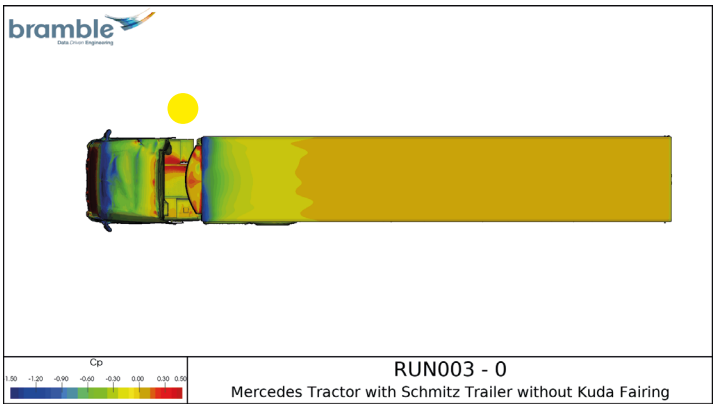


Comparison Point D

Mimicking the above this alternate view shows how the area of high drag continues down the front of the trailer bulk head. This is almost completely removed after installing the Kuda iAM Air management Kit.

Top Down View

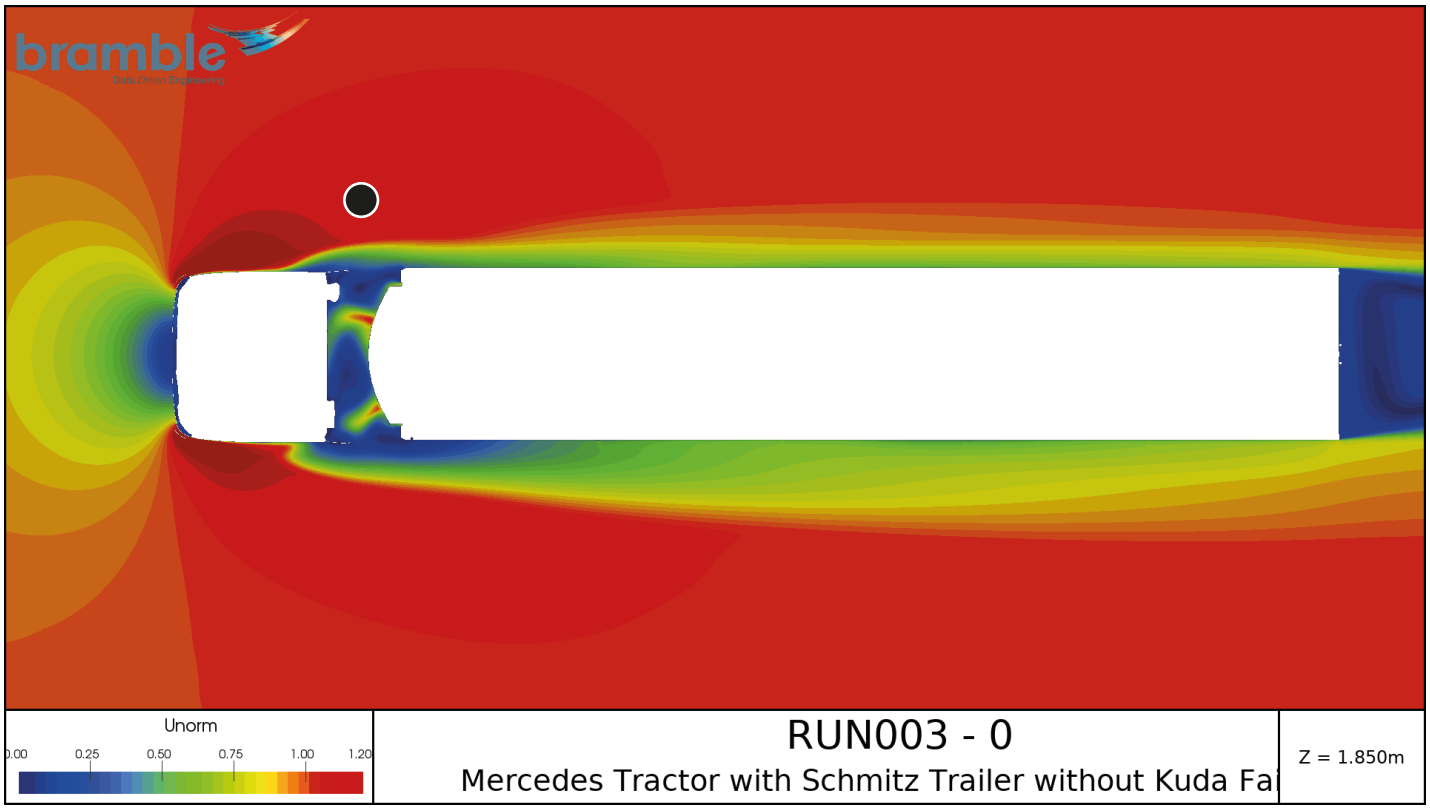


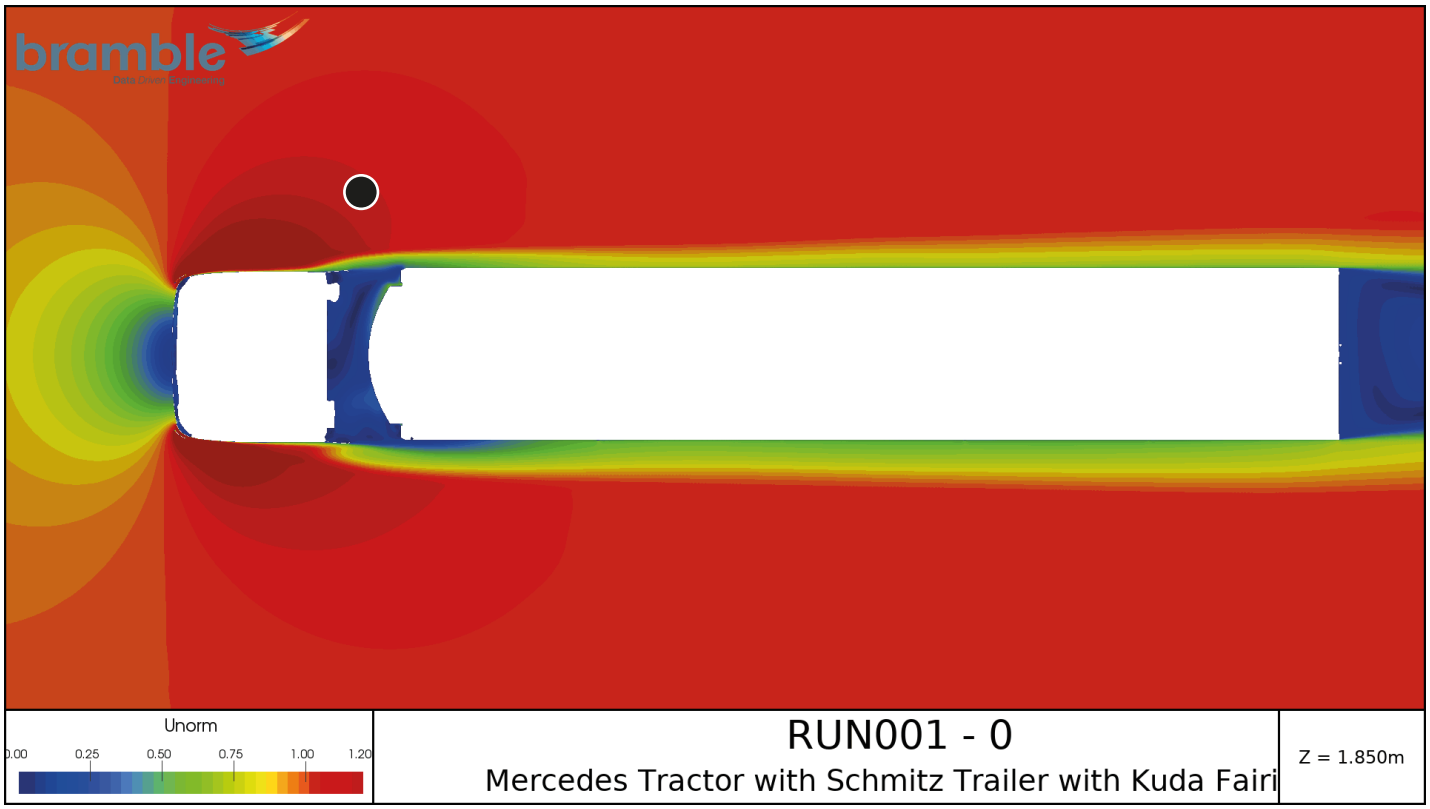


Comparison Point E

This top down view shows the area of high drag directly on top of the vehicle chassis immediately behind the cab. The installation of the Kuda iAM Air Management kit all but eliminates this area of high pressure.

Visual Representation Continued.





● **Comparison Point F**

This top down view shows areas of high and low pressure. Higher pressure being the red and orange colours and lower areas of pressure being greens and blues.

Interestingly, installing a Kuda iAM Air Management kit to the vehicle has stabilised the wake generated down the sides of the vehicle. Creating a much cleaner "hole" to be punched into the oncoming air. You can clearly see how clean the wake is down the sides of the vehicle compared to that of the vehicle without the Kuda iAM fitted.

Conclusion

The results of this CFD assessment demonstrates a clear benefit to installing a Kuda iAM Air Management kit.

The reduction in drag, as shown in the results table and visually enhanced by the pictorial representations within this report is significant (143 (N)).

Based on this data alone, the fuel efficiency of the vehicle would improve by 5%.

The drag on the overall vehicle would reduce by 10%.

Areas of high pressure and drag are clearly eliminated by the aerodynamic shape of the Kuda iAM creating a much cleaner and aerodynamically sound surface to travel through the air. The wake of the vehicle is also improved.

Notes

The data collected in this report was taken directly from the Bramble environment, a tool provided by TotalSim. The results generated were from simulation runs, carried out by TotalSim.

All models are either supplied directly by the truck and trailer manufacturers or 3D scanned in the real world and then imported into Bramble.

A live view of these results, within Bramble can be arranged on application.

This report was compiled using the above data by Tim Vincent, Commercial Director at Kuda UK LTD.

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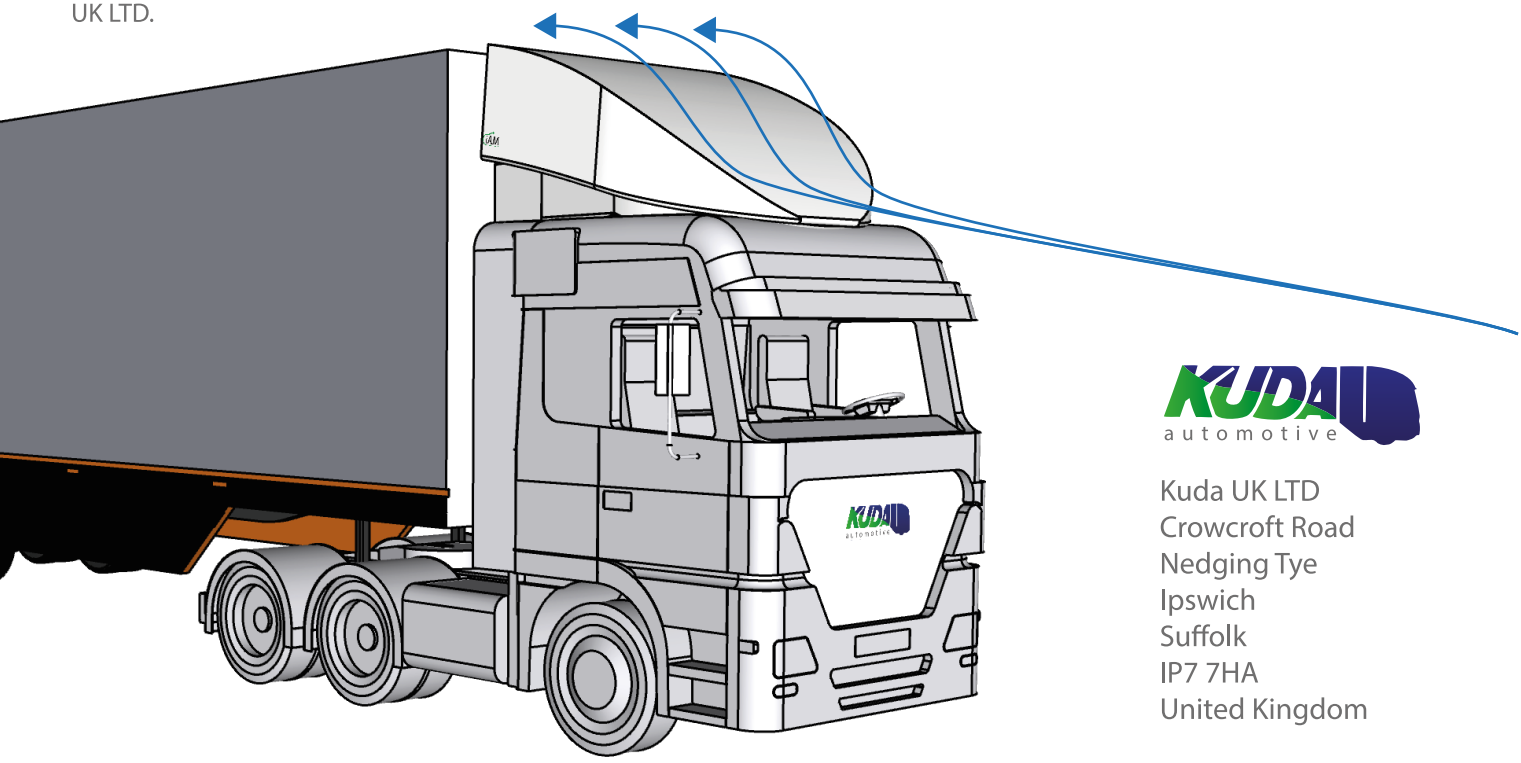

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