WELCOME

- Introduction
- Trailer innovations
- TPMS
- FleetRemote & More

By Peter Sijs
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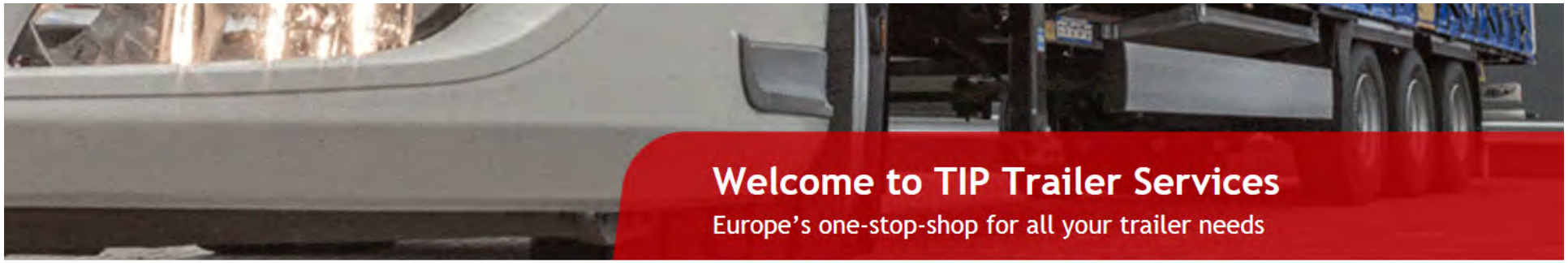


Welcome to TIP Trailer Services

Europe's one-stop-shop for all your trailer needs

TIP Trailer Services provides trailer leasing, rental, maintenance and repair as well as other value added solutions to transportation and logistics customers across Europe. We supply you with products and services from seventy locations in Europe spread over sixteen countries.

Our services include a wide variety of products and services ranging from specifying and sourcing of equipment to lease and rental, daily operations, maintenance and repair as well as the buying and selling of used assets. In our one-stop-shop all your needs are managed by a single point of contact. Combine our value-added services to create your own trailer-made solution!

One-stop-shop trailer service & more

Our network

Nordics

8 Branches **6k** AuM*
11 Workshops

Benelux

8 Branches **17k** AuM*
16 Workshops

UK and Ireland

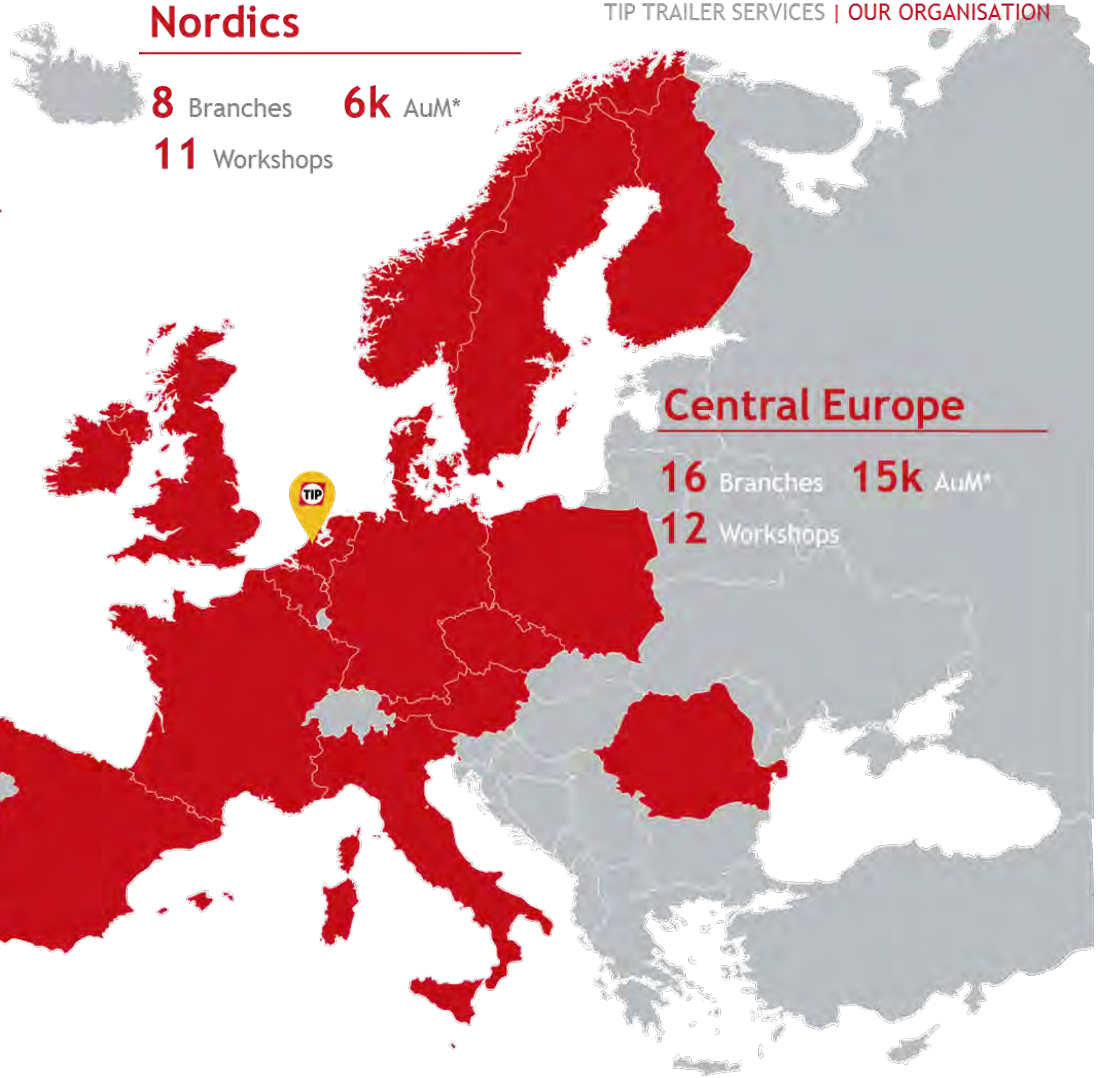
14 Branches **19k** AuM*
14 Workshops

Mediterranean

13 Branches **14k** AuM*
10 Workshops

Central Europe

16 Branches **15k** AuM*
12 Workshops



59 Depots
63 Workshops
130 Service vans
600+ Mechanics

1968

TIP Trailer Services was founded in 1968, established as the Transport International Pool Inc. TIP originally operated in the Netherlands and Canada only. As a rental and leasing company it provided short-term and long-term solutions to customers.

GE Equipment Services
TIP Trailer Services

1993

In 1993, TIP was acquired by GE Capital, the financial services unit of the American conglomerate General Electric. With the introduction of this new owner, TIP was able to expand its European network and grow further.

In 2007, by using the experience and knowledge it had developed over the years, TIP changed its focus by introducing value-added services. In short, TIP became a one-stop-shop for managing all relationships and needs through one single point of contact.

TIP Trailer Services
TRAILERMADE SOLUTIONS

2013

In October 2013, TIP was acquired by HNA Group limited, a Chinese conglomerate that offers services in air transportation, real estate, retailing, financial services, tourism, logistics, and other sectors. The acquisition will enable further growth for TIP Trailer Services in the years ahead.

HNA Group

With the acquisition of TIP Trailer Services' business by HNA, the company is now part of HNA Capital, an integrated financial service provider.

HNA initiated its business \as a domestic regional airline company (Hainan Airlines) in 1993. HNA Group, founded in January 2000, has now grown into a large integrated operator in diversified modern service industries.

HNA Group reported **assets of €73bn** and generated **revenues of €23bn** for the financial year 2014.

HNA Aviation
A large international aviation group based in China and targeting the international market with world leading services and scale.

HNA Holdings
An investment management group in the leading international infrastructure industry and related industries.

HNA Capital
An integrated financial service provider.

HNA Tourism
An vertical-integrated service provider in tourism.

HNA Logistics
A world class equipment manufacturer and investor in leasing and financing for operators and solution provider in logistics.

TIP Trailer Services is member of the HNA Group

We manage more than

6,000

SUPPLIERS

in our network

Each year we see more than

800,000

TYRES for inspection

We handle

75,000

ROADSIDE INCIDENTS PER YEAR

We spend

€44,000,000

ON PARTS annually

Combined assets under management of

71,000

Our managed fleet covers

5,700,000,000

KILOMETERS per year

48 Years Service & maintenance experience

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TIP Trailer Services TRAILERMADE SOLUTIONS

A trailer is not a brick anymore

The evolution of a trailer

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A trailer is not a brick anymore

Air suspension, long-life bearings & sealing, Disc brakes, Steering & load help

Prepared for

A trailer is not a brick anymore

All kind of loading security and body designs

Prepared for

A trailer is not a brick anymore

ABS, EBS, Steering & load distribution help, TPMS

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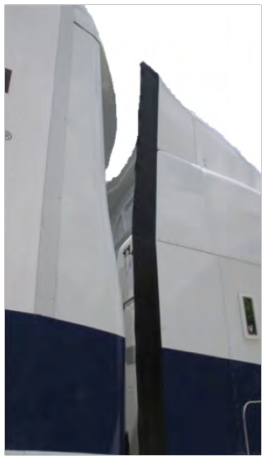
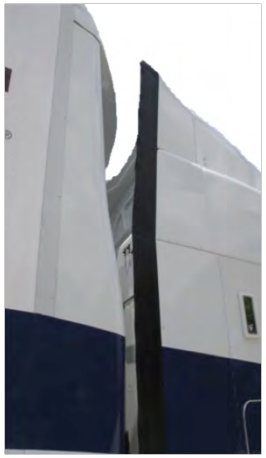
A trailer is not a brick anymore



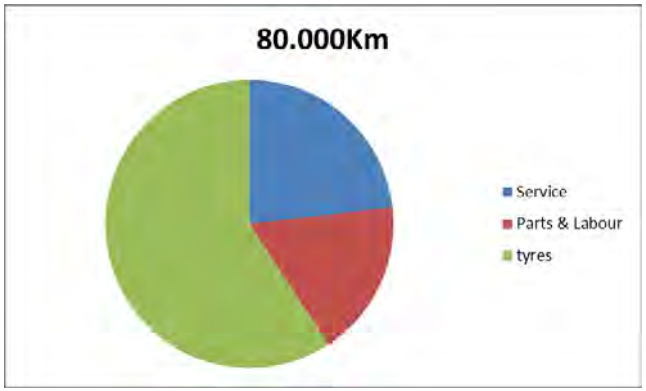
Aerodynamics – Side, rear and front spoilers

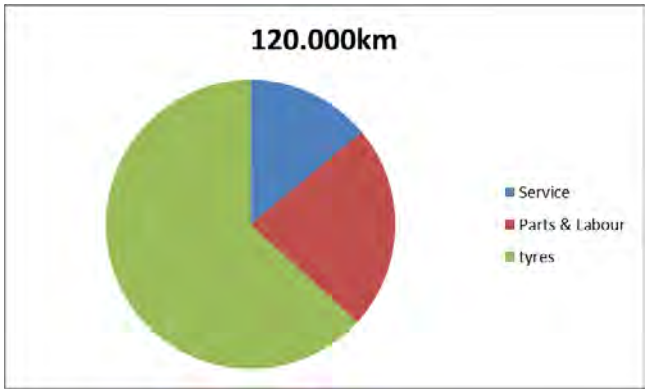
A trailer is not a brick anymore



Aerodynamics – Side, rear and front spoilers

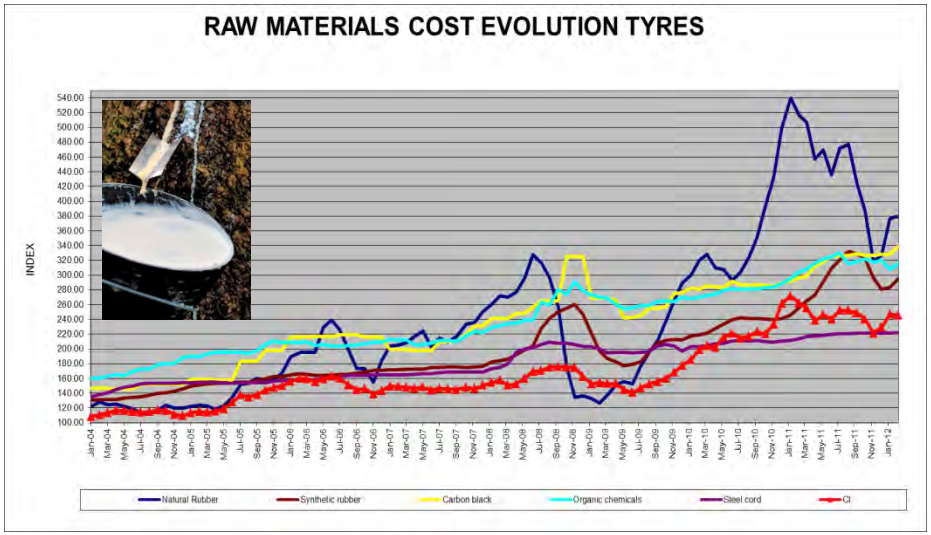
Tyres the No 1 cost





Tyres are the most expensive maintenance component for trailers

- Up to 60% of maintenance cost



The tyre cost 3-axle trailer

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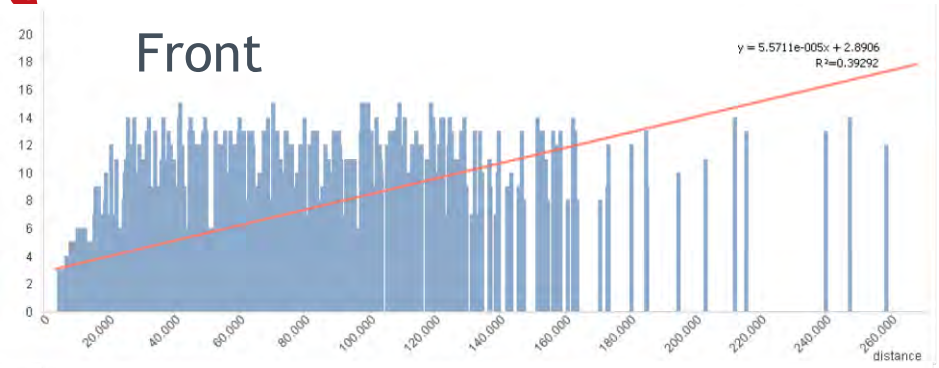
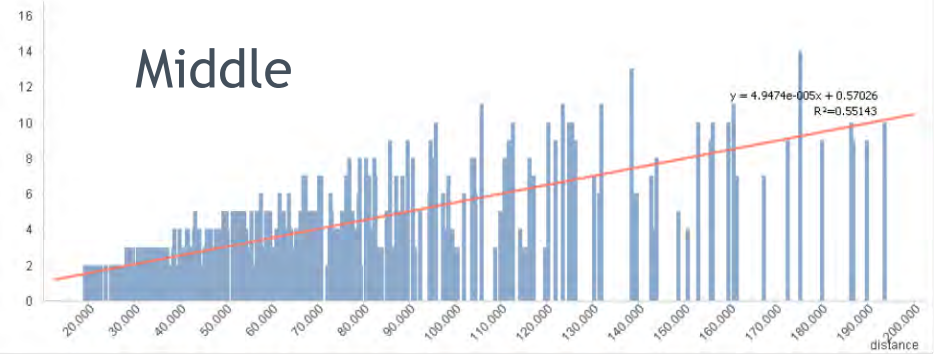
Tyres the No 1 cost

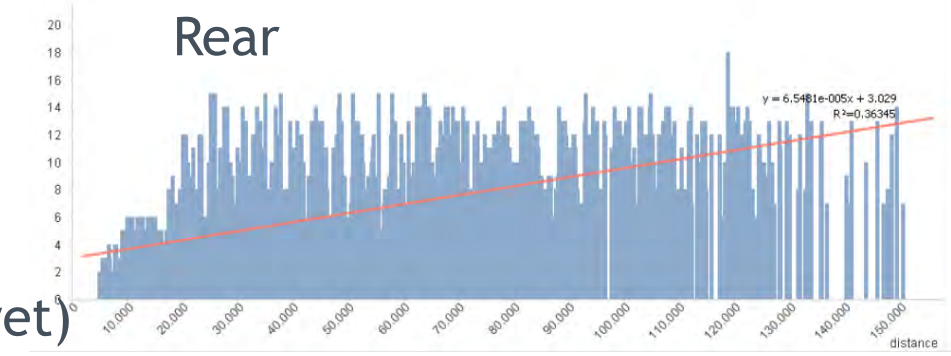
Tyre management is a challenge

- We have 257 types of 385/65R22.5
- We have winter tyres
- 16 Countries = 16 Conditions
- Swopped of tyres
- New tyre developments
- High tyre damage

We do not have usages information (yet)







We run 257 different types of 385/65R22.5

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The TPMS systems

Pressure

1

2

3

Measure

TPMS systems will become mandatory

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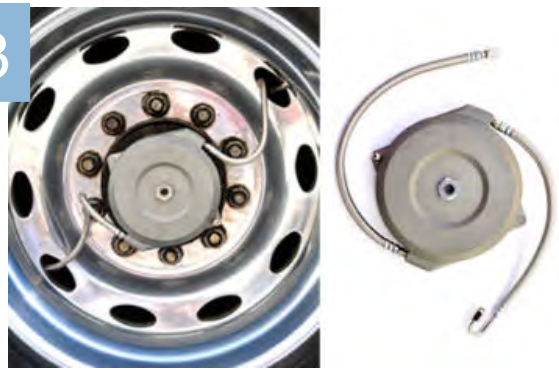
The TPMS systems

Pressure

1

2

3



Measure

4

5

7

6

TPMS systems will become mandatory

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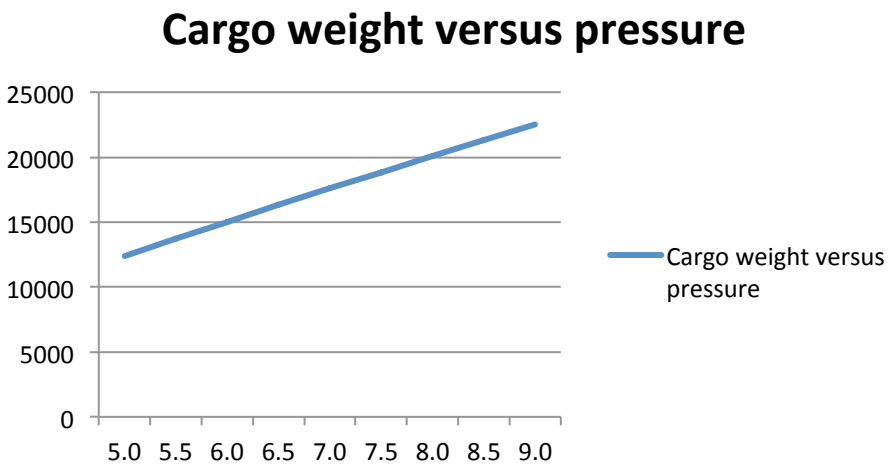
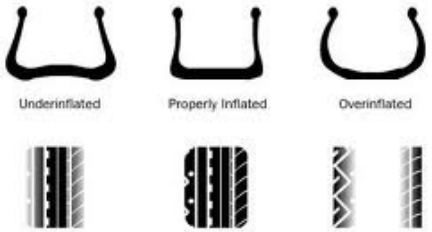
What is the correct pressure ?



Under inflation

- Higher fuel consumption
- Tyre damage
- Poor vehicle handling – unstable straight ahead, slow steering reactions, increased lateral sway



Over inflation

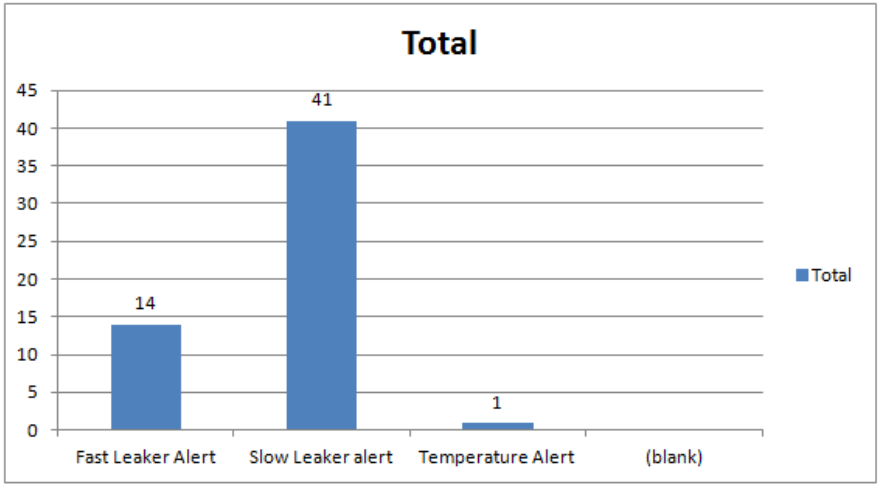
- Reduced penetration and impact resistance
- Tendency to heel an toe wear
- Reduced driver comfort
- Increased vehicle damage (wear of suspension, cracked welds etc.)
- Higher risk of payload damage
- Poor vehicle handling – specially rear axle
- Road damage

*) Source: Goodyear

The correct pressure is depending on the cargo weight

Incident data on tyres

Row Labels	Count
Fast Leaker Alert	14
Slow Leaker alert	41
Temperature Alert	1
(blank)	
Grand Total	**56**



Incident ratio 0.63

- Fast leaker - Difficult to predict and often picked up by the operator
- Slow leaker - Highest productivity savings. External causes, nails etc

75% of the tyre incidents are slow leakers and can be detected ahead.

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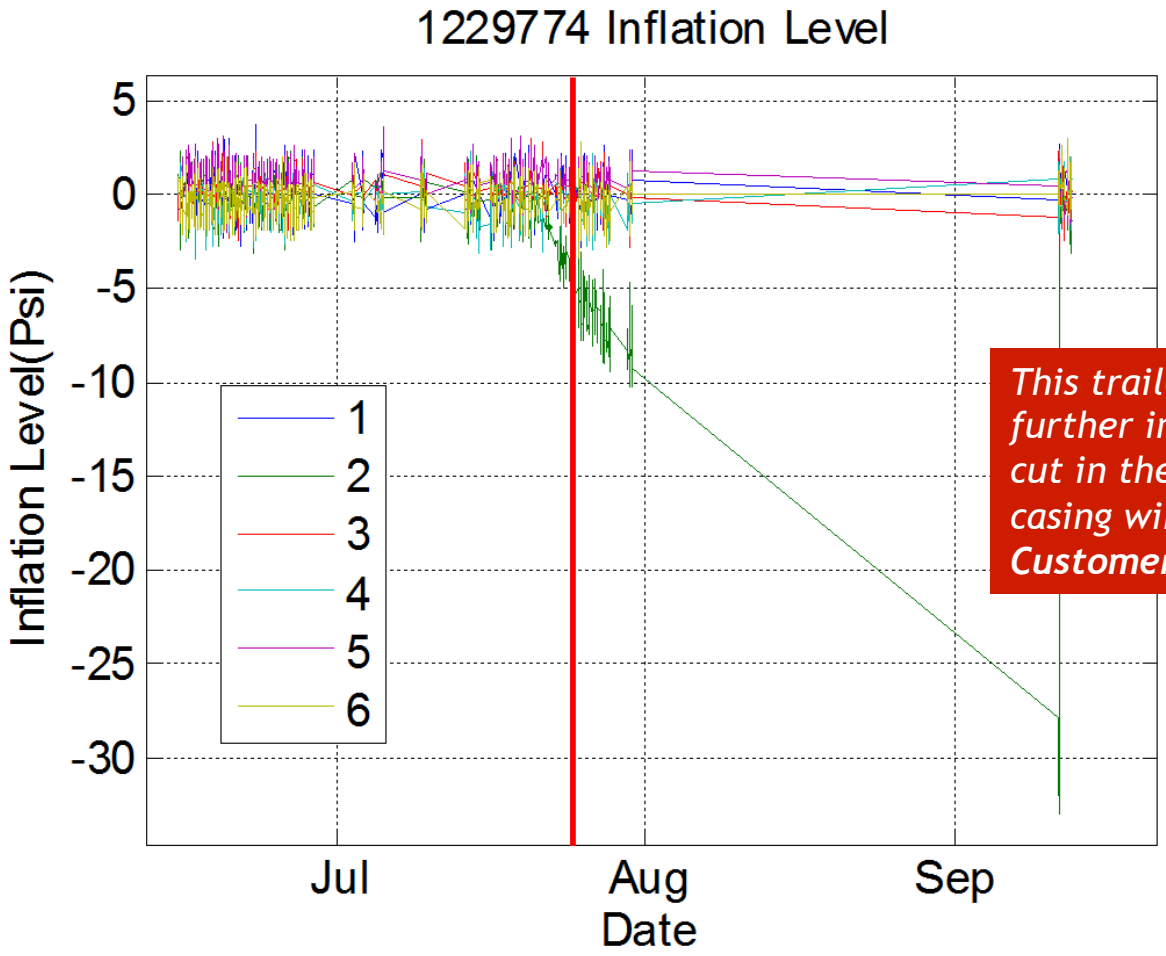
Predictive algorithm



This trailer had a nail in the tread. By further inspection there was also a 5 cm cut in the tread, al the way up to the casing wires -
Customer findings

Data shown that we could predict a low pressure alert 6 days in advance

TPMS - Observations

- Big differences between fleets
- Massive data pack
- Remote pressure management is a challenge
- Fuel saving questionable
- Cost saving mainly by avoiding roadside repair

Managing the alerts a challenge

Aerodynamics

Masterclass Aerodynamic

in 5 minutes

- What is aerodynamic
- Examples & test results
- Take away

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Frontal Surface

1 Million cub air / hour

at 85km/h 18.5mtr combination

The big movement of air

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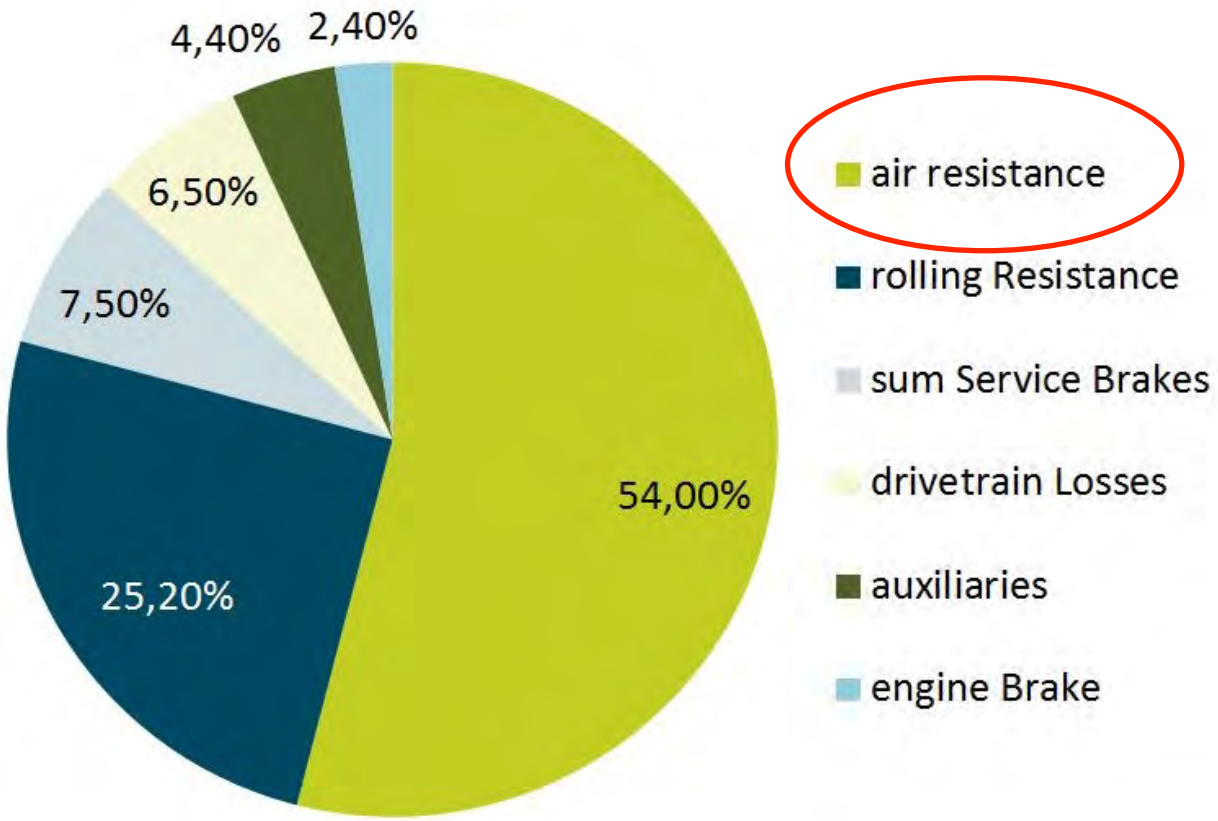
Energy consumption



>50% total energy consumption HDV on highway is lost to aero drag

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Labatt's 1947 →

The 4 mtr restriction

- 76mm Mega neck
- 1.15 mtr 5th wheel height
- Min int height 2.28 mtr
- Max int height 2.88 mtr

Aerodynamic is not new

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Aerodynamics in a single formula

aerodynamic drag

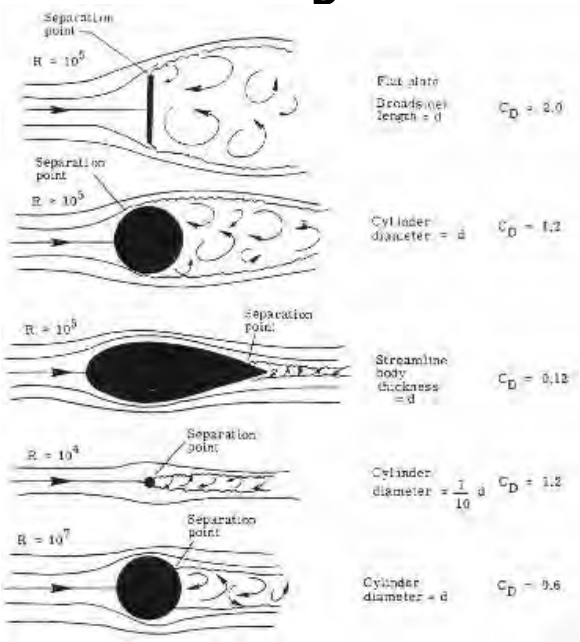
velocity frontal surface

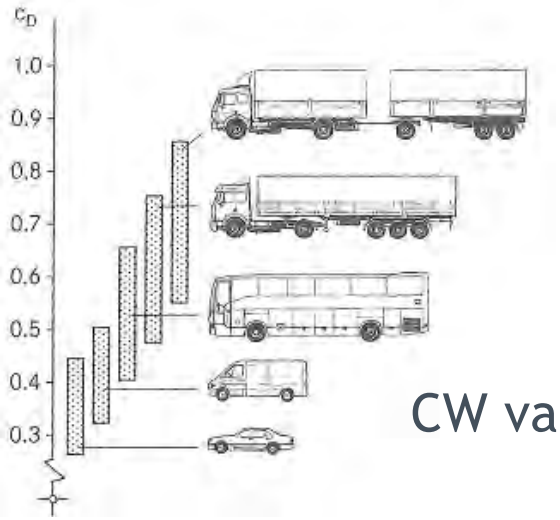
$$D = C_D * 1/2 \rho V^2 * S$$

drag coefficient

air density

Trailer →





CW value

Speed and frontal surface have a big impact on the aerodynamic drag

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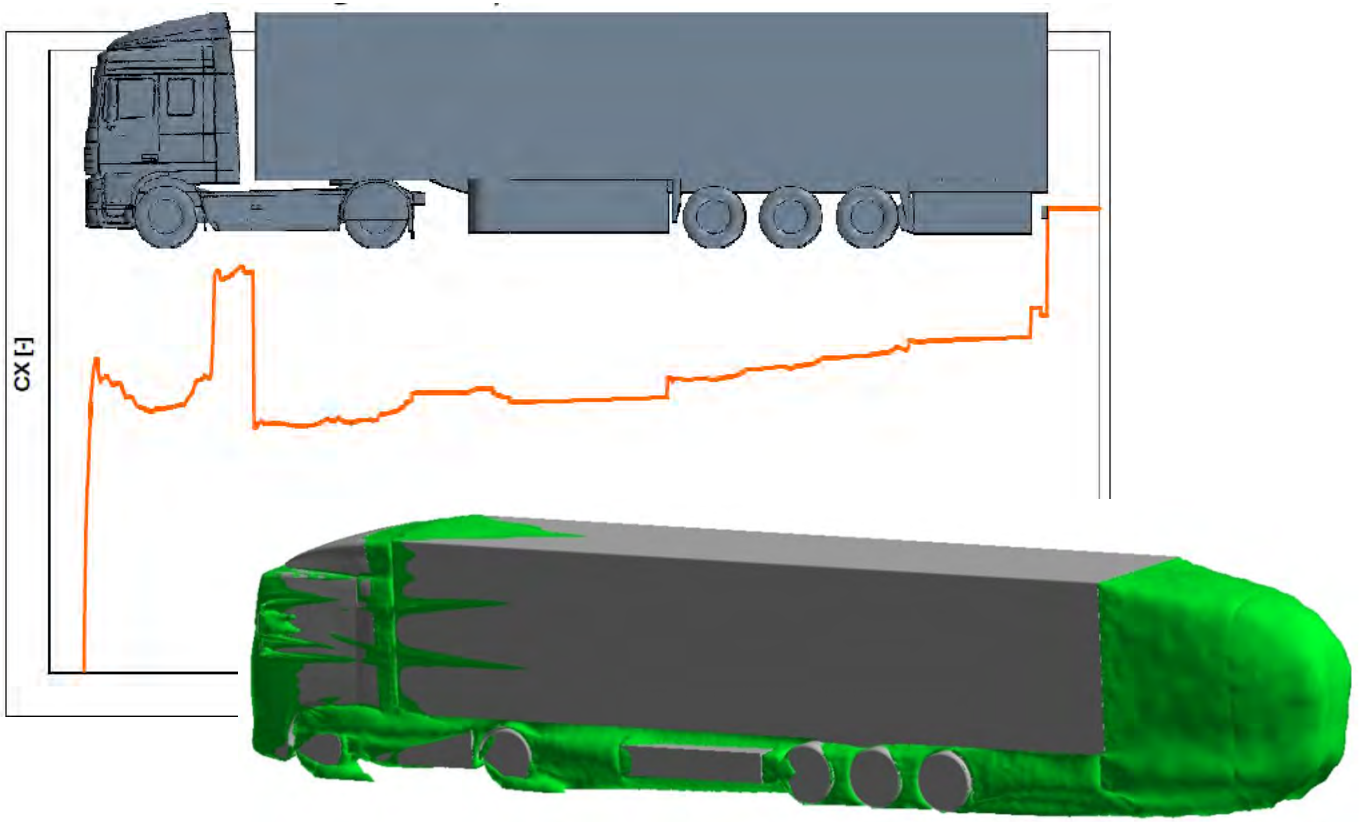
Drag



The drag building up over the whole combination

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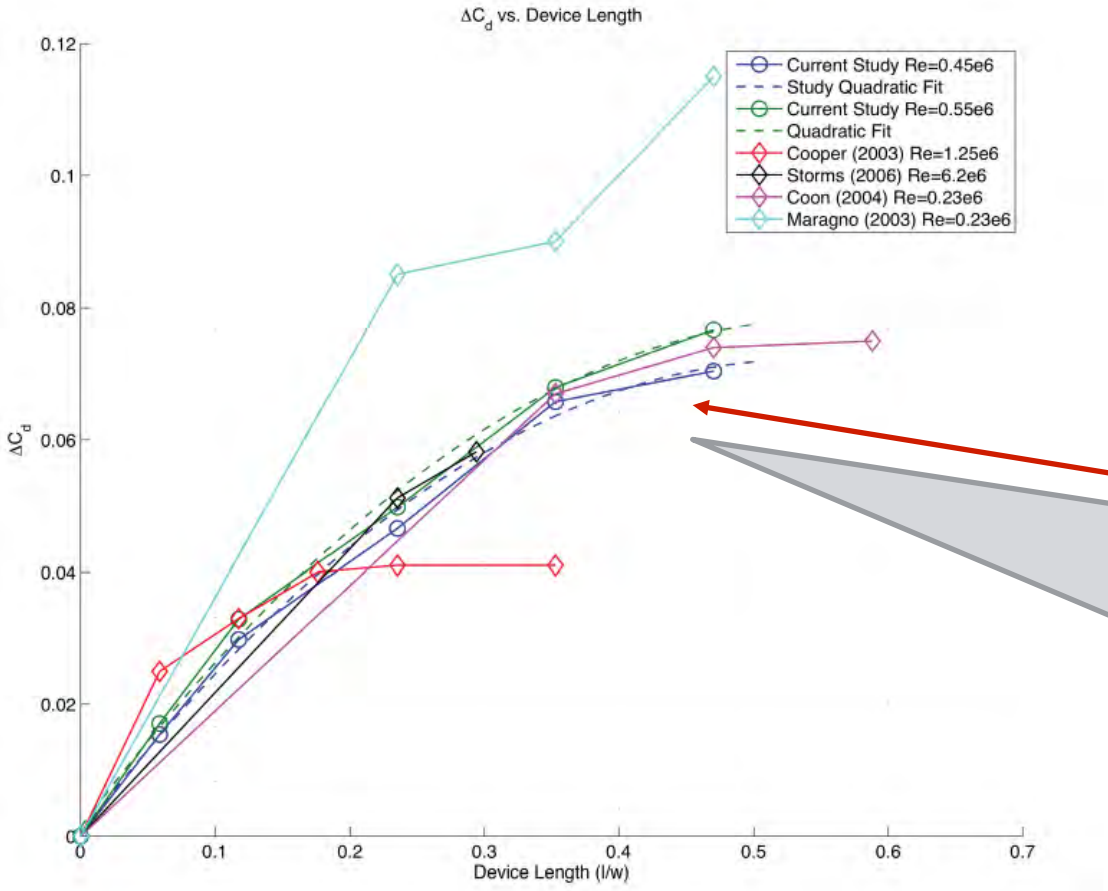
Longer is better 12 degree angle



A simple tail with a length of 0.5 x the width is giving a good result

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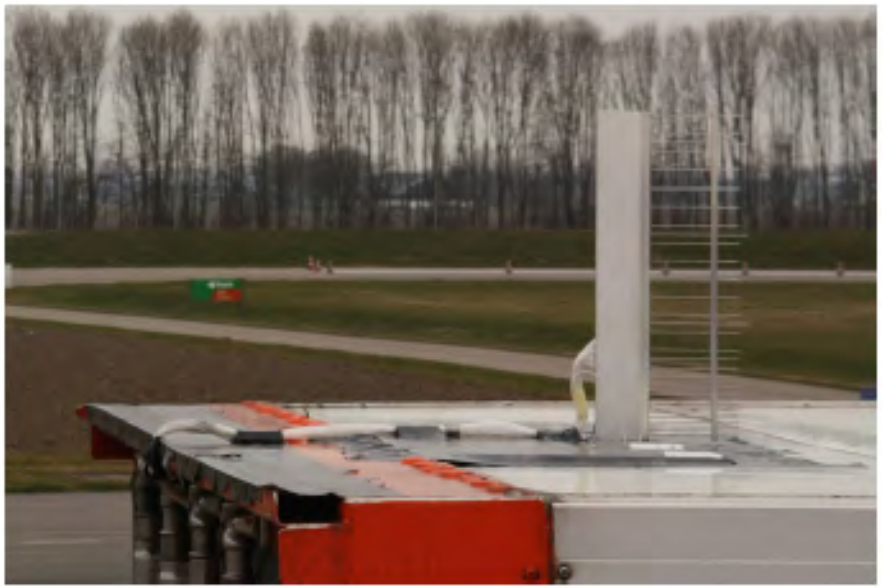
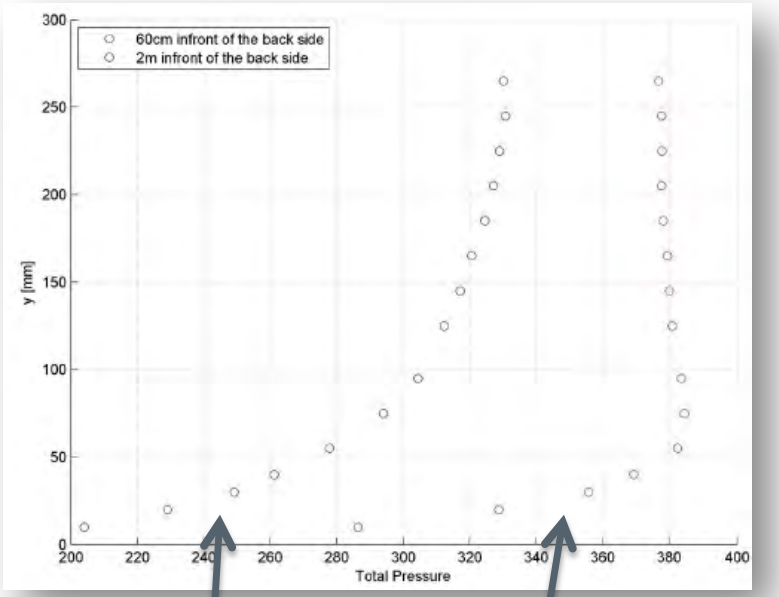
Boundary Layer Thickness





60 cm from rear

200 cm from rear

$$\delta = \frac{0.37x}{Re_x^{0.2}} \qquad C_f = \frac{0.455}{(\log Re)^{2.58}} \quad \text{or} \quad C_f = 0.074\,Re^{-0.2} \qquad \theta = \frac{0.036x}{Re_x^{0.2}}$$

The air speed around the object has an impact on efficiency

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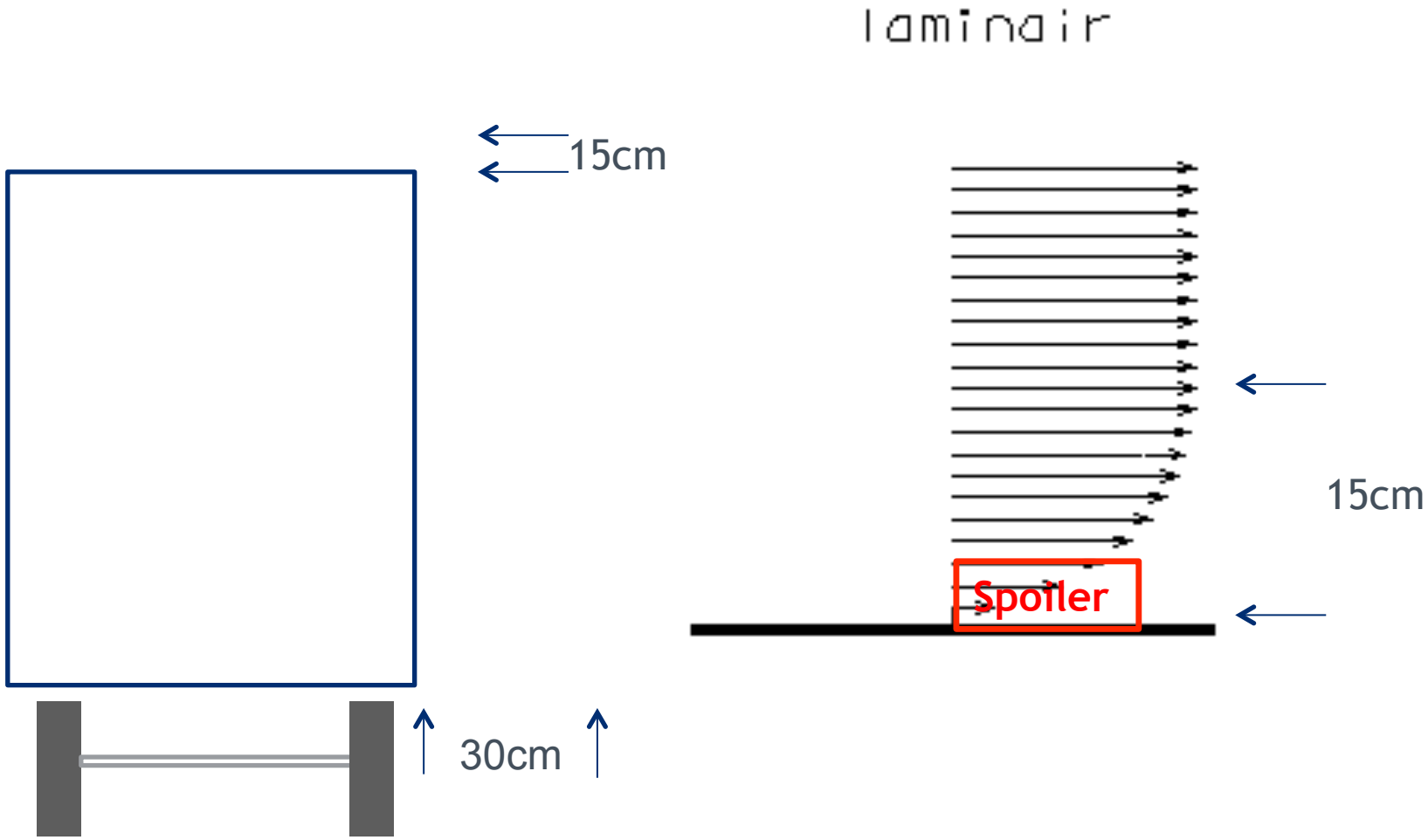
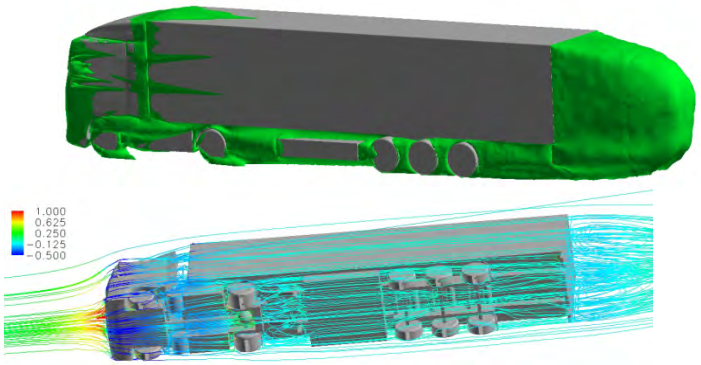
The position matters



Small spoilers close to the object are less effective

Testing technics

1: Computational Fluid Dynamics



Multiple measurements technics to show efficiency

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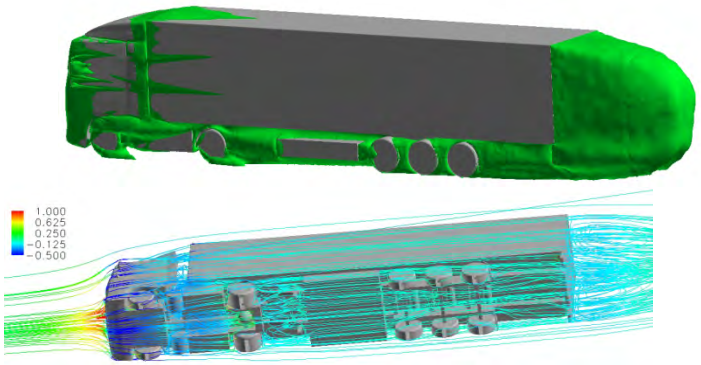
Testing technics

1: Computational Fluid Dynamics

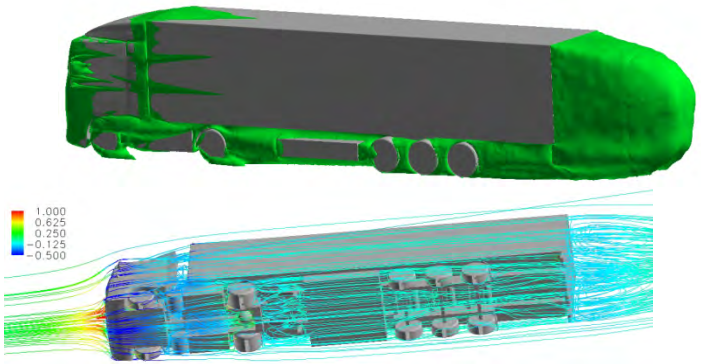


2: Wind tunnel – Water Tank

Multiple measurements technics to show efficiency

Used testing technics

1: Computational Fluid Dynamics



2: Wind tunnel - Water Tank

3: Drive test

A controlled drive test is a must

The Aerodynamic test

3-Day test

4 Trucks

4 Trailers

Test protocol SAE J1321 Type II

To test various Aerodynamic products

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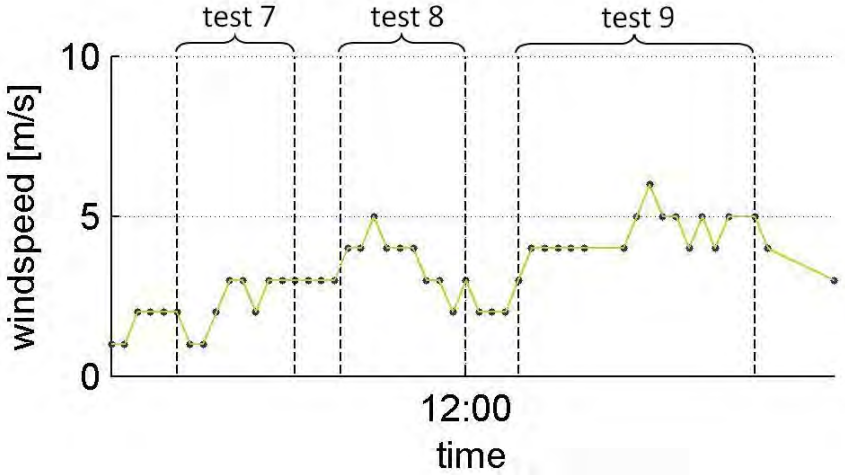
Side wings on a curtainsider



wind speed: av. 4 tot 5 m/s
wind direction: South to West/South-West

configuration	consumption [l/100km]	abs. savings [l/100km]	pct. savings [%]
SideWing	25.15	**1.01**	4.01%

1 liter per 100 km savings measured on average
at a wind speed of 4 to 5 m/s*

A good side wing design is also effective at crosswinds

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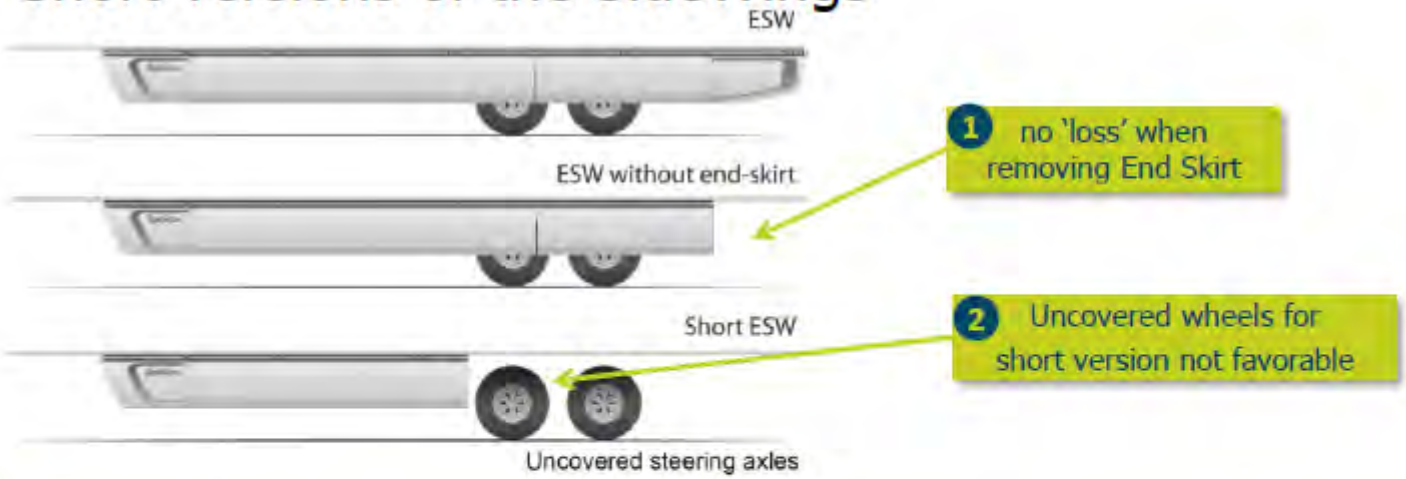
Impact of the weather

Short versions of the SideWings

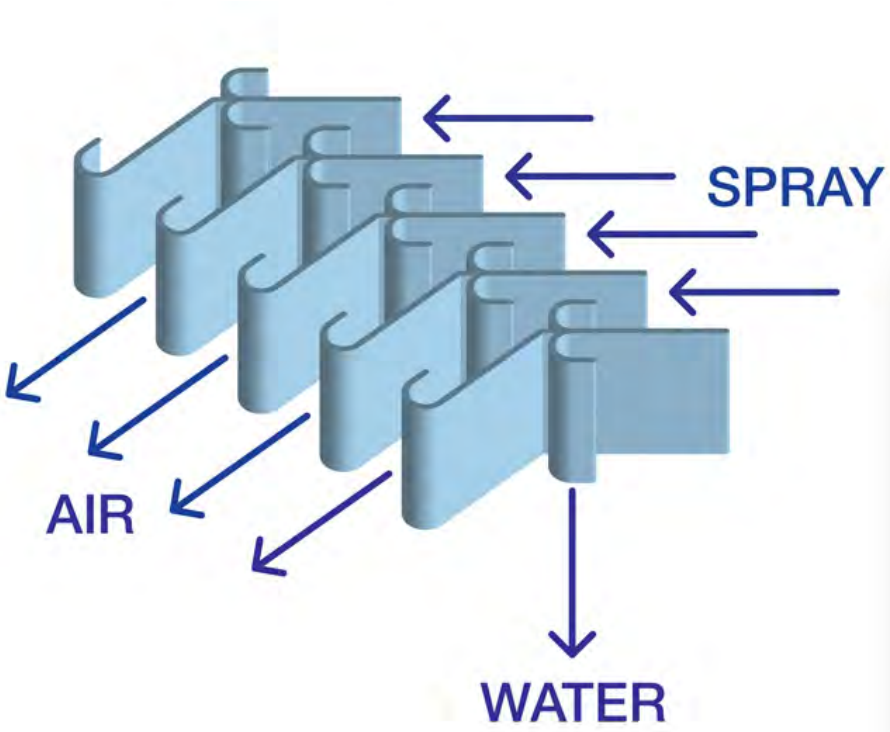


test		consumption [l/100km]	abs. 'savings' [l/100km]	pct. 'savings' [%]	wind velocity [m/s]	wind direction [-]
1	without End Skirt	29.67	**0.03**	0.12%	9 - 11	S / SSW
	short SideWing	28.88	**-0.38**	-1.33%		
2	short SideWing	26.48	**-0.38**	-1.42%	4 - 5	S

!

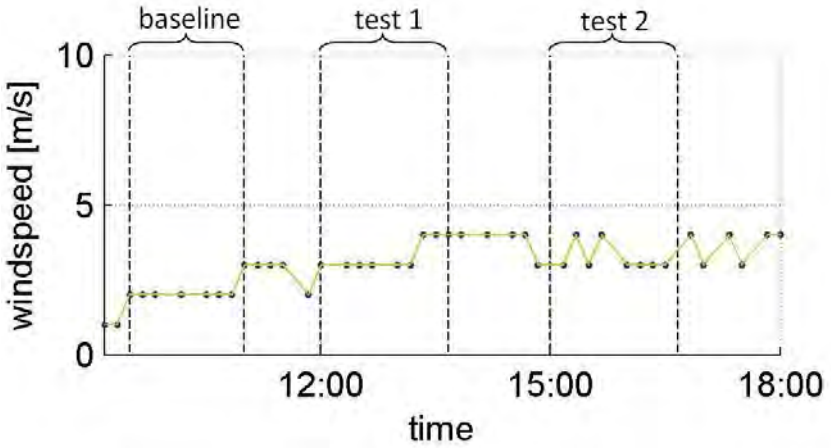
The wind direction and speed has a impact on the efficiency

Spaydown mudflaps



A simple cost effective product, not design for aerodynamics but works

Spraydown flaps



wind speed: 3 to 4 m/s
wind direction: North to North-East

test configuration	fuel rate TV [l/100km]	fuel rate CV [l/100km]	abs. savings [l/100km]	pct. savings [%]
baseline	26.06	26.20	-	-
Spraydown Flaps (2)	26.57	27.04	**0.32**	1.20%
Spraydown Flaps (2 + 4)	26.20	26.32	**-0.02**	-0.09%

savings of 0.32 liter per 100 km* measured for 2 Spraydown Flaps at these specific wind conditions

The saving is depending on the number of flaps fitted

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Circuit test with collapsible tail

test configuration	fuel rate TV [l/100km]	fuel rate CV [l/100km]	abs. savings [l/100km]	pct. savings [%]	wind velocity [m/s]	wind direction [-]
baseline	25.72	25.22	-	-	3 - 5	SW / WSW
open-cavity	25.53	26.15	**1.12**	4.29%	5 - 6	WSW / W
improved top panel	23.60	24.22	1.13	4.67%	2 - 3	SSE
closed-cavity	23.90	24.44	1.04	4.26%	3 - 4	S / SSE
no bottom panel	24.60	25.08	0.98	3.91%	3 - 5	SE / ESE

savings of 1.12 liter per 100 km* for an open-cavity foldable tail on circuit

Hardly any effect when leaving the bottom panel off.

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Operational test on public roads

fuel savings based on weighed average fuel consumption

configuration	> 70 km/h	const. 85 km/h
tractor	2,575 km	2,178 km
boat tail	4,849 km	3,805 km
clean	24,859 km	17,312 km

vehicle speed > 70 km/h

clean [l/100km]	boat tail [l/100km]	abs. savings [l/100km]	pct. savings [%]
24.44	22.96	**1.48**	6.1%

const. vehicle speed 85 km/h

clean [l/100km]	boat tail [l/100km]	abs. savings [l/100km]	pct. savings [%]
24.11	22.46	**1.65**	6.8%

average savings of 1.65 l/100km
at constant speed of 85 km/h on public road*

Road test could show different saving due to route and wind direction

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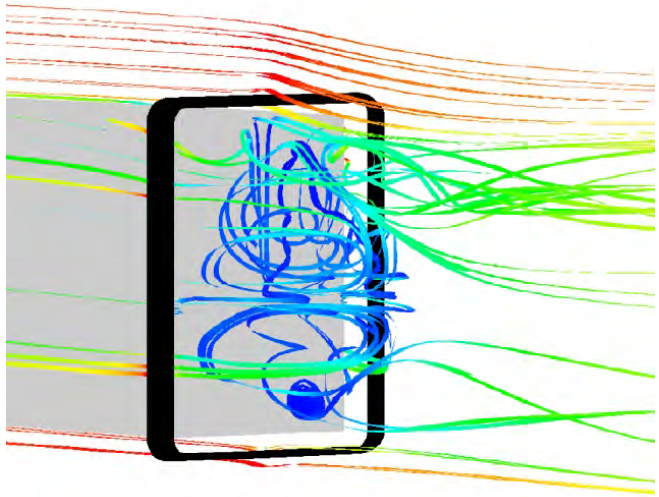
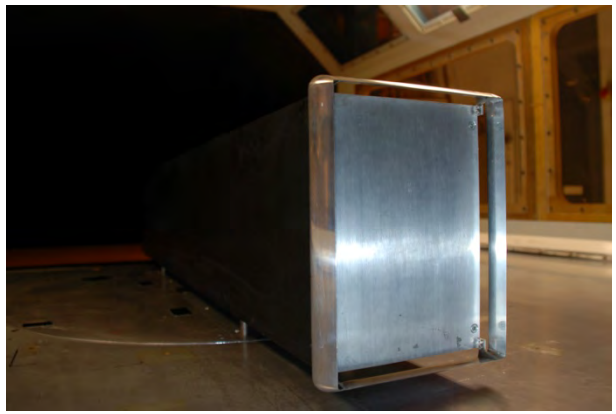
The Vanes

Guiding vanes

Numerical analysis & wind tunnel experiments





Numerical analysis: ΔC_D =-21%

Wind tunnel experiments: ΔC_D =-20%

Promising fuel saving of 7%

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Circuit test guiding vanes

test configuration	fuel rate TV [l/100km]	fuel rate CV [l/100km]	abs. savings [l/100km]	pct. savings [%]	wind velocity [m/s]	wind direction [-]
baseline	26.44	27.13	-	-	2 - 3	W/WNW
top vane	25.76	27.23	**0.78**	2.86%	3 - 4	WNW → WSW
all sides	-	-	**-**	-	3 - 4	WNW → WSW

The configuration with all vanes at trailing edge trailer was not performing as expected
→ more research is required

savings of 0.78 liter per 100 km* measured
for top vane on circuit

The position of the vanes at the side are inside the boundary layer

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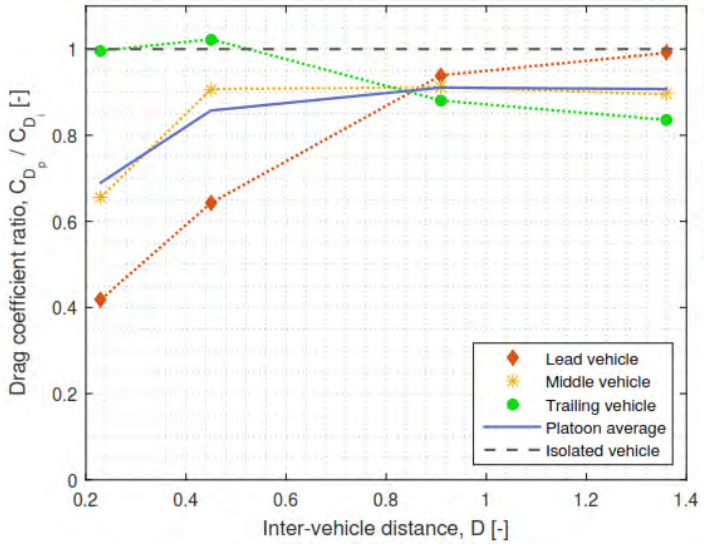
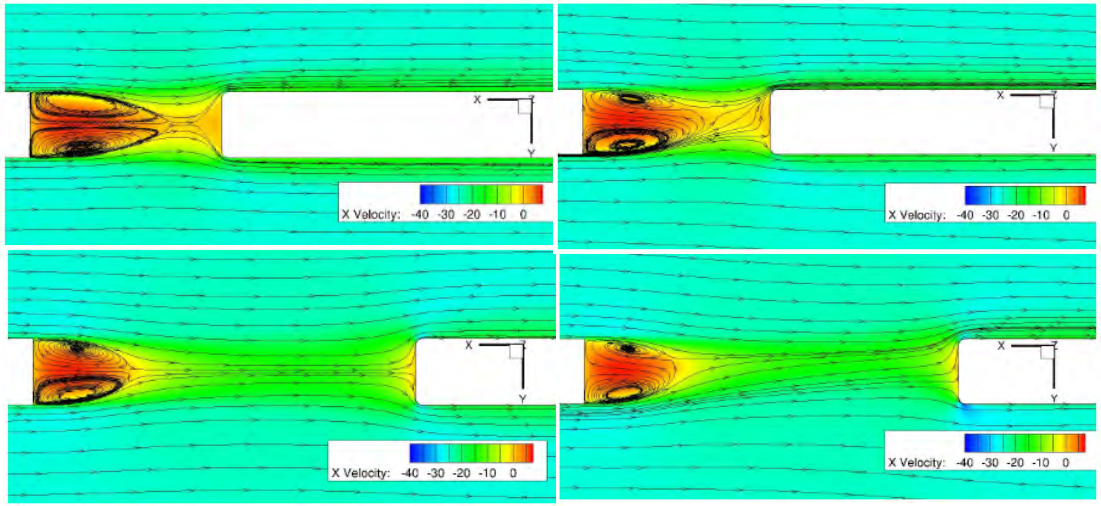
Platooning





Potential fuel savings ~10% for complete platoon

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Mercedes / Schmitz - Cartwright

Various good looking test trailers on the road

Open is better

Rear light assembly can be improved by **ALL** manufacturers

Leave the rear open

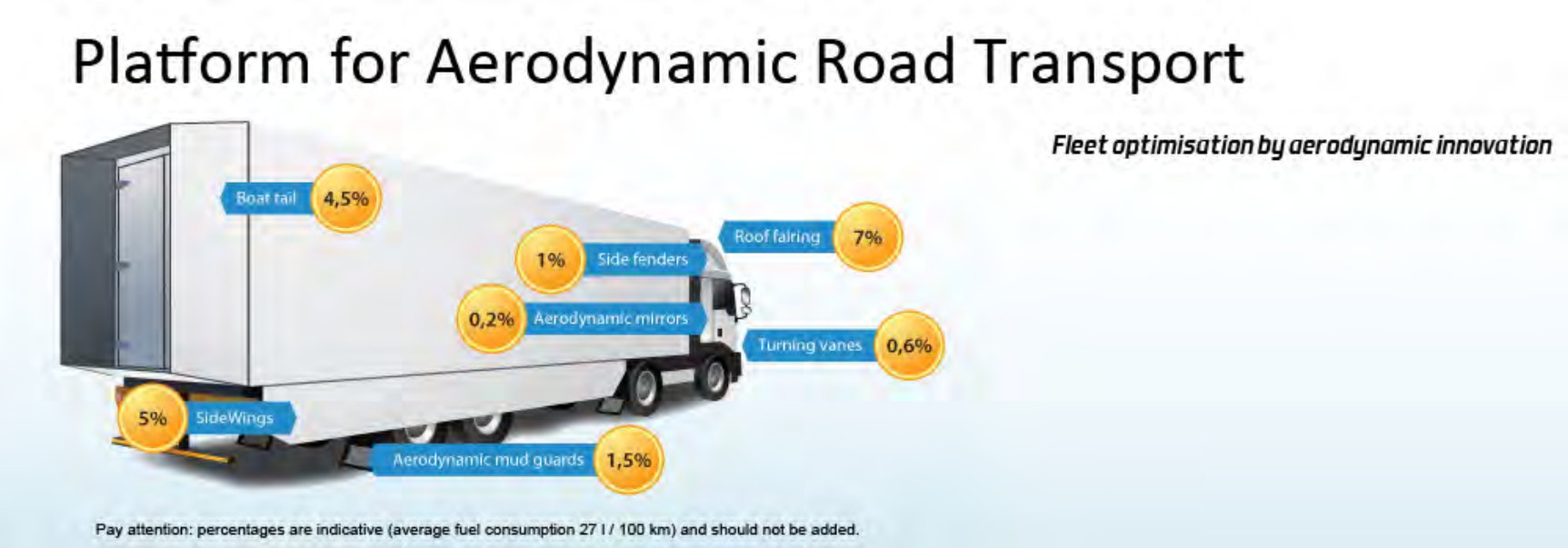
Fuel saving 3.5%

Leave the rear open and let the air get away

Avoid pimped trucks

Lights, air horns and etc. are disturbing the flow, causing drag

www.part20.eu



Recap

- Keep the rear open
- Longer is better
- 12 Degrees
- Never 100% headwind

Pitfalls

- Test methodology
- Weather condition
- Equipment usage
- Total combination

On www.part20.eu information on trailer aerodynamics

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Trailer EBS

Main Function
- Regulation Brakes

Sub Functions
- Regulating Suspension
- Safety enhancement
- Roll over protection
- Safe docking
- iCorner
- iCargo

Start up in 300ms

- Data collection & Transfer

Start up in 30s

EBS, more than just brakes

Prepared for

FleetRemote

Predictive Maintenance Platform

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What is FleetRemote

FleetRemote is a platform that is using the enriched data from the EBS and a black box (iTAP) to monitor equipment health.

- FleetRemote is reporting critical failures when they occur or even before they happen.
- It is using an innovative Wifi-offload process that allows a data offload at free or secured Wifi hotspots

Multiple Awards

IAA Trailer Innovation Award 2015
Category: Smart Trailer

Fleet Transport Trailer Innovation Award 2015

Industry recognition with two awards

FleetRemote

www.FleetRemote.com

EBS
- Data

+

iTAP
- More Data
- WiFi connect

+

Phone
- Activation
- In cab screen

+

WebSite
- Display
- Alert
- Predict

Knorr-Bremse
Haldex
Wabco

+

TPMS optional

+

+

Predictive Maintenance Platform

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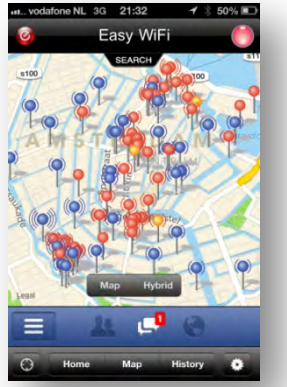
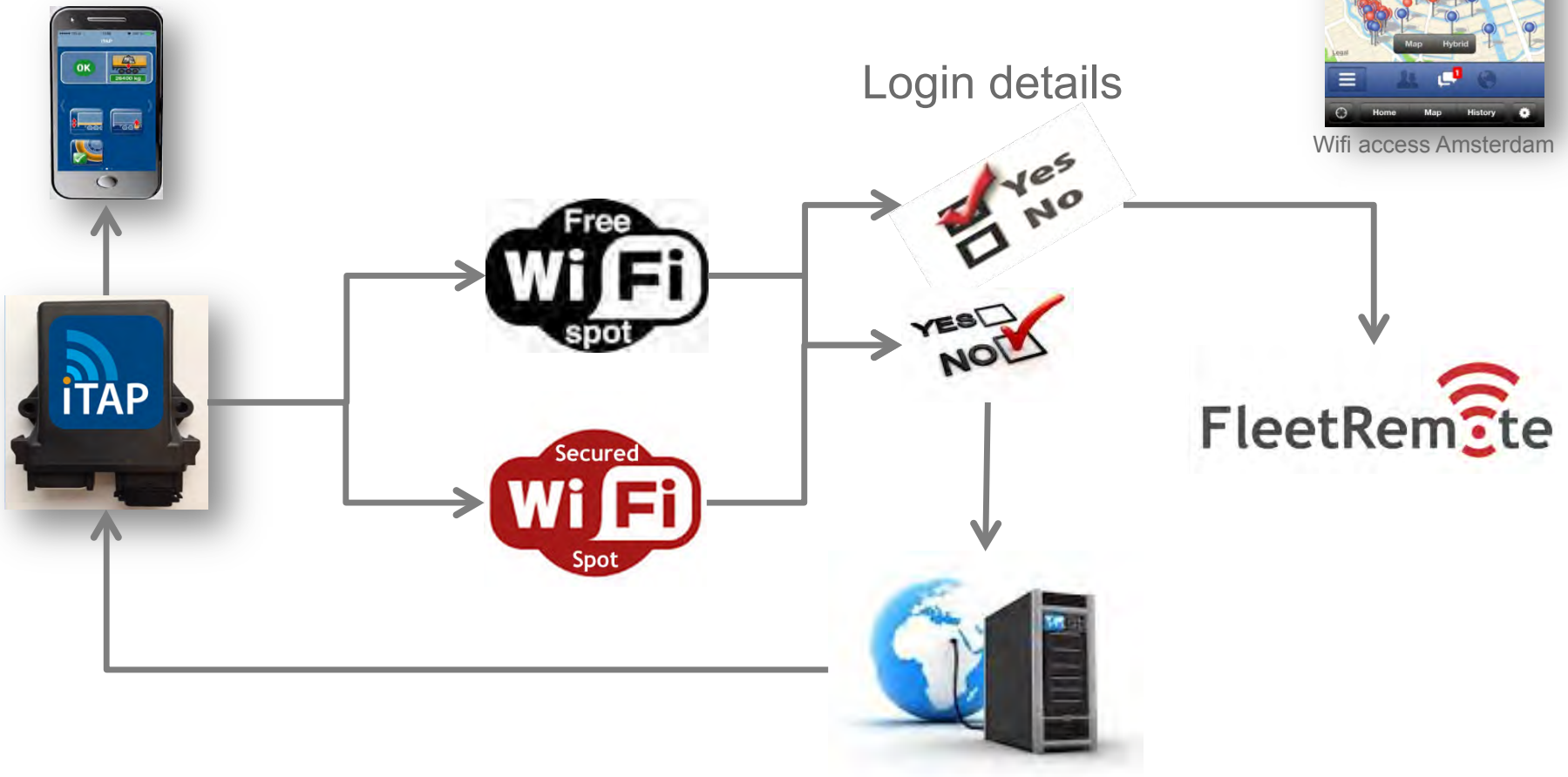
Wifi offload - How it works



Wifi access Amsterdam



FleetRemote as an unique WiFi offload protocol to open and secure hotspots

Prepared for

FleetRemote versus Tracking & Tracing

More of **How Are You ?**

Can you finish your trip and the following trip

And less of **Where Are You ?**

Focus on condition location

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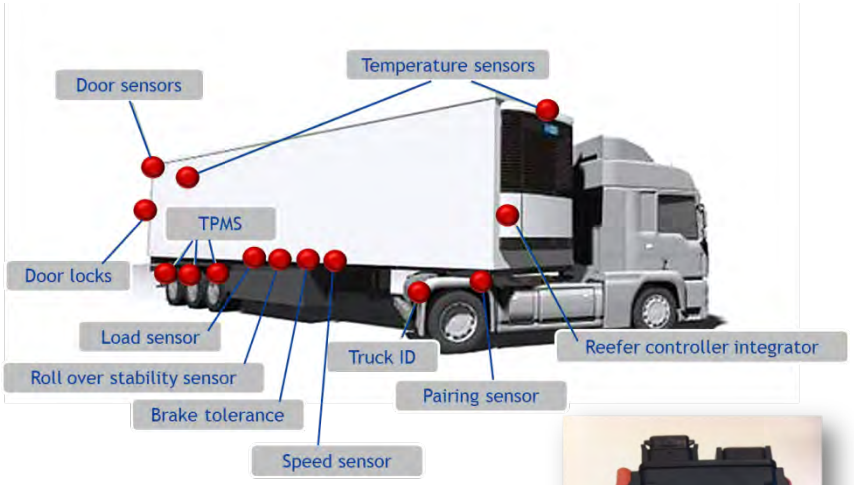
Why is FleetRemote Unique

Joint development by industry experts, Knorr-Bremse and TIP

- WiFi Offload
- Tcan compliant
- Data
  - Volume of data
  - Different data
  - Trend algorithm
  - Life time health
  - Data that matters
- Smart phone integration
- Sign-on and User Interface
- Competitive one-off 5-year fee



We use data - No sensors

Big data in a simple format

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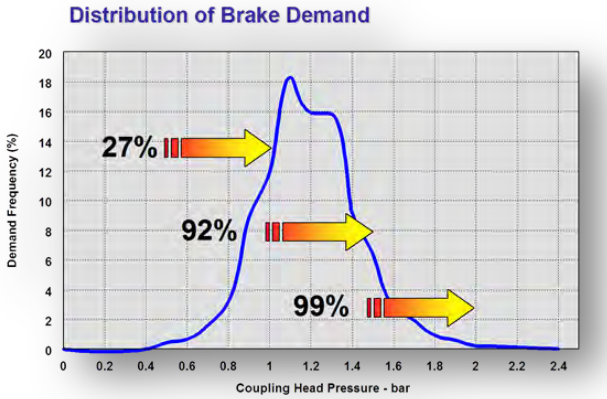
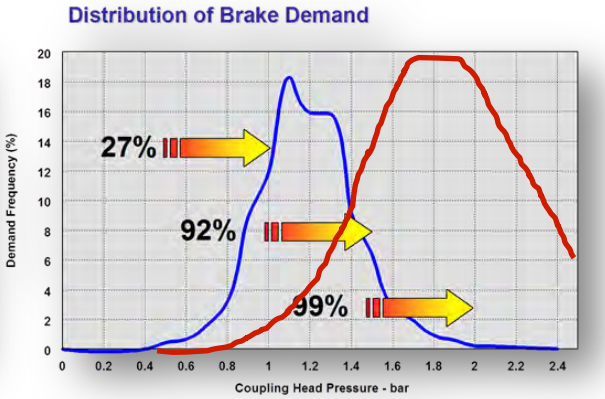
Brake data > 200 data points

Brake event

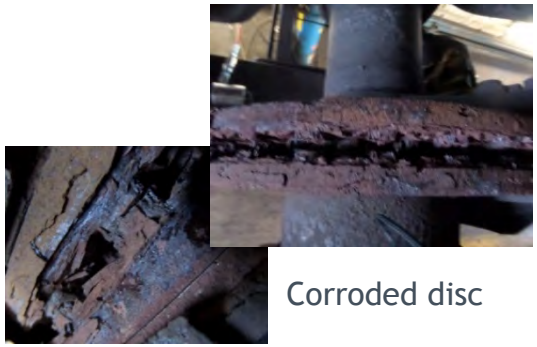
6.000.000 data points per year (Brakes only)



Normal distribution



Changed distribution
Example only



Corroded disc

FleetRemote is following trends and reporting on that

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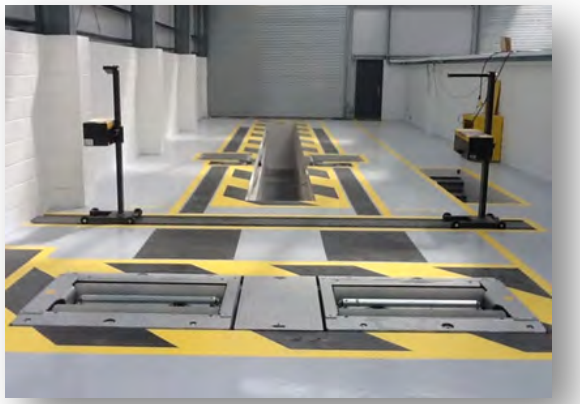
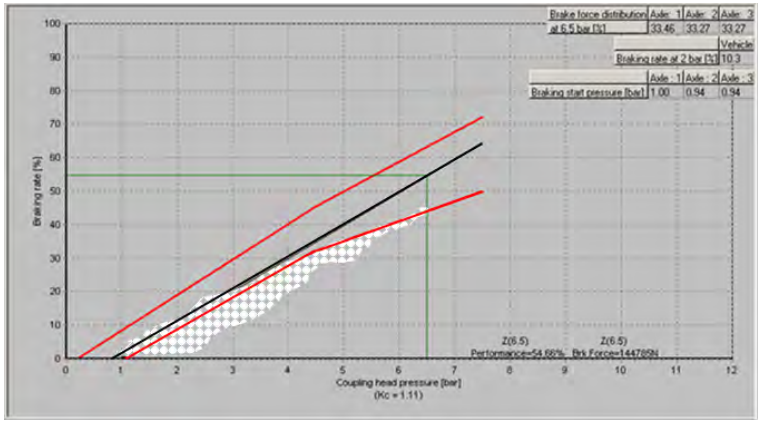
Safety condition in operation



- Once a year
- Empty trailer
- Walking speed

Kinetic energy at the annual test
15.000kg at 2.5 km/hr = 3.675 Nm
(0.7 m/s)

- >100.000 x per year
- Any load condition
- Any speed



Example only

Kinetic energy on the Road
40.000kg at 80 km/hr = 9.856.800 Nm
(22.2 m/s)

Continues brake monitoring at any load and speed

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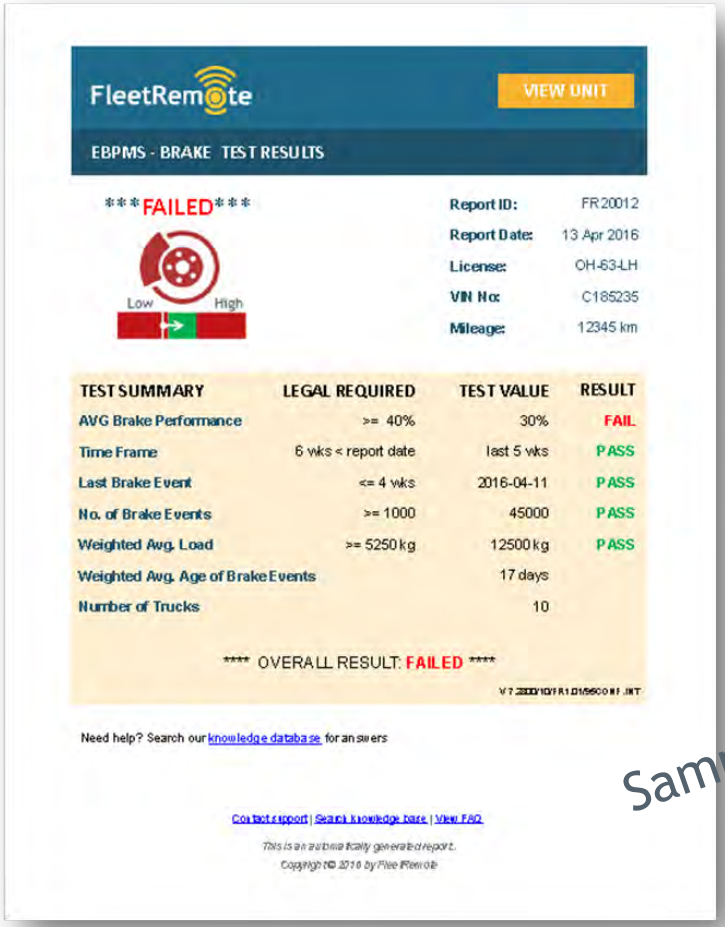
OBD and brake performance report



FleetRemote

VIEW UNIT

EBPMS - BRAKE TEST RESULTS

FAILED

Low High

Report ID:	FR20012
Report Date:	13 Apr 2016
License:	OH-63-LH
VIN No:	C185235
Mileage:	12345 km

TEST SUMMARY	LEGAL REQUIRED	TEST VALUE	RESULT
AVG Brake Performance	>= 40%	30%	FAIL
Time Frame	6 wks < report date	last 5 wks	PASS
Last Brake Event	<= 4 wks	2016-04-11	PASS
No. of Brake Events	>= 1000	45000	PASS
Weighted Avg. Load	>= 5250 kg	12500 kg	PASS
Weighted Avg. Age of Brake Events		17 days	
Number of Trucks		10	

**** OVERALL RESULT: FAILED ****

Need help? Search our knowledge database for answers

Contact support | Search knowledge base | View FAQ

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Sample report

Reporting on brake performance

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TIP Roadside 75.000 cases/year

Fault Code 1	%	34%
Puncture (M535)	8.3%	FleetRemote
Air Leak (A010)	5.9%	FleetRemote
Marker Lights inop (H335)	5.5%	
Blow out (M540)	4.7%	FleetRemote
Brakes locked on (C145)	4.1%	FleetRemote
Tyre (other damage) (M555)	3.7%	FleetRemote
Torn curtain / tilt cover (B085)	3.5%	
Other (F320)	3.4%	
Non start (F265)	3.3%	
Air bag burst (K425)	3.2%	
Mudwing broken off (D215)	2.9%	
ABS Fault (C165)	2.9%	FleetRemote

Top 12 roadside events

TIP Roadside Hasselt Belgium

34% Detection possibility

1. Tyres (TPMS)
2. Brakes
3. ABS fault
4. Air leaks
5. Others

34% of all roadside events can be detected by FleetRemote

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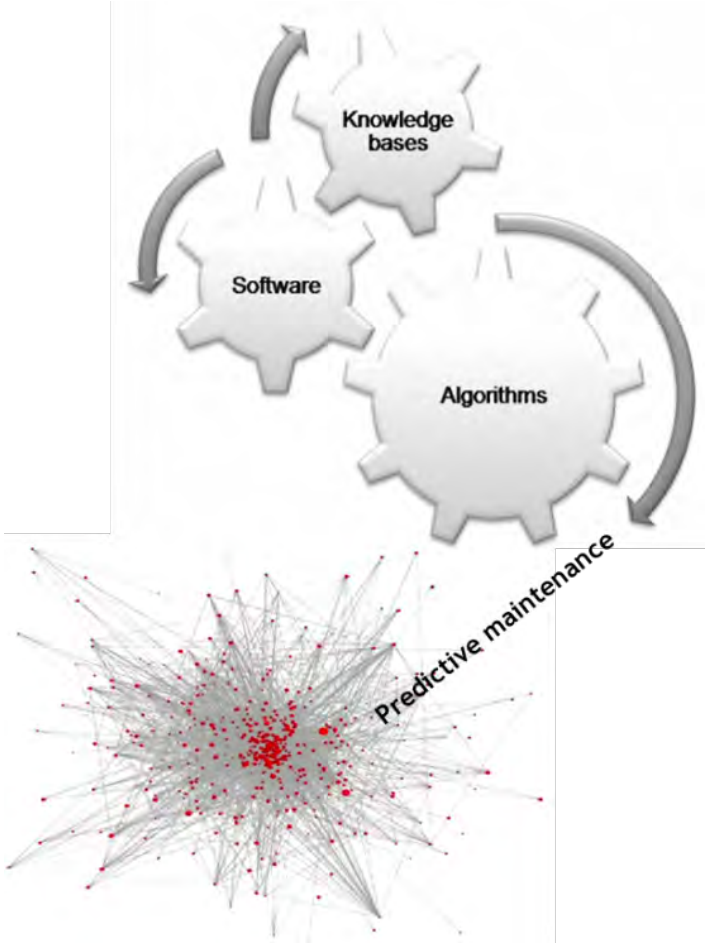
Maintenance Planning Today

Distance

Time

The traditionally maintenance planning is done on distance and time

Big data for maitenance



- ✓ Km reading
- ✓ Date / Time

- Number of brake application
- Average brake application time
- Maximum brake application time
- Brake pressures
- Vertical acceleration
- Longitudinal acceleration
- Speed & load
- Truck
- Driver
- Weather
- Traffic
- Roundabouts
- And more

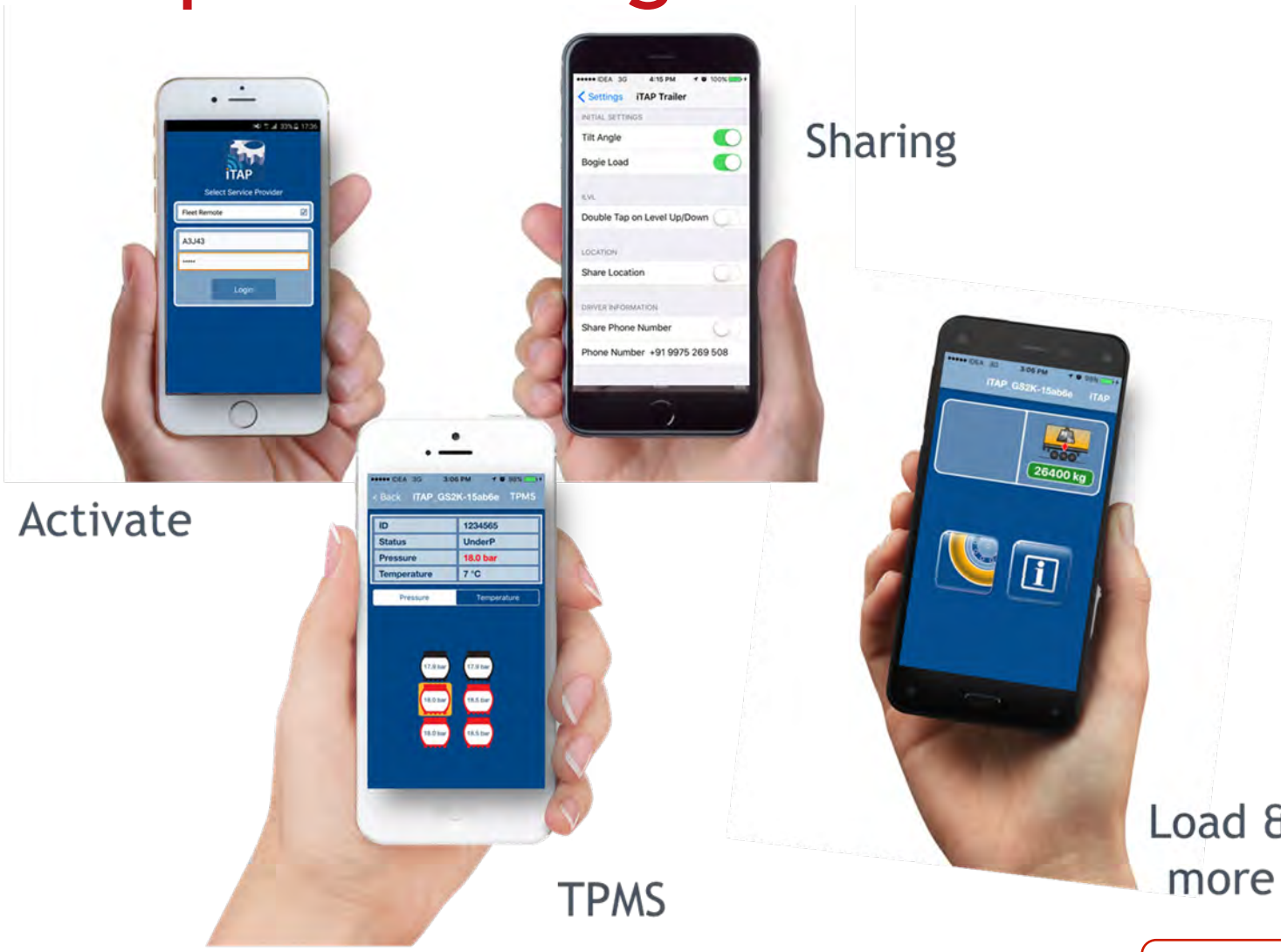
Adding big date is making predictive maintenance possible

The component combination

Brakes and tyres is a combination

- High brake wear = High tyre wear
- High brake frequency = High tyre wear
- High G-forces, low km = High tyre wear
- Low brake frequency, high speed = Low tyre wear

Smart phone integration



Wifi connection to read information and activate FleetRemote service

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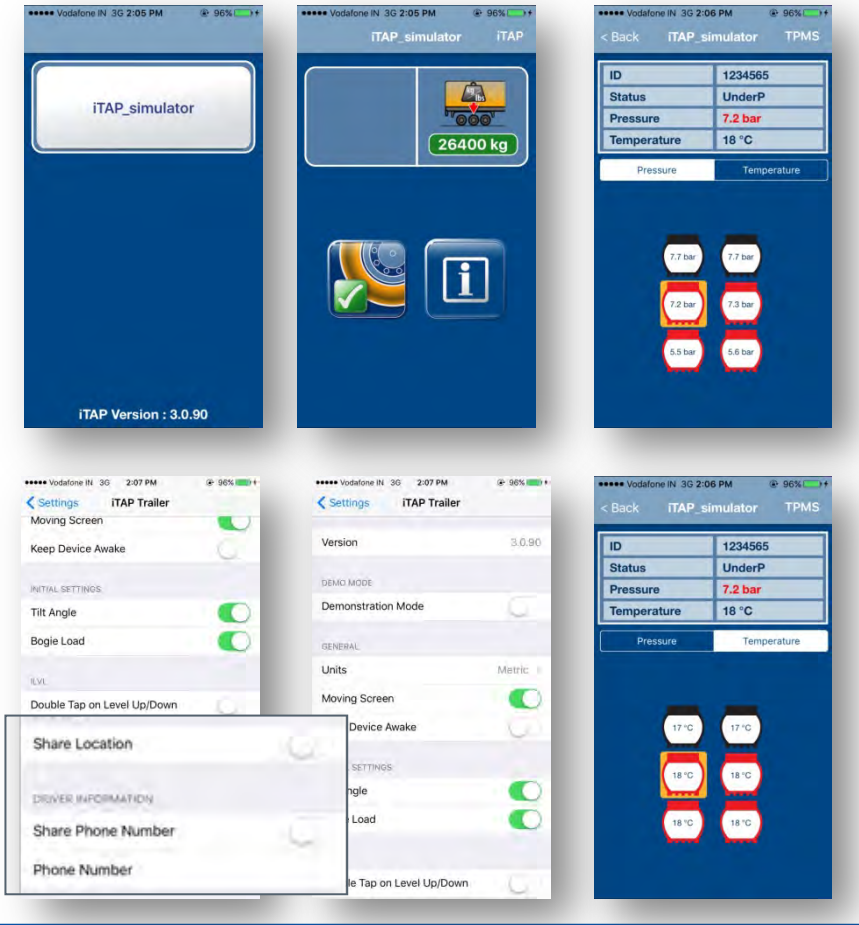
Smart phone integration

All EBS



Knorr Bremse only

Direct WiFi connection with the iTAP by using the FleetRemote App

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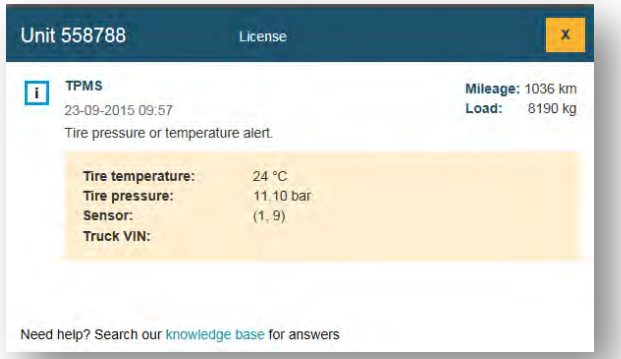
TPMS that is easy to manage

- Valve mounted
- Quick & Easy fitting
- Anti-theft protected
- No position programming
- Smart phone integrated

- Affordable



Field tested now

The management of a TPMS could supersede the savings

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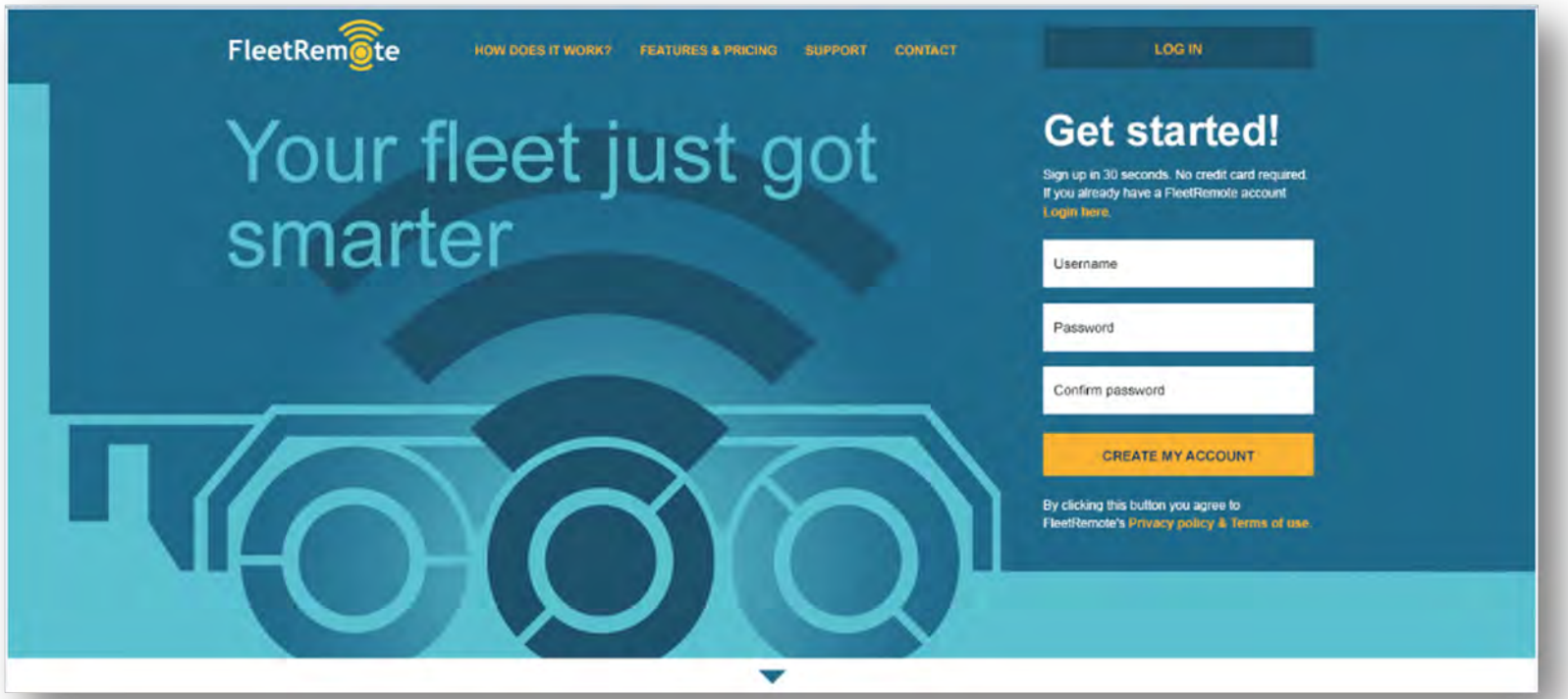
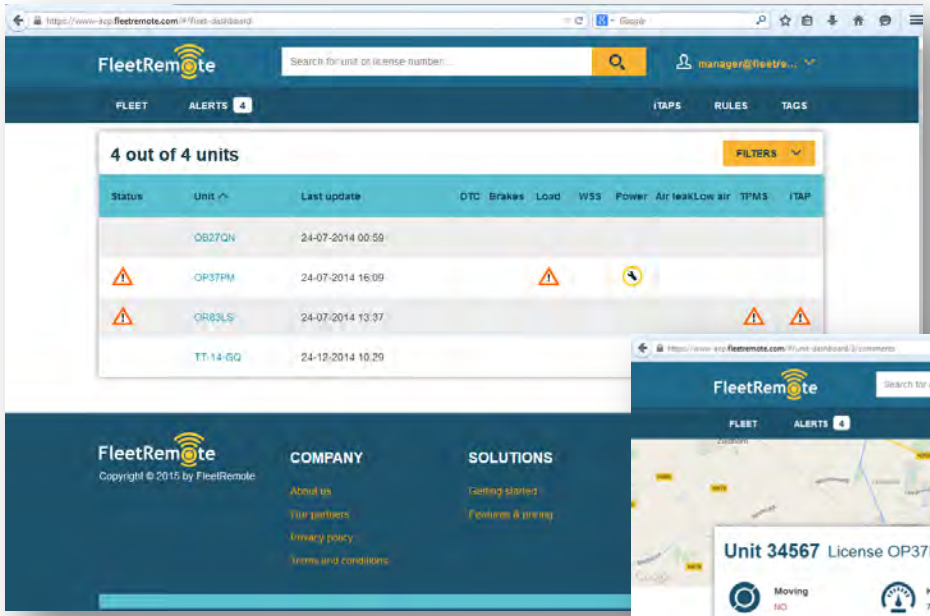
The website www.fleetremote.com



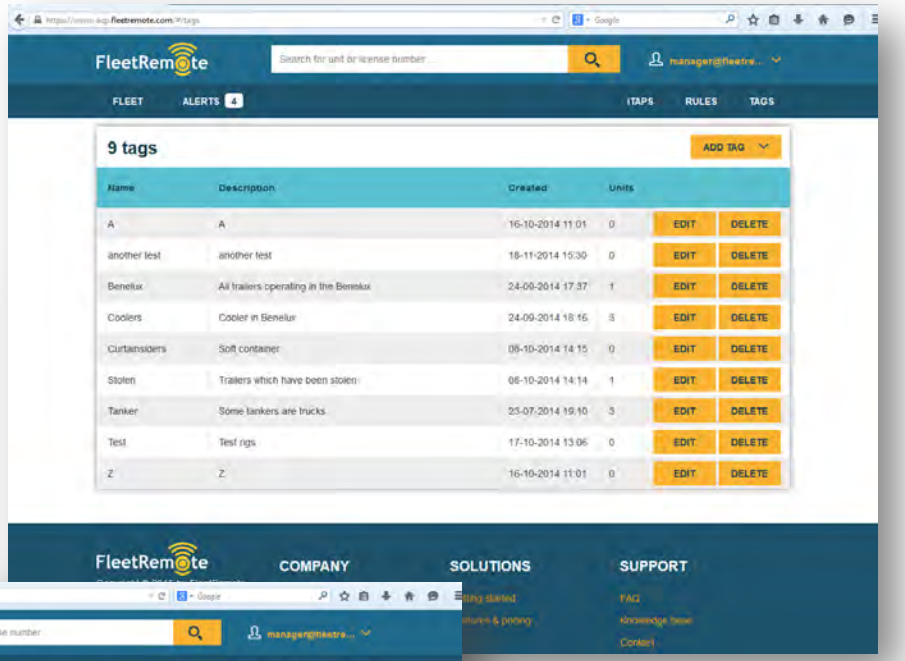
Simple, fast and Self-service Sign-on

Webshop approach of the

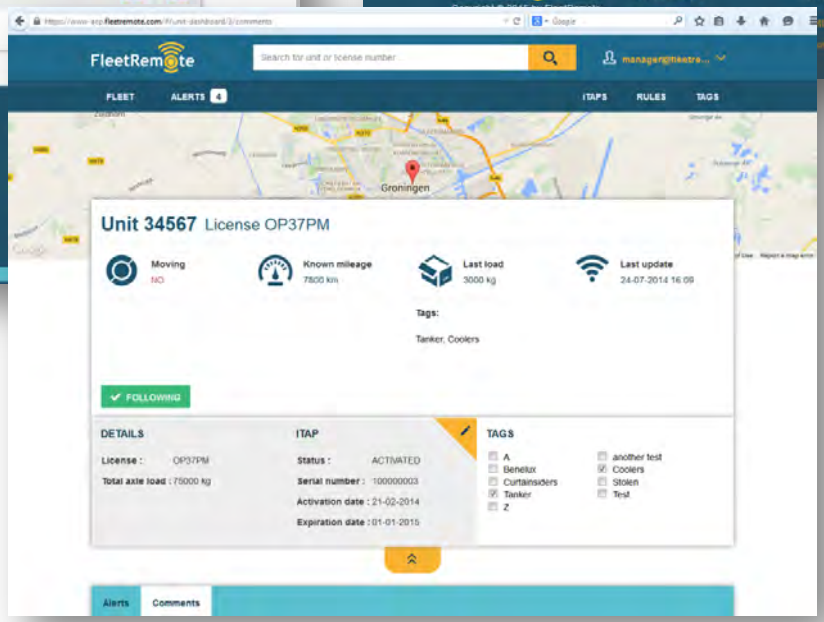
Some screens



Fleet dashboard



Unit tagging



Unit dashboard

Simple clear screens

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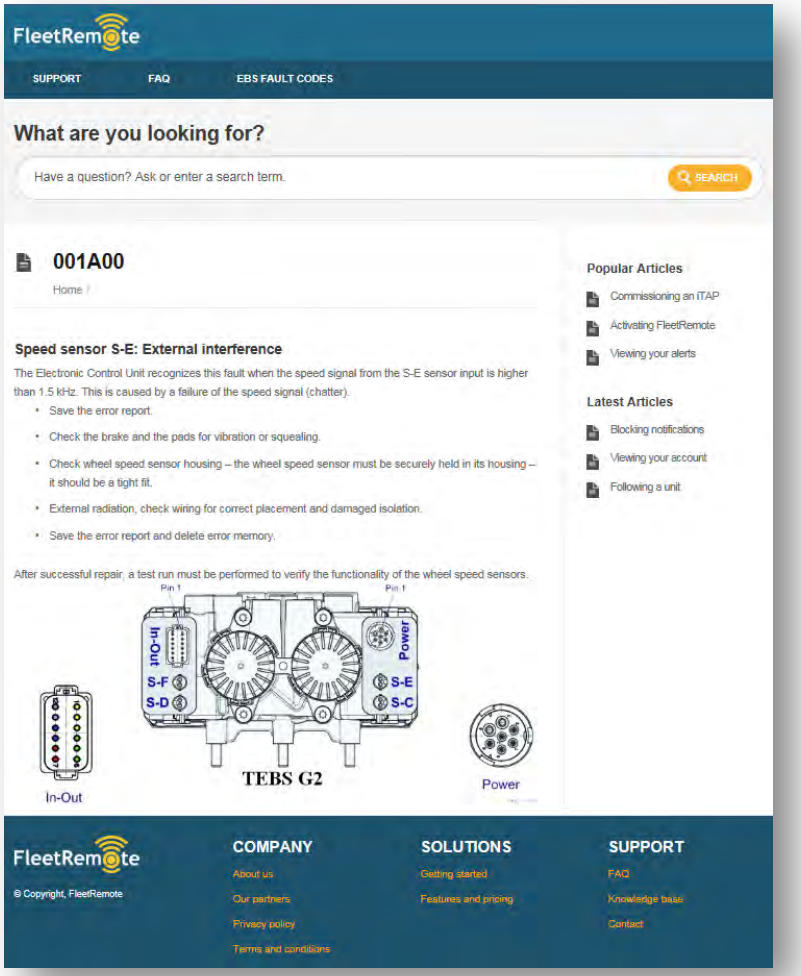
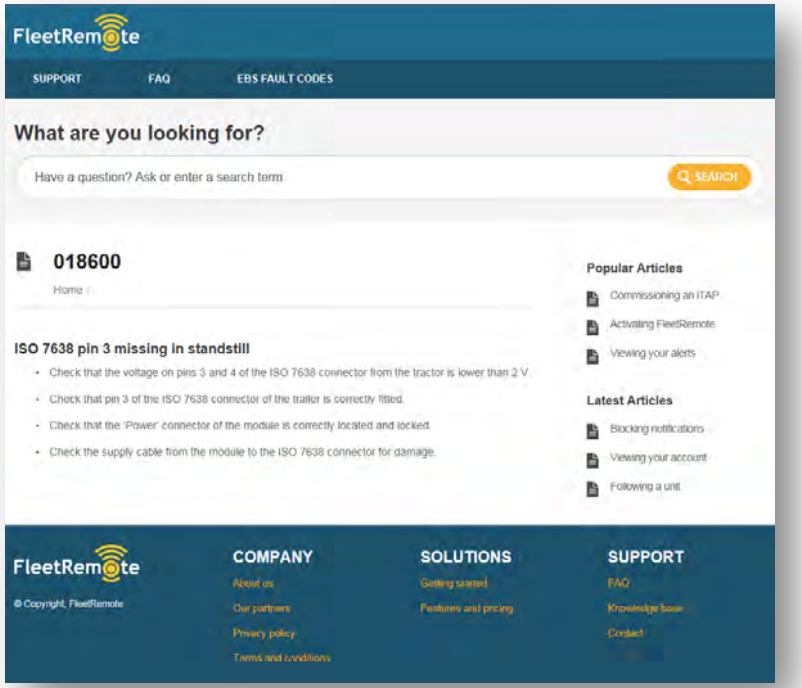
FleetRemote Knowledgebase





Unique feature showing repair instruction for EBS errors

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www.trailercan.org

Suppliers agree EBS standard

16 September 2014

The major trailer electronic braking systems (EBS) suppliers are to adopt a common language so that their EBS data can be collected and interpreted by each other's telematics systems.

This is a voluntary agreement between three trailer EBS suppliers: Knorr-Bremse, Wabco and Haldex. Pressure to standardise trailer EBS data came from European logistics operators belonging to the self-styled European Transport Board, a customer focus group set up by trailer rental company TIP Trailer Services.

TCAN a protocol for the data exchange between braking and data collection systems, e.g. telematics, on towed vehicles with a mass greater than 3500 kg

What's inside?

1. Scope
2. Normative reference
3. Terms and definitions
4. Abbreviations
5. General specifications
6. Application layer
7.
   - Message frame format
   - Parameter specification
   - Diagnostic specification

Summary

This protocol outlines the interface between braking and data collection systems on towed vehicles. It aims to increase the amount of data from and interoperability between electronic braking systems.

Keywords CAN bus, trailer, telematics, EBS, electronic braking system, ISO 11898 and 11992, SAE J1939 and 15765

Download publication

Please provide your name and email address for your free download.

Your Name *

Your Email *

Personal data will be used only to inform you about future changes to the protocol.

DOWNLOAD

The development of the TCAN is an initiative of the European Transport Board and supported by Haldex Brake Products, Knorr Bremse and Wabco Vehicle Control Systems. This protocol was officially released in 2014 and will be implemented during the next release of the applicable hardware and/or software.

KNORR-BREMSE

Knorr-Bremse are pleased to have played a leading role in developing the TCAN specification. We firmly believe that its introduction will improve the data collection and analysis capability on trailers, leading to greater efficiency and safety for both fleets and operators.

WABCO

WABCO recognizes the need of fleets to effectively manage their vehicle data. We appreciate this initiative as the next step towards increased operational vehicle safety and efficiency.

Haldex

Haldex is pleased to be involved with this initiative, which will reduce complexity and improve clarity for both fleets and their telematics providers.

TIP Trailer Services

It's great to see the 3 major EBS manufacturers agree on an industry standard. With this in place we can read and analyze data independently of the ECU. This makes it possible to compare perfor-

Standard protocol for EBS data

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What's more to come

10 LoRaWan Beacons cover Amsterdam

Location Tracking will move to the truck

- Protocols are implemented
- Trailer VIN and 80+ data points are available

The Internet of Things

- LoRaWAN (*) battery powered Things 10 km range

Legislation

- Mandatory TPMS but what about the display
- ?

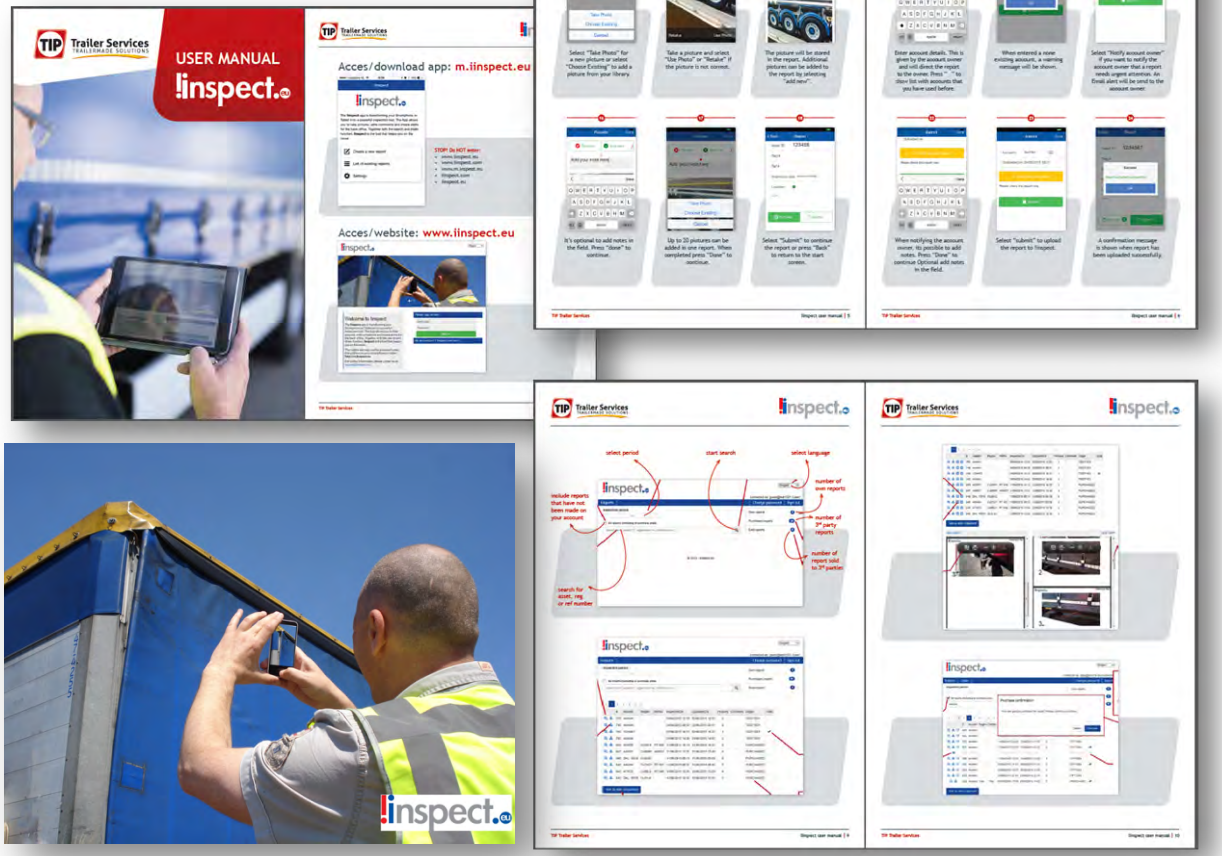
(*) Long Range Wide Area Network

The Internet of Things will impact the transport industry

Inspection App www.iinspect.eu

9.000 Reports made in 2015

In 3 month only



Inspection App and back office website with compare & share

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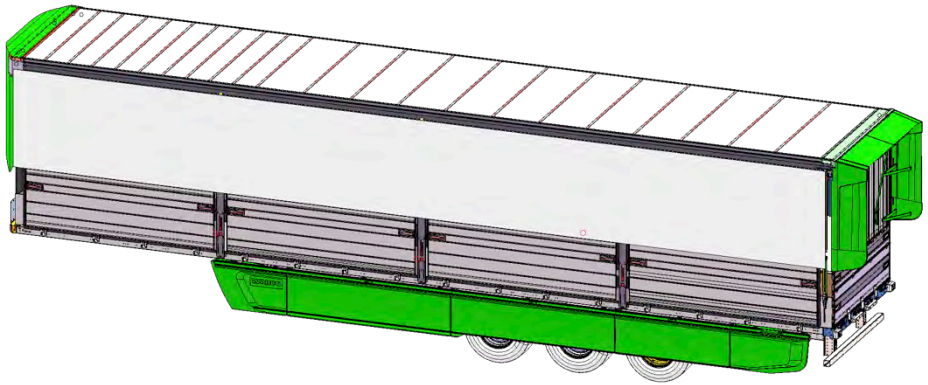
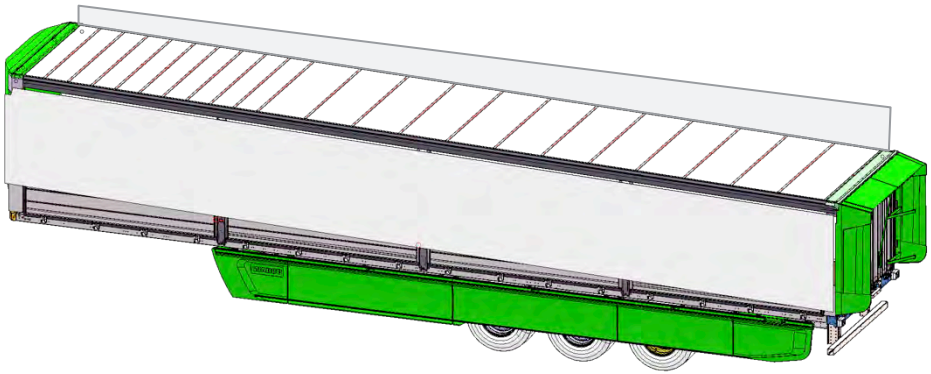
TRANSFORMERS

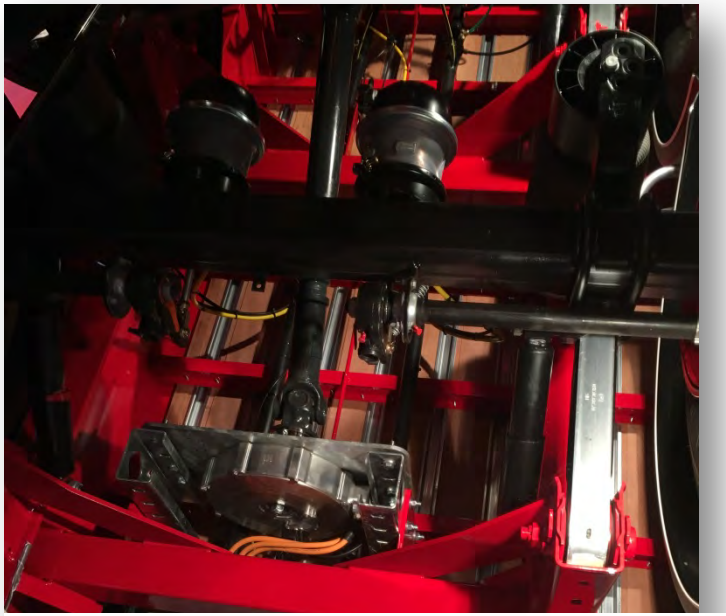
Considered Solutions

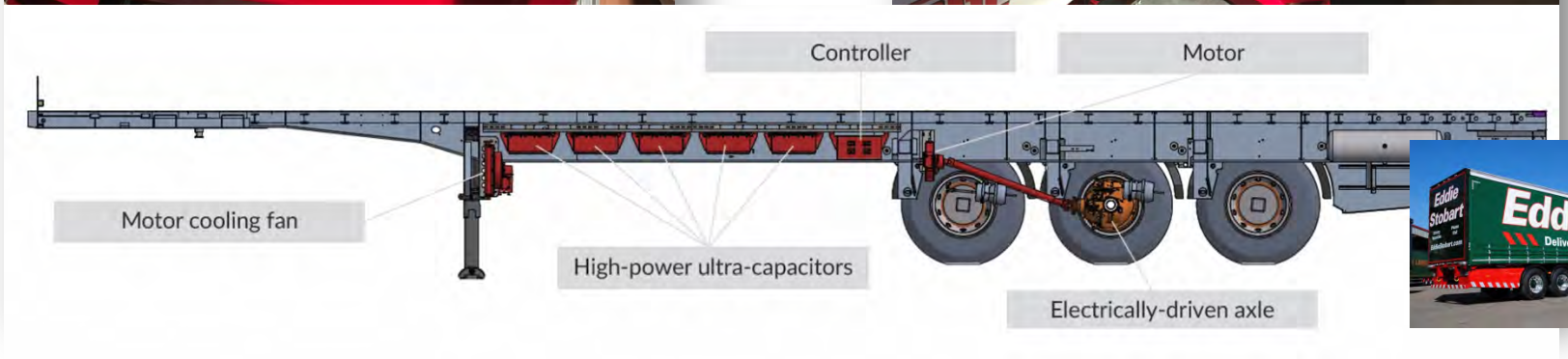
- Optimized trailer aerodynamic
- Adoptable trailer shape
- Hybrid-on-demand driveline





KERS for trailers





268 horsepower for 30 seconds from recovered brake energy. Fuel saving 25%

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Take away

- Aerodynamic is **Good** but look for the **Good** products
- TPMS doesn't use fuel so how can it save fuel
- Tablets and Smart Phone are changing the transport industry
- Internet of Things will come, also for trailers
- Reporting cost is easy……. Predicting cost is the challenge

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