



**WABCO**

# Maximize Returns on Trailer Fleets



# 01

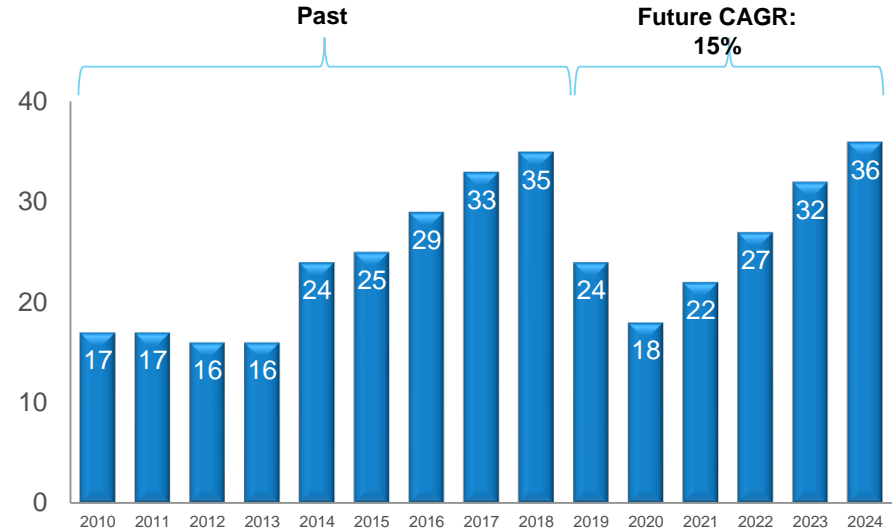
## Introduction



# Good Growth Potential for Trailer Market in India

- Trailer industry in India is still evolving and not matured in comparison to Europe, China and US
- Current challenges include infrastructure, lower leverage of the flexibility offered by tractor-trailer model by fleets and availability of skilled drivers
- Strong fundamentals and legislation, favourable for CV industry in the long run
- Improvement of roads and infrastructure to stimulate the trailer market
- Recent mandate allows tractors and trailers to be registered separately
- Evolving hub and spoke model favourable to trailer industry
- Fuel efficiency, driver productivity and TCO key consideration factors

Trailer production evolution – India (in '000s)



Source : Internal Market Intelligence

Trailer industry projected to grow at 15% CAGR over the next 5 years

# Indian Trailer Industry - Challenges Today

## SAFETY

- **Only 20 % of trailers compliant** with Trailer standards - CMVR 125D ( implemented wef from April 2017)
- **Front end collision** - a primary cause of accidents ; driver fatigue and loss of control main factors
- **2% of accidents** occur while reversing

## EFFICIENCY

- Inefficient utilization of trailers ; **33% utilization as compared to global standards**
- **Govt rules now allow single tractor to tow multiple trailers** ; not leveraged by fleets
- **Low focus on trailer performance** ; prime mover given importance

## CONNECTIVITY

- Majority of trailer fleets **do not monitor key parameters** including trailer optimization, driver efficiency, load and fuel efficiency / fuel usage
- **Reactive maintenance model** over predictive maintenance

Strengthen focus on safety compliance (CMVR 125D)

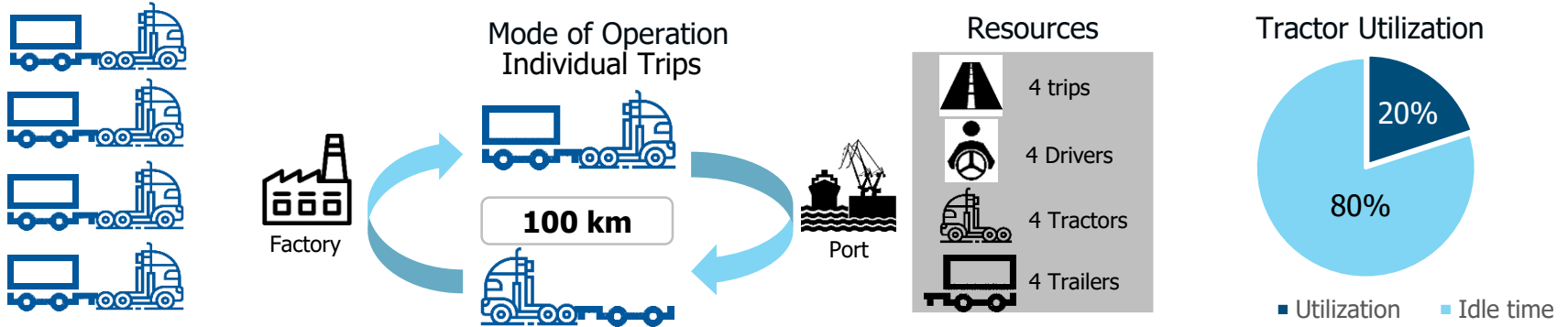
Leverage single tractor with multiple trailers rule to bring in greater efficiencies

Focus on advanced technology to improve TCO and trailer efficiency

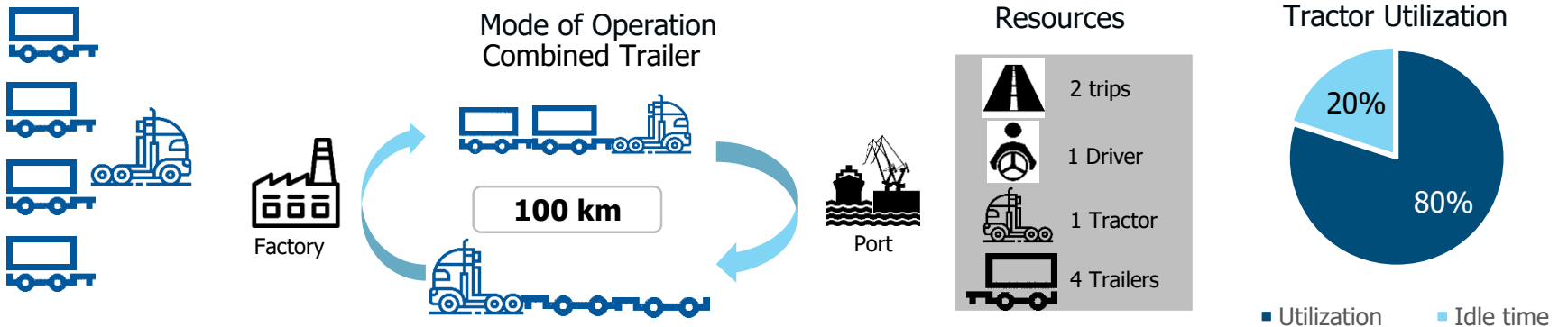
Upskilling drivers and mechanics on road safety, technology etc

# Improving Trailer Fleet Efficiency

## Current Scenario – Single Tractor with Single Trailer

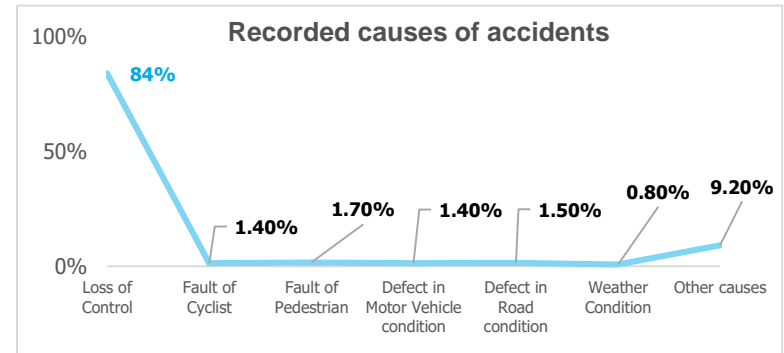
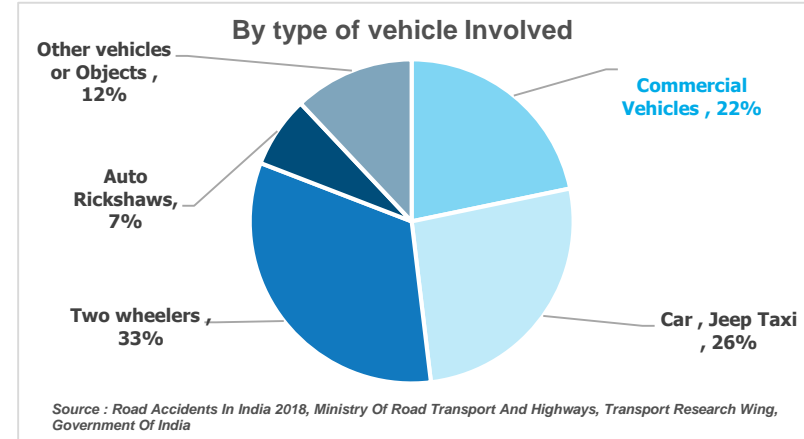


## Improved Scenario – Single Tractor with Multiple Trailers



# Importance of Road Safety in India

- India has 3% of world's vehicles but **11% of global road deaths**
- In 2018 , ~ **4.7 lakh accidents** occurred on India's roads ; **1.4 lakh accidents** were fatal
- BRICS nations contribute to **20% of the world's road accident** deaths & India is among the top
- Trucks, buses & trailers account for **22% of road accidents**
- Loss of vehicle control accounts for **84% of the accidents**



# India Legislation – Status and Forecast (June 2020)

Legislation requires installation of products enhancing Efficiency, Safety and Connectivity

Red = in discussion

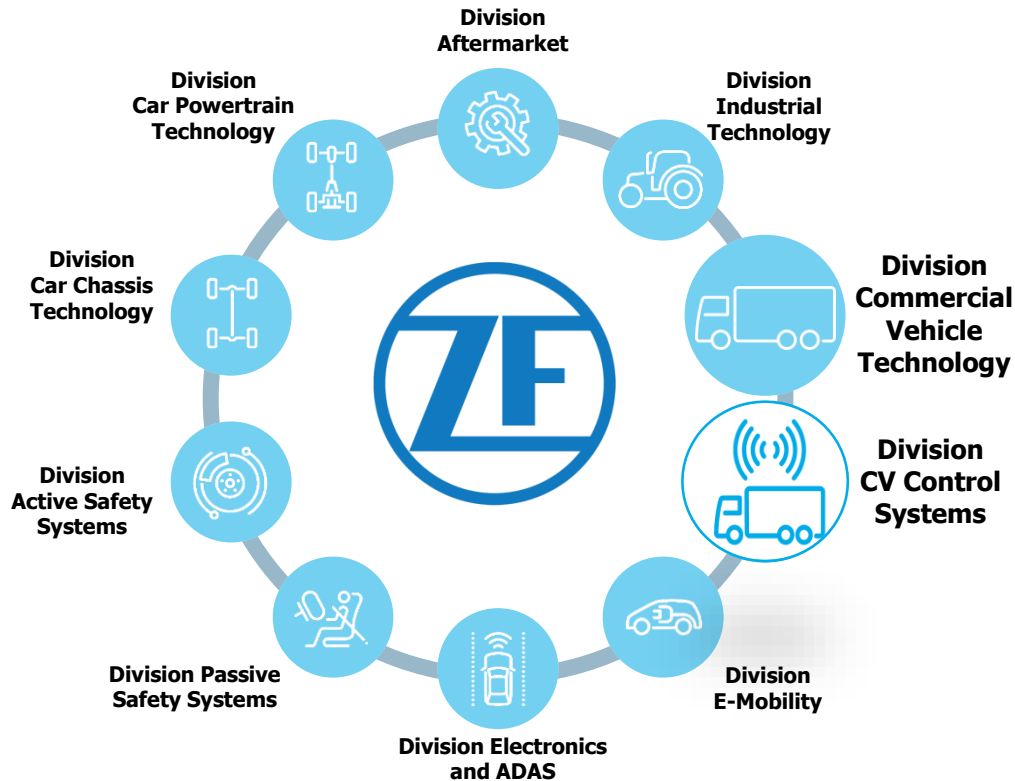
Type	Status (June 2020)	2016	2017	2018	2019	2020	2021	2022	2023		
Emission / Efficiency	BS IV BS VI		BS IV (Nation wide)	Axle load increase		BS VI (Nation wide)					
					Fuel Efficiency targets for M3 & N3 BS IV vehicles			CAFE			
Safety	100% ABS for TB&C, Trailer & 2 Wheeler	ABS for M3 /	Trailer ABS	ABS for M1 / M2 & 2 Wheeler ABS (New model 04/2018, existing models 04/19)							
			Speed Governor							ESC M3	
			Trailer Code							ESC / AEBS for M & N	
					Truck Code (Phase 1 – 10/2018, Phase 2 – 10 / 2019)						
			Bus Body Code	Bus Body Code – Phase 2							
			Agricultural Trailer Brakes – On hold till further notice								
							Additional safety requirements / RPAS for M1 (07/19), all other (04/20)				
								Endurance braking IS 11852			
Connectivity	ITS VTS Multiplexing RPAS						Intelligent Transport System				
					Multiplexing/ electronic architecture – AIS 153						
				VTS and emergency button – AIS 140 (11/18 – NP Trucks)							
					Reverse Parking Assist System for all vehicles (AIS – 145)						
Electrification & Others	E Vehicles End of Life Scrapping Policy	FAME – Phase 1			FAME – Phase 2						
								Electric two and three wheelers			
								End of Life Scrapping Policy			

# The Perfect Match: WABCO & ZF Mobilizing Commercial Vehicle Intelligence





# Establishing the New Division: CV Control Systems



## WABCO

- Vehicle Dynamics & Control, Automated Driving
- Suspension, Powertrain & Axle Solutions
- Vehicle Energy Management Systems
- Fleet Solutions
- Trailer Systems
- Off-Highway Solutions
- CAR Systems

# Commercial Vehicle Technology Expertise Domains

TRUCK/COACH/BUS

TRAILER

Transmission Automation

Truck Telematics

Vehicle Electronic Systems

Truck ADAS Systems

Braking, Steering & Stability Control

Air Compressors

Foundation Brakes/Braking Actuation

UNIQUE COMBINED TRACTOR / TRAILER EXPERTISE

Air Processing & Dryer Units

Aerodynamics Solutions

Trailer Telematics

Trailer ADAS Systems

Trailer Air Suspension Control

Trailer Braking & Stability Control Systems

Foundation Brakes & Braking Actuation

# ZF in India

## Overview (2019)

**3**  
ZF Subsidiaries<sup>1</sup>

**8**  
Engineering Center

**5**  
Joint Venture  
Partners

**37**  
Manufacturing Units

**20,742<sup>3</sup>**  
Employees  
(Incl.ZF Wabco)

### ZF Subsidiaries –

**WOS** ( ZF India Pune & ZF Wind Power Coimbatore),

**Subsidiary** (Wabco India 75%)



# ZF Commercial Vehicle Control Systems – WABCO India

A leading supplier of technologies and services to the Indian Commercial Vehicle industry

  
**~4,700**  
Employees

  
**250+**  
Authorized sales  
& service partners

  
**5**  
Lean manufacturing  
units +1 Test track

  
**50+ years**  
as market leader

  
**>500**  
engineers global  
hub for software  
development

## Journey of Excellence

- First company to win Deming Prize and Japan Quality Medal in India
- Leading innovator in India for improving safety, efficiency and connectivity of commercial vehicles



**2002**

**Japan Quality Medal**  
*(First company in India to win the award)*

**TATA Motors**  
"Enduring Relations Excelling Together"

**2008**

**Volvo Eicher**  
"Best Quality Supplier Award"

**2008**

**2011**

**TATA Motors**  
"Excellence in Quality, Innovation & Technology"

**2010**

**Ashok Leyland**  
"Gold Award for Quality"

**Ashok Leyland**  
"Co-location Award"

**2012**

**Volvo Eicher**  
"Outstanding contribution to new product development" award

**2013**

**2015**

**TATA Motors**  
"Supplier of the year"

**2014**

**Ashok Leyland**  
"Cost competitiveness Award"

**SML Isuzu**  
"Supplier of the year"

**2017**

**Volvo Eicher**  
"Excellence Award for Technology Innovations"

**2018**

# Our Continuous Commitment to Improve Trailer safety in India

Homologation support for 100+ trailer builders (200+ models)



**WABCO & BOSCH  
Safety Drive meet**



**ABS Homologation: 100 models at WABCO  
test track within a year**



**Received FICCI Road Safety Award  
for Improving  
Trailer Safety in India**



**Launch of Intelligent Trailer Program**

2012

2015

2017

2018

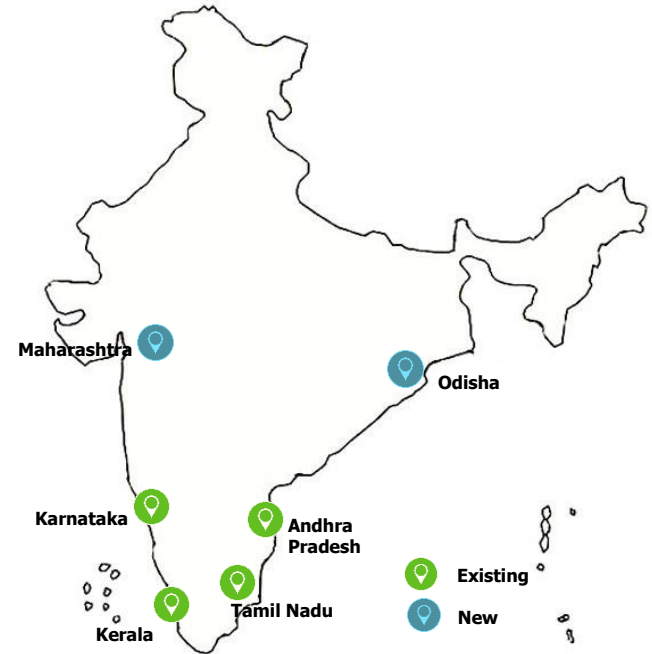
# Focusing on Road Safety through Safety Training and Awareness

**8000+** drivers upskilled since 2018

**PAN India training coverage** spanning six states and expanding

**Partnering with fleets, RTO's and STUs** to drive the initiatives

**Holistic curriculum** covering new technologies, regulations and guidelines



# Safe Driver Training in partnership with Praxair

## Specialized driving training for drivers of hazardous Cargo carriers

- Over 500 drivers trained and qualified through this program since inception
- All drivers have reported a **"Zero Accident"** rate



Benefitted  
500+  
Drivers

## Scaling up the Safety Chain – Upskilling Mechanics

- Established Centers of Excellence in partnership with leading Universities to offer training with specific focus on commercial vehicles
- Emphasis on hands-on practical training sessions
- Skill upgradation for existing mechanics
- Over **500 students trained / upskilled**



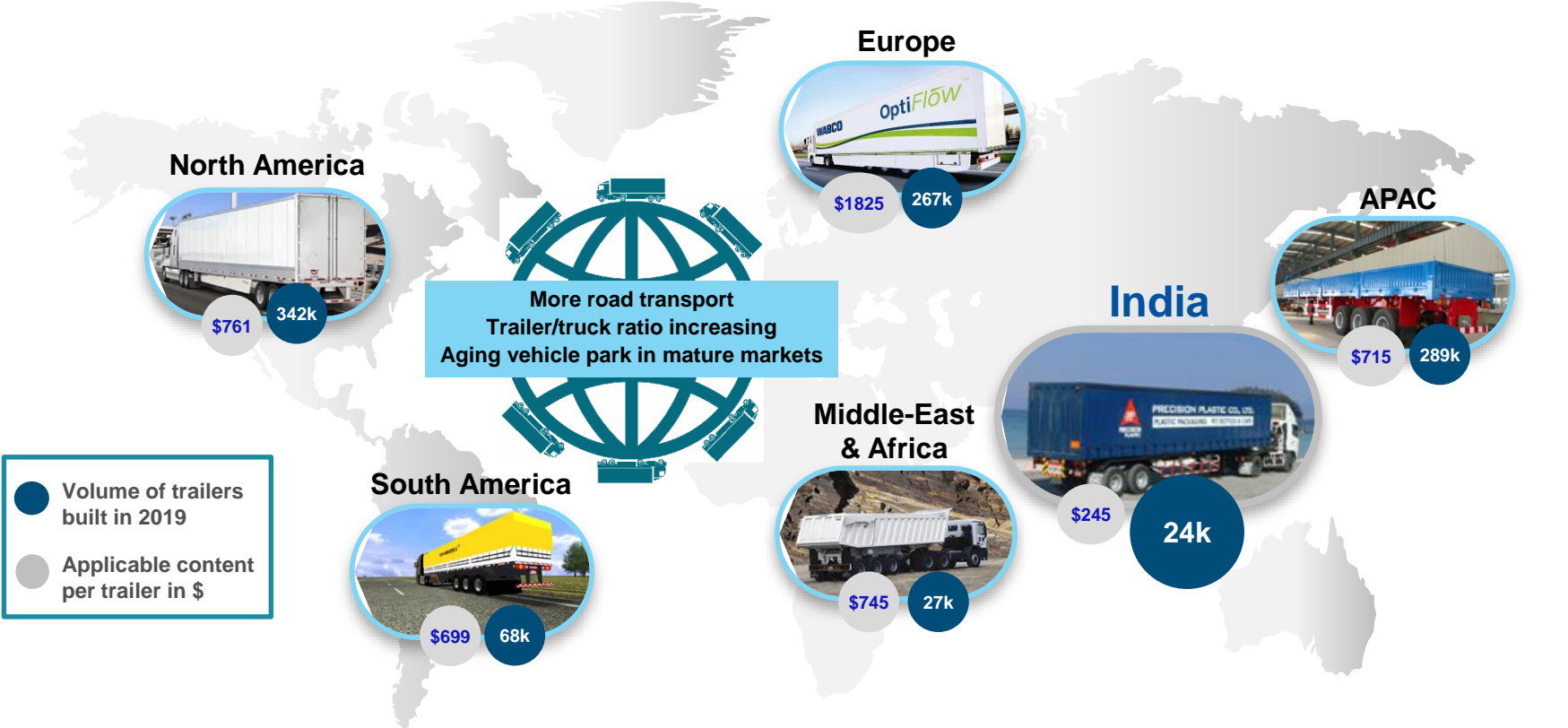
# 02

## Mobilizing Trailer Intelligence





# Trailer Markets Continue to Grow Globally



# All Markets are Adopting More Trailer technology



# Understanding Trailer Stakeholders and Their Needs



## FLEETS

- Reliability
- Operational efficiency
- **Adapted trailers**
- **Less dependence on drivers**



## TRAILER OEM

- Quality - Cost - Delivery
- Compliancy
- **Modular systems**
- **Smart trailers**

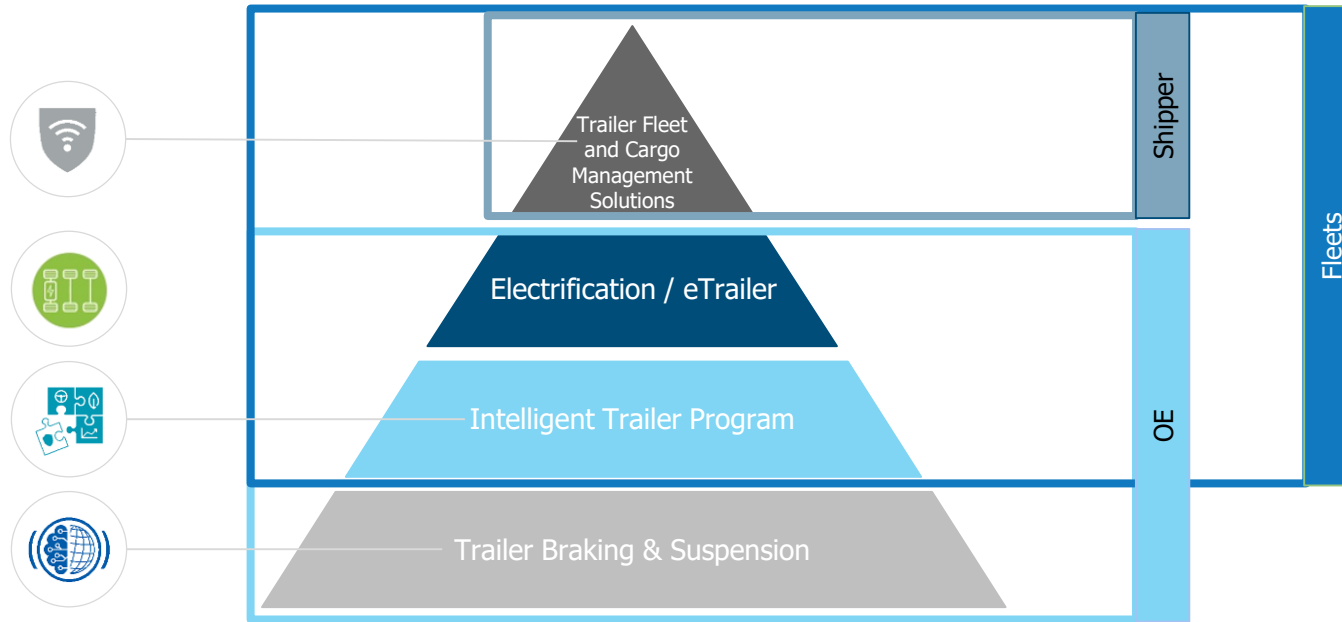


## SHIPPER

- Cost / ton-km
- Cargo Integrity
- **Tracking & monitoring**

# ... Answering with a Clear Technology Concept

## Mobilizing Vehicle Intelligence on the Trailer ; Delivering value to OET and Fleets



# Braking & Suspension – Foundation for Trailer Intelligence

## Mobilizing Vehicle Intelligence on the trailer, delivering value to OEs and fleets



Intelligent Trailer Program



Trailer Fleet & Cargo Management Solutions

iEBS



Intelligent Braking Platform

iABS



Trailer Electrification Concept



## Trailer ABS

### First step towards intelligent trailers ...

- Saving lives by optimizing control during emergency maneuvers
- Maximizes the effectiveness of the brakes independent of road and weather conditions
- Provides additional functionality



### ...supporting Automotive Indian Standard to make roads safer

- Wheel sensors automatically detect when the brakes lock
- Automatically releases locked brakes and keeps the trailer safe
- Assures compliance with legal braking regulations in India

**~10,000 systems fitted on trailers in India and growing ...**

## Trailer EBS

### Making your trailers even more intelligent...

- Electronic braking and the integration of suspension control allows for enhanced intelligence
- Enables more than 40 ITP functions
- Range of options can be fully customized to fleet needs



### ... adding value to the fleets

- Lowers operational costs
- Reduces common trailer accidents
- Increases driver comfort and operability
- Supports optimized fleet utilization

**1500 systems fitted on trailers in India and growing ...**



I am confident that WABCO Trailer-EBS will prevent roll-over accidents and enhance my tire life, lining life and under-chassis components.

I took a decision to retrofit E-EBS in all my vehicles and WABCO T-EBS is really beneficial for every rupee I spend.

**Bharat Varanasi**  
*Partner, VK Patel Translines*

## ANNAI BULK CARRIERS

The WABCO T-EBS is a trouble free product which brings a lot of benefits to us.

We are planning to install this product across all our fleets to enhance safety and protect our LPG trailers from the capsizing accidents.

**Managing Partner**  
*Annai Bulk Carriers*

# Intelligent Braking Platforms for Trailers

Global intelligent braking platform for trailers - one platform delivers new iABS and iEBS



- Single global platform for trailer ABS and EBS
- Simplified interchangeability of ABS and EBS in production lines
- Enhanced performance, more integrated, scalable and robust
- Extends access to Intelligent Trailer Program for ABS applications
- Available in Basic, Standard or Premium configuration
- Further integration of electronic units
- Delivers valuable data to FMS to further optimize fleet operations





# PAN™ – Air Disc Brakes for Trailer

## Product features

- Lightweight design for light, medium and heavy CVs
  - PAN™16/17 for light trucks, trailers and buses
  - PAN™22 for trailers as well as trucks and buses (with brake torques up to 23,000Nm / 17,000 ft lbs)
- Patented single-piston technology
- Available with end-of-life wear sensor
- Compact design based on finite element method (FEM) calculations
- Very robust brakes with strong quality performance in all kind of applications

## Key benefits

- Significant improvement on braking distance vs. drum brake application
- Compact design for easy axle adaptation
- Excellent braking performance even on poor road conditions
- Flexible service concept
- Robust and proven design ensures extraordinary product life



### WABCO Difference

- Best in class performance for over 20 years

# Intelligent Trailer Program (ITP)

## 40+ Intelligent Trailer Functions based on Trailer EBS Modulators



**Intelligent Trailer Program**

SafeStart

OptiLoad

SmartBoard



Trailer Fleet & Cargo Management Solutions



**Intelligent Braking Platform**



**Trailer Electrification Concept**

# Intelligent Trailer Platform

The trailer is more than the platform that carries the load!



















## Advanced Safety

 Anti-Lock Braking Function	 Rollover Stability Support	 Emergency Brake Alert
 Router & Repeater	 Bounce Control	 Electronic Park Brake
 TailGUARD™	 SafeStart	 TiltAlert














## Operational Efficiency

 OptiLevel™	 Return-to-Load Level	 Memory Level	 Brake Pad Wear Indicator	 TX-TRAILER GUARD™	 TX-TRAILER PULSE™
 Advanced MultiVoltage	 Operating Data Recorder	 Notebook Memory	 Extension Control	 Battery Control	
 Immobilizer	 OptiLock™	 OptiTurn™	 ServiceMind	 OptiLink™	

 Trailer Remote Control	 New SmartBoard	 Return-to-Ride Level
 Finisher Brake	 Traction Help	 Trailer Length
 Steering Axle Lock		

## Driver Comfort & Effectiveness

 Overload Indicator	 OptiLoad™	 Fuel-Saving Suspension	 Tire Pressure Monitoring	 Lift Axle Control
 OptiLevel™ 2-Point	 Air Bellow Protector	 Forklift Control	 OptiFlow™ SideWings	 OptiFlow™ Tail
			 OptiFlow™ AutoTail	

## Load Optimization

## Fuel & CO<sub>2</sub> Reduction

# Advanced Safety



**TiltAlert**



**Bounce Control**



**Anti-Lock Braking Function**



**Rollover Stability Support**



**TailGUARD™**



**Electronic Park Brake**



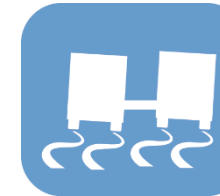
**SafeStart**



**OptiTurn™**



**Emergency Brake Alert**



**Router & Repeater**



### Product features

- Autonomously brakes the reversing trailer at a programmable distance from detected objects in the rear blind spot
- Programmable stopping distance between 20"-78" / 50-200cm
- Up to six ultrasonic sensors to measure distance to moving or stationary objects within 3,5m / 137" behind the trailer
- Forced slowdown by pulsing the brakes when reversing speed is higher than 6mph / 9km/h
- Optical and acoustical warning signals to alert driver and traffic participants

### Key benefits

- Helps the driver to safely reverse in limited visibility conditions
- Helps to avoid accidents while reversing
- Helps to avoid trailer damage, repair costs and trailer downtime
- Prevents damage on cargo, unloading facilities and infrastructure



### WABCO Difference

- Industry's first reversing collision avoidance system with autonomous active braking
- Detection performance customizable with up to six ultrasonic sensors

# Driver Comfort & Effectiveness



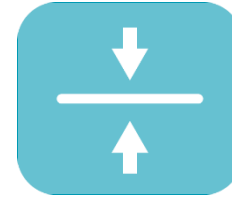
Trailer  
Remote  
Control



Trailer Length



Finisher Brake



Return-to-  
Ride  
Level



Steering  
Axle Lock



SmartBoard



Traction Help

# SmartBoard

## Access key trailer information and operate trailer suspension functions without the need for diagnostic tools



### Product features

- Monitoring and operation panel for trailer safety and suspension functions
- Mounted on the side of the trailer and linked directly to the Trailer EBS
- Simple control pad allows the driver to operate Trailer EBS and suspension functions

### Key benefits

- Driver can access key trailer information, e.g. axle load, mileage status, tire pressure and temperature, brake pad wear, Trailer EBS failure codes,...
- Activates Trailer EBS and suspension functions, such as WABCO's OptiLevel™, OptiTurn™ and Immobilizer
- Receives Trailer EBS-error codes when truck is not connected to the trailer, helping to optimize maintenance schedules
- Provides first insight on the trailer status even when uncoupled



### WABCO Difference

- User-friendly monitoring and control of the Intelligent Trailer Program functions
- More than 180,000 systems in operation
- 18 pre-programmed languages available

# Operational Efficiency



**OptiLevel™**



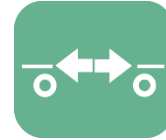
**Battery Control**



**Operating Data Recorder**



**Immobilizer**



**Trailer Extension Control**



**Trailer Telematics**



**OptiLink™**



**Memory Level**



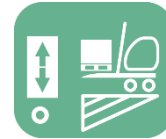
**Brake Pad Wear Indicator**



**Notebook Memory**



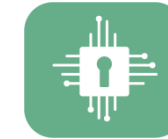
**Advanced MultiVoltage**



**Return-to-Load Level**



**ServiceMind**



**OptiLock™**



# OptiLevel™ - eTASC

## Advanced air suspension system for trailers



### Product features

- Integrates six suspension functions:
  - Fuel Saving Suspension
  - Memory Level
  - Return-to-Load Level
  - Return-to-Ride
  - Lift & Lower
  - 2-point ECAS

### Key benefits

- Automatically adjusts trailer height during loading and unloading, allowing the driver to stay in the cabin
- Reduces loading and unloading time by up to 1.5 minutes per turnaround
- Intelligent trailer height control lowers trailer drag, reducing fuel consumption by up to 100l and CO<sub>2</sub> emissions by around 275kg (per trailer per year) compared to conventional air suspension
- Allows lifting and lowering the trailer without power from truck when used in combination with eTASC



### WABCO Difference

- Pioneer in electronic air suspension for trailers
- Automatic and manual level control with single device
- More than 25 years experience

# OptiLevel™ - eTASC Functionality



OptiLevel FUNCTION		OptiLevel DEVICE	Rotary Slide Valve	TASC™	eTASC (Trailer EBS E Premium)	ECAS 1-Point (Trailer EBS E Premium)	ECAS 2-Point (Trailer EBS E Premium)
Manual Activation (via available control modes)	Lift and Lower without Power Supply from Truck						
	Lift and Lower with Power Supply from Truck						
	Memory Level (power required)						
	2-Point Control (power required)						
Automatic Activation (power required)	Return-to-Ride Level			✓	✓	✓	✓
	Return-to-Load Level				✓	✓	✓
	Fuel-Saving Suspension				✓	✓	✓

★ ECAS 2-point Control with eTASC works with EBS E version 4 onwards only.

Trailer EBS E: Trailer Electronic Braking System Generation E  
 ECAS: Electronically Controlled Air Suspension



Activation via handle



Activation via electronic control device



Automatic activation

# Load and Fuel Efficiency



**ECAS  
2-Point**



**Forklift  
Control**



**Air Bellow  
Protector**



**Tire Pressure  
Monitoring**



**OptiFlow™  
Tail**



**Overload  
Indicator**



**OptiLoad™**



**Load and  
Efficiency**



**Lift Axle  
Control**



**OptiFlow™  
SideWings**



**OptiFlow™  
AutoTail**

# OptiTire™: Next Gen TPMS

Next generation of tire pressure monitoring, including strap-mounted sensors covering all rim sizes and applications



## Product features

- Measures tire pressures and temperatures with up to 10 years of sensor life
- Warns in case values exceed defined levels
- Sensor options: internal valve mounted, internal strap-mounted and external wheel module
- Tire pressure & temperature information and alerts available for the driver  
(on the dashboard, via OptiLink app and SmartBoard)
- Monitors up to 20 rolling wheels plus two spare wheels with a central unit

## Key benefits

- Tire pressure monitoring and warning helps to increase vehicle safety
- Early leakage detection reduces downtime due to tire blowouts
- Helps to extended tire life by maintaining recommended tire pressure
- Helps to decrease fuel consumption by avoiding under-inflation
- Internal sensor measures air temperature, enabling a more precise pressure monitoring
- Internal strap-mounted sensors offer simple, universal installation
- Telematics connectivity enables real-time fleet notification



## WABCO Difference

- First system for commercial vehicles with either external or internal wheel sensors
- Sensor range covers all types of rims
- Applicable to the widest range of commercial vehicles

# Connecting the Global Trailer Market

Trailer Telematics - Connectivity and Health Data by Hardware and IoT Cloud Infrastructure: Trailer Data Analytics for OETs, fleets & shippers



Intelligent Trailer Program



Trailer Fleet & Cargo Management Solutions

TX-TrailerGuard

TX-TrailerPulse

OptiLock



Intelligent Braking Platform



Trailer Electrification Concept

# TX – Trailer Pulse

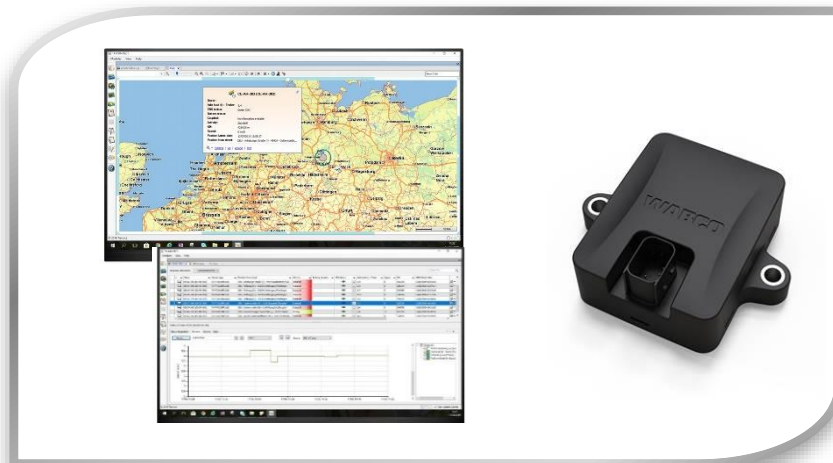
## EBS connected trailer telematics enabling over-the-air assessment of the technical health of the trailer

### Product features

- Mid-range telematic system to track & trace trailers and EBS information for technical trailer health status monitoring
- Advanced remote diagnostics capability via a dedicated web portal
- Extended WABCO trailer EBS data input including “fault code-to-plain language” translation, root cause indication and repair hints

### Key benefits

- Reliable economically-priced and easy-to-use solution to track & trace trailers and analyze Trailer-EBS-data
- Role-based web portal available for data sharing to fleets, leasing and rental companies, trailer builders, workshops,...
- Availability of real-time information on the technical health of the trailer designed to improve maintenance and reduce downtime



### WABCO Difference

- Telematics solution which offers 'track & trace' functions along with trailer health and diagnostic information
- Delivering value to multiple stakeholders, including trailer builders, rental companies and fleets at an economical price

# Partnering with Trailer OEMs and Fleets

Proven partner for the trailer industry in India

Support in application engineering, homologation, production process optimization

Globally proven program to make trailers more efficient and safe

Trained service and application engineers

Pan - India service and support network

Training on WABCO systems and solutions



[www.wabco-auto.com](http://www.wabco-auto.com)



# Thank You