



Innovation

Tyre Diagnostics is contributing to vehicle safety

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Tyre Diagnostics in PTI

The role of tyres in critical driving situations

- Share of tyre failures in accidents in Germany: ~36% (similar to brakes)

| Sources of and responsibilities for tyre failures reported in passenger car accident investigations | % |
|--|------|
| Insufficient/wrong maintenance (by owner / user, e.g. inflation pressure, tread wear, over-aged tyres) | 36.8 |
| Failures related to tyre mounting / repair | 6.9 |
| Production-related failure (e.g. retreaded tyres) | 14.6 |
| Damage during operation (e.g. puncture) | 14.6 |
| Not exactly identifiable | 27.1 |

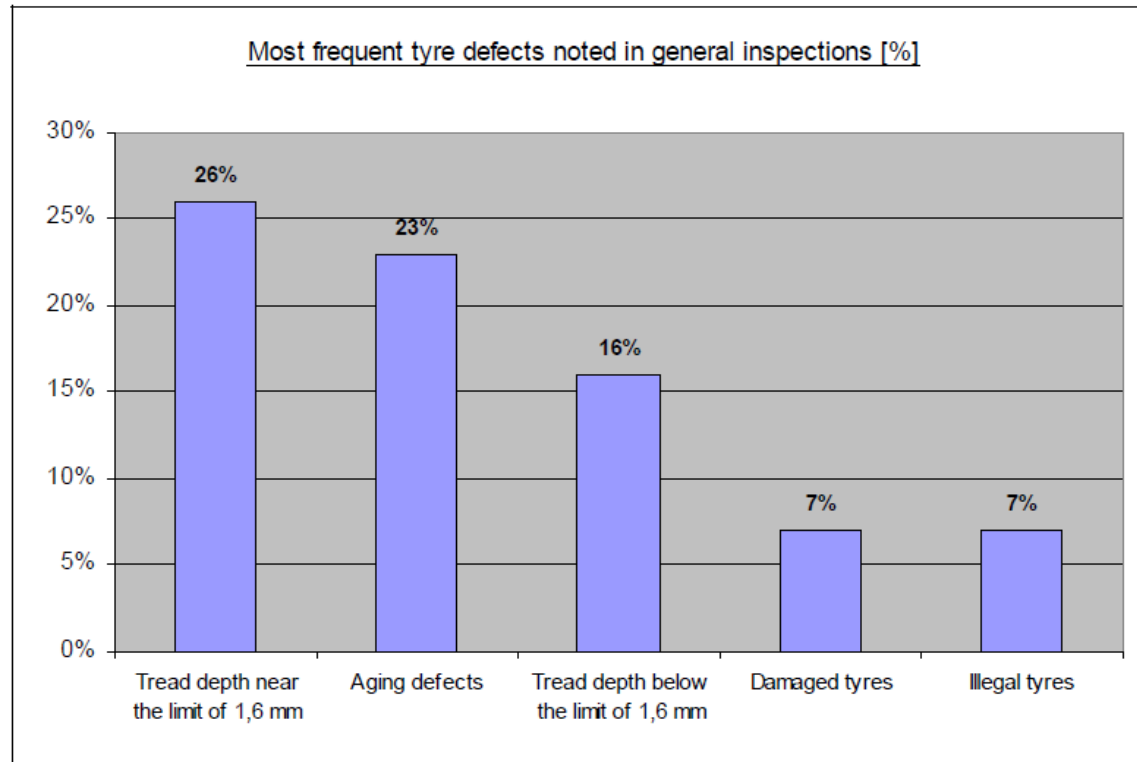
Source: TÜV Automotive, Germany

Probability of accidents caused by irregular tyre conditions is very high

Tyre Diagnostics in PTI

Propper inspections can prevent accidents

- Out of 2 Mio tyres inspected, about 11% were found defective



Source: TÜV Automotive, Germany

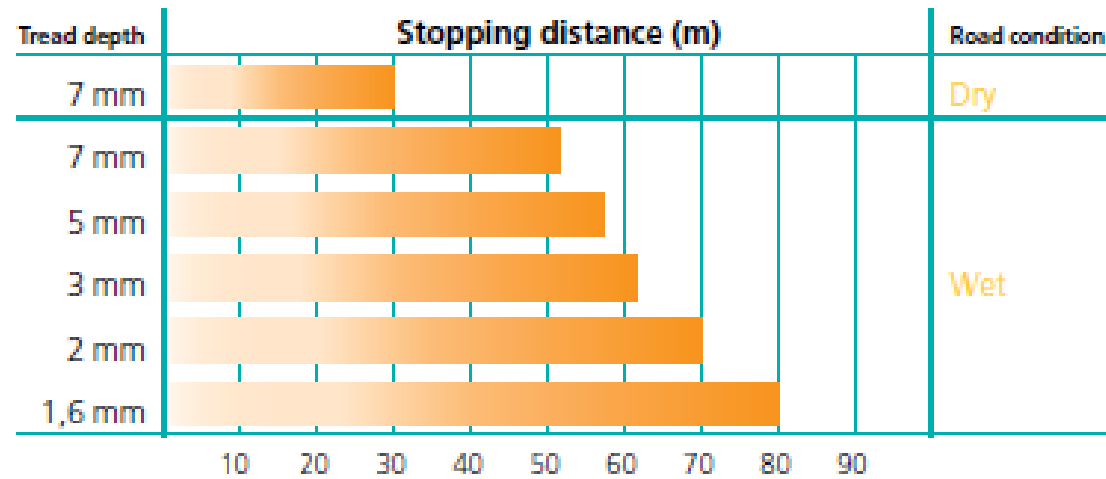
Tyre defects can be detected in workshops and inspection centers prior to an accident

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Stopping distance depends on tyre condition

Summer tyres

Braking from 100 km/h down to 60 km/h



Winter tyres

Braking from 40 km/h down to 0 km/h (Dimension: 205/55 R 16)



Source: Continental

Decreasing tyre tread depth, increases stopping distance drastically

Tyre Diagnostics in PTI

Tyre Wear Patterns






Various patterns possible – hard to detect with standard methods in PTI today

Tyre Diagnostics in PTI

Wheel Alignment is critical

- Car/Tyres, after 9,550 miles (15T km):
 - Tyre tread depth within the norm!
 - Tyre pressure loss!
 - Extream inside edge wear!

Actual Vehicle Spec measured:

- Tyre tread depht: 3 mm 
- Negative Camber: -3.4 degrees 
- Toed out by 0.46 degrees 



Tyre tread depth checks are not enough – Alignment must be checked as well

Tyre Diagnostics in PTI

Impressions from vehicle testing sites worldwide

*Driver & Vehicle
licensing
Authorities*



*PTI in
workshops*



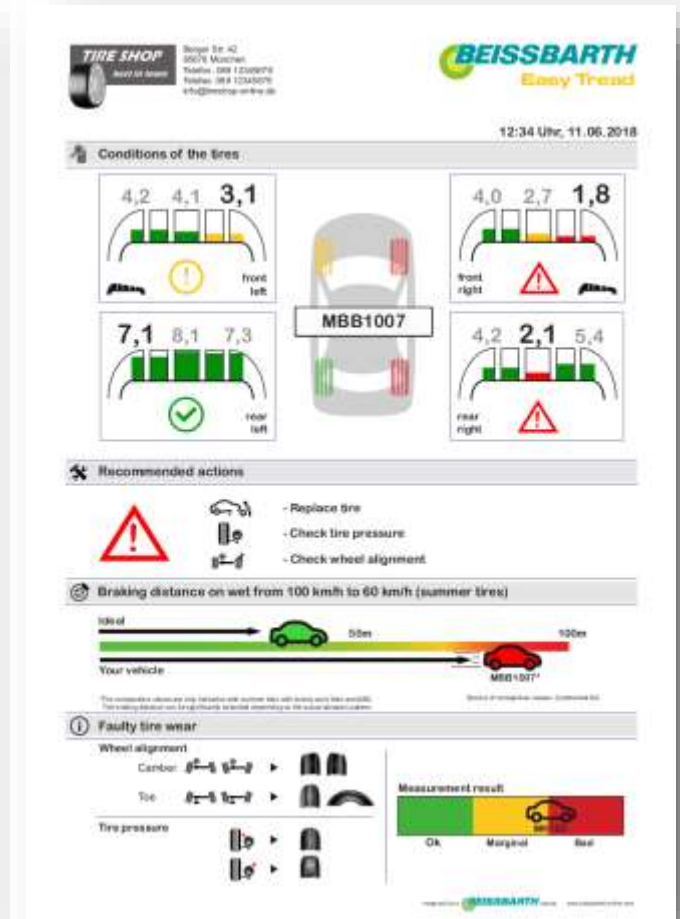
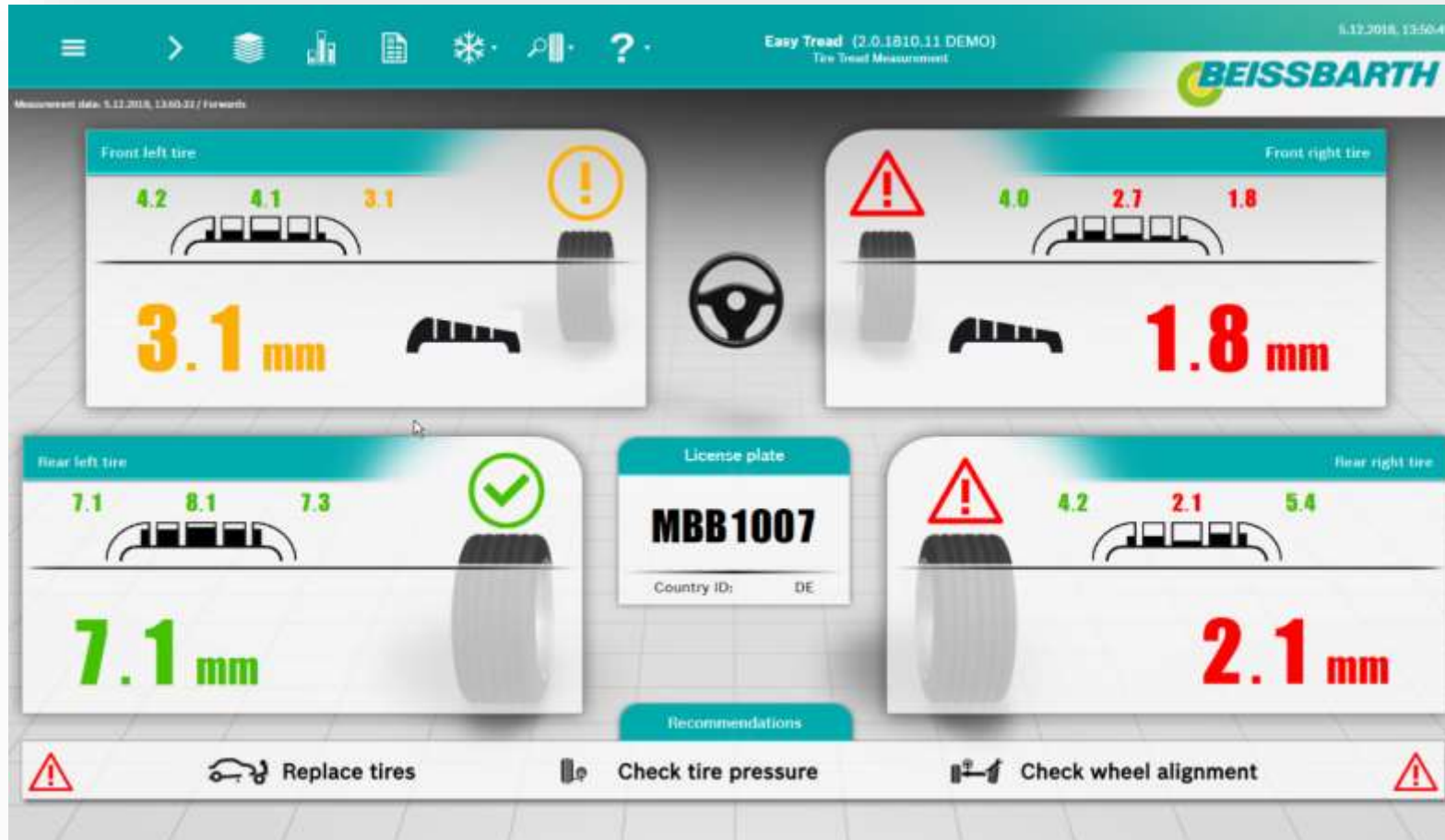
*Vehicle
inspection
centers*



Integrated with the standard inspection lane workflow – no additional time needed!

Tyre Diagnostics in PTI

All relevant data, available within seconds



Vehicle ident, tread depth & alignment indication in a single report

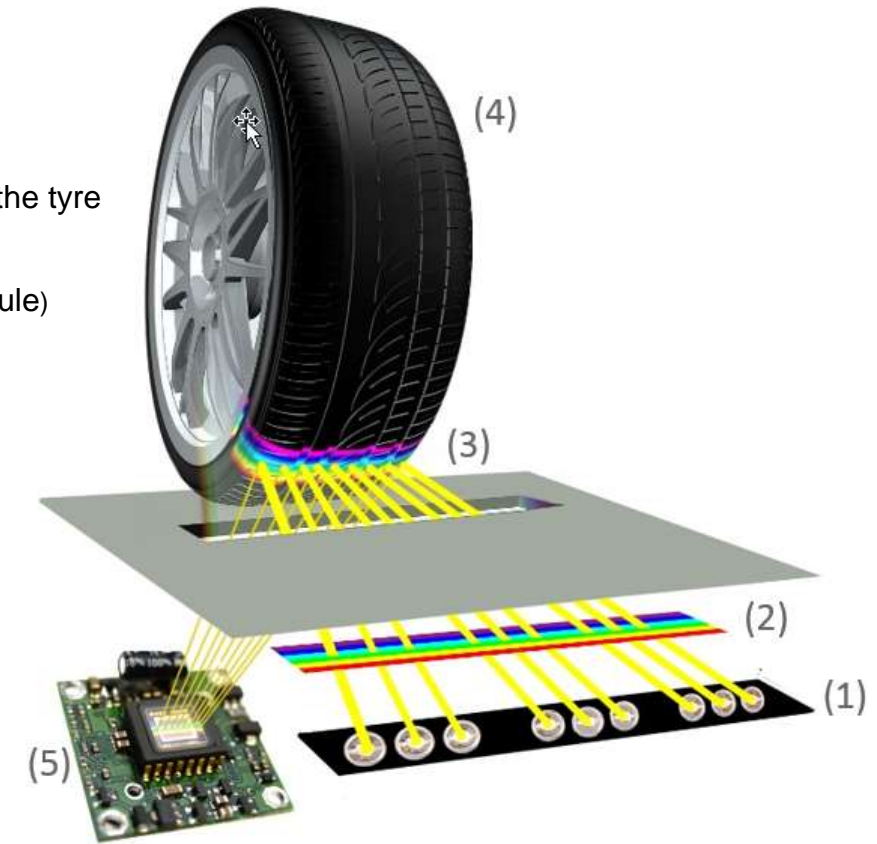
Tyre Diagnostics in PTI

How it works

- Color coded light projection
- Robust system
- Works in extrem conditions



- (1) LEDs lights
- (2) Color strip filter foil
- (3) Picture projection of the tyre
- (4) Tyre
- (5) Camera (2x per module)



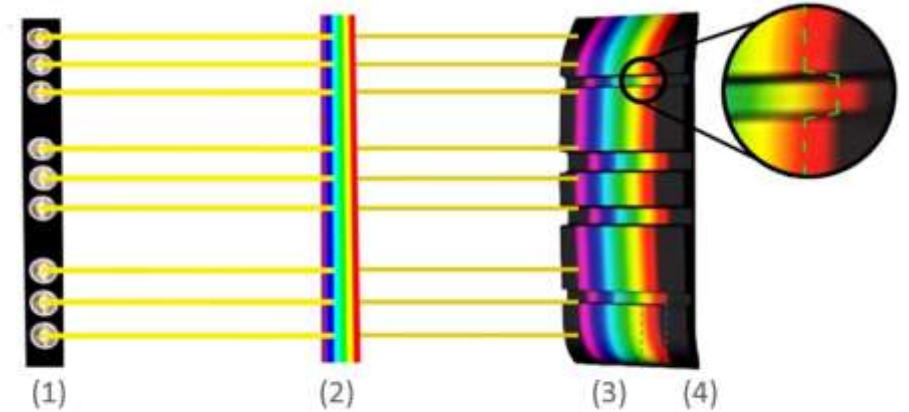
Light created by LEDs (1) will be projected (3) through a colored strip foil (2) on an object (Tyre) (4). The picture will be recorded by cameras (5), The resulted 2D pictures will be converted in a 3D points cloud. From this 3D point cloud, the tread depth calculation will be made.

Drive over speed 8 kmh

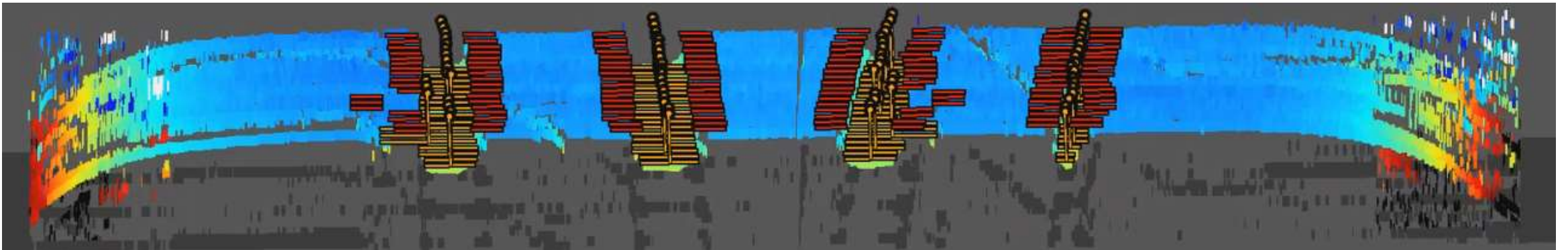
Tyre Diagnostics in PTI

Color coded light projection

- More than 500.000 measured points
- 18.000 qualified measuring points deliver the result



Displacement of the position of the color will allow to calculate the tyre tread depth



0.25 mm accuracy in dry conditions

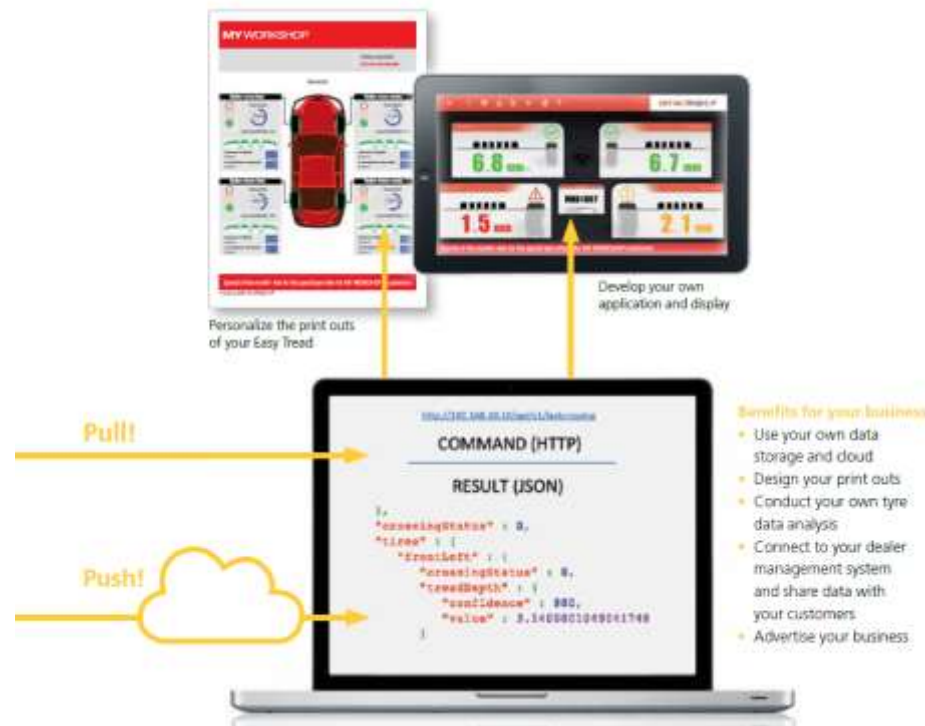
Tyre Diagnostics in PTI

Integration with any PTI software

- Automated license plate recognition
 - Licence plate is captured automatically
 - Robust against sunlight or reflections



- PUSH API
 - Recorded data gets pushed to PTI application



Simple integration in any existing PTI application/software

Tyre Diagnostics in PTI

References



Mercedes-Benz



Volkswagen



Different use cases worldwide

Thank you for your attention.

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