Slide 1

Slide 2

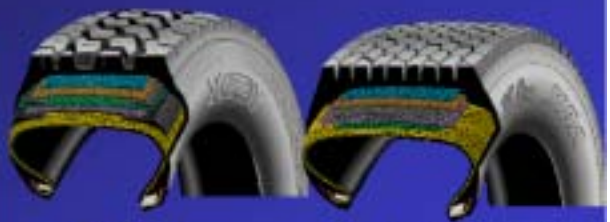
Slide 3

Introduction

Transportation
Responsibility
Five years
United with industry
Michelin, father, Canadian

Slide 4

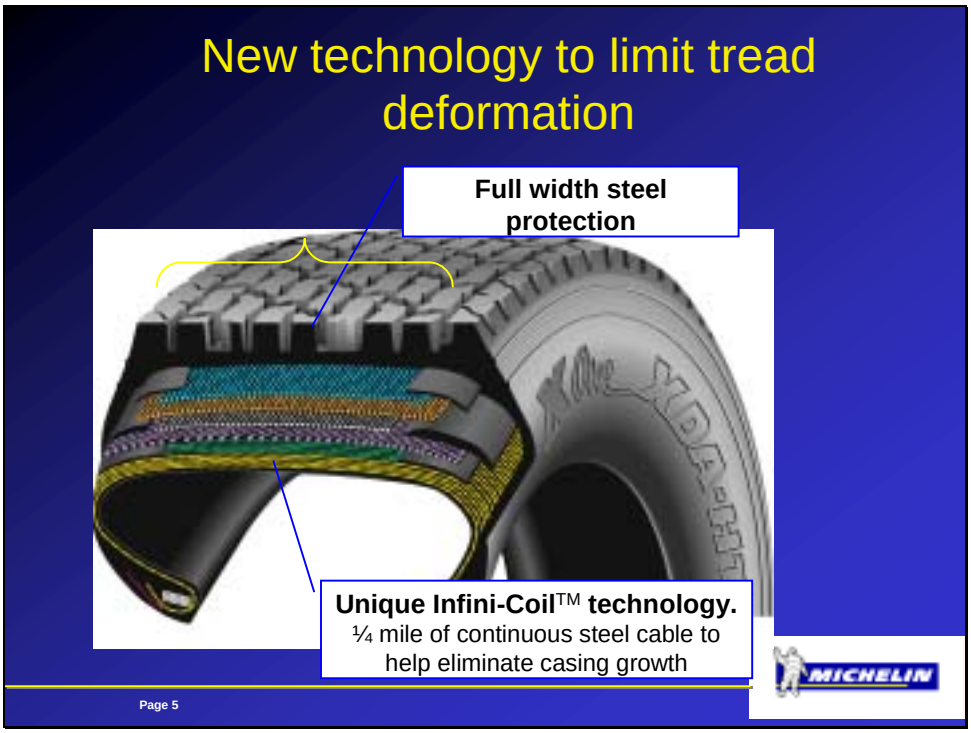
Apples versus watermelons



425/65R22.5
XZY

445/50R22.5 X
One XDA

Slide 5



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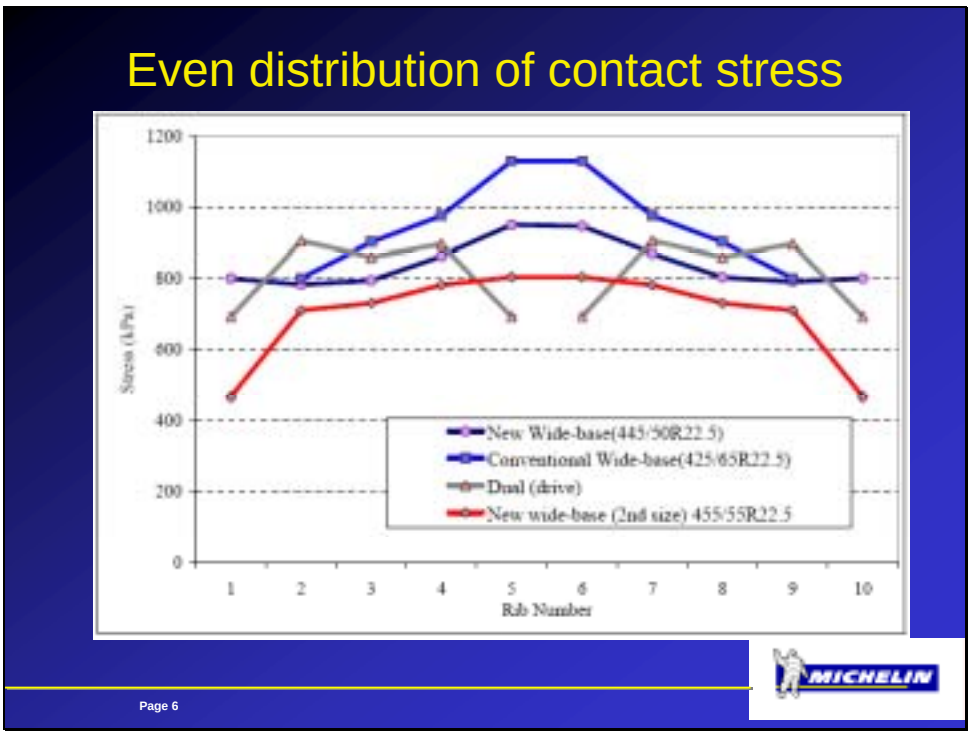

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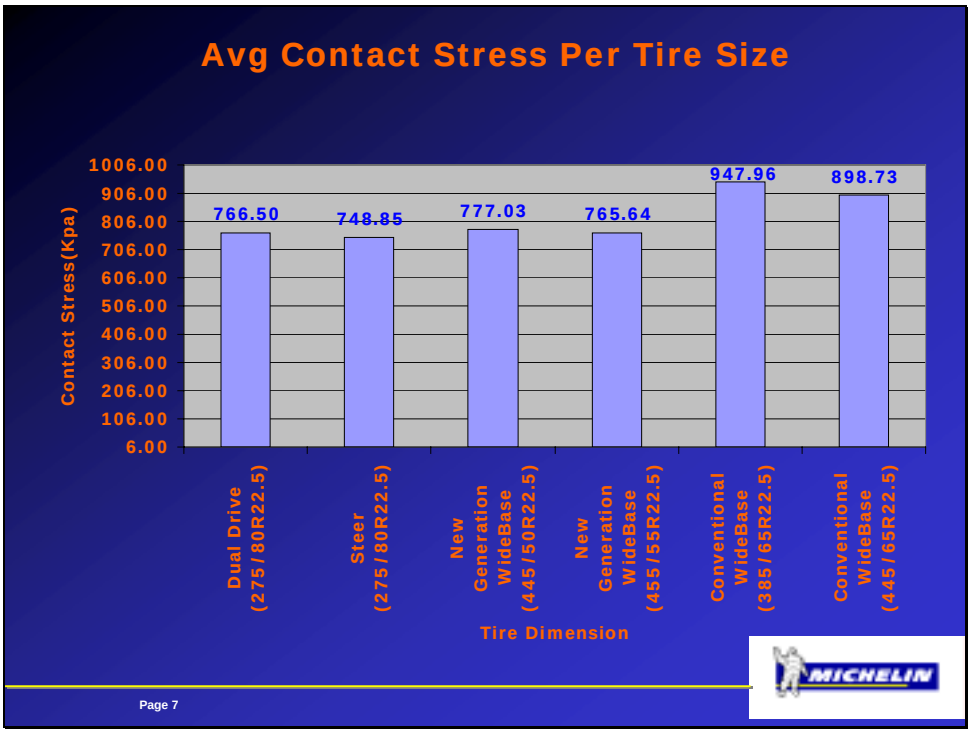

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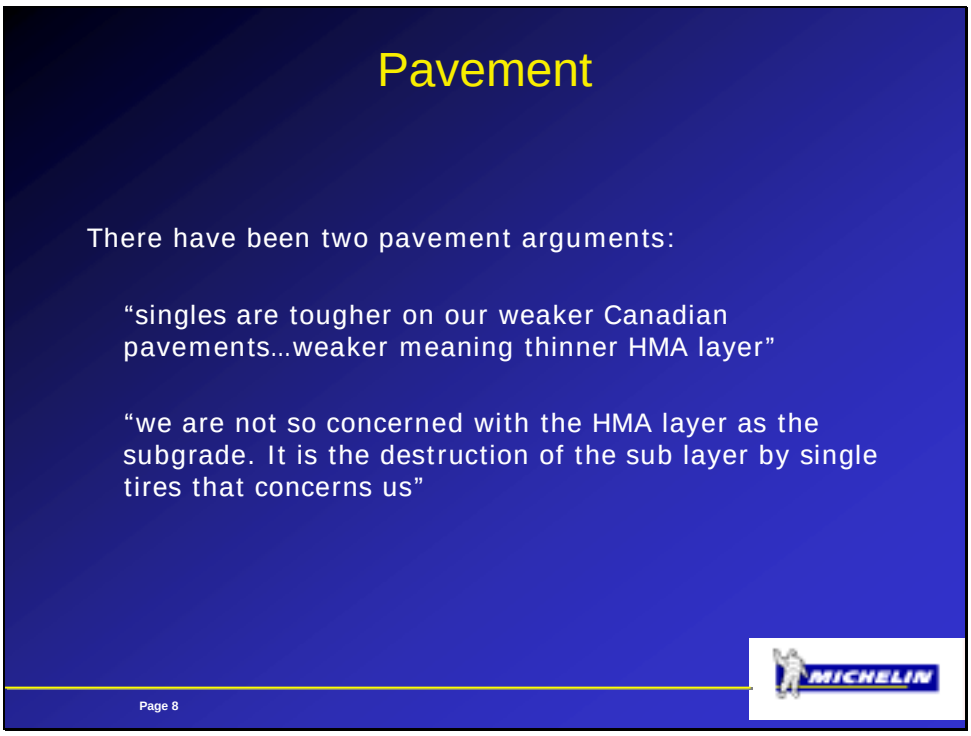


Slide 9

Pavement…facts

Fact:

Initial Virginia Tech (VT) study looked at strong pavements and applied US loads – 80,000 GVW.

- US directed test on pavement impact of tires
- Clearly showed no impact of single versus dual configurations on HMA or subgrade with US loads

Up to 7,700kg/axle singles have no impact

Slide 10

Pavement…facts

Fact:

Provincial governments are faced with shrinking monies for road maintenance and greater public and industry frustration with a National Highway System in generally poor condition.

- A product with negative impact on pavement life needs to be avoided
- Products that have a positive or neutral effect on pavements must be considered on other merits

Slide 11

Pavement…facts

Fact:

Laval University study commissioned by the MTQ to examine pavement impact of new generation singles is the basis of the MTQ report.

- Canadian loads, weaker pavement
- HMA – 'summer X One slightly positive, spring X One slightly negative'
- Regarding the subgrade – margin of error too large to use measurements

Slide 12

Pavement…facts

Fact:

Tire contact stress is not evenly distributed across the contact patch

- Research based on this assumption is flawed

Fact:

The tire contact patch is neither round nor spherical for all tires

- Research using this assumption has ignored an important advancement in tire design

Slide 13

Pavement…facts

Fact:

Most single tire impact studies have looked at traditional single tires (apples and watermelons)

- Attributing those results to new generation singles in inaccurate and unfair.

Fact:

The MTO study by J. Ponniah is a theoretical study.

- Joseph clearly indicated he would defer to any valid physical tests

Slide 14

Pavement…facts

Fact:

When addressing the issue of subgrade impact, both VT and COST Action clearly stated that impact of wide base tires on lower layers including subgrade, is equivalent to dual tire configurations because they carry the same load and distribute it over the same area at greater depths.

- Single tires have no negative impact at the subgrade

Slide 15

Pavement…facts

Fact:

Laval University indicated that impact measurements at the subgrade were so small as to be virtually nonexistent. But concluded that there was no difference between duals and singles at that level

- Single tires have no negative impact at the subgrade

Slide 16

Pavement…facts

Fact:

VT, Laval confirm that HMA impact is virtually identical **under test conditions**.

- The real world has another dimension.

What part of the tire supports ~5% of the load and what supports ~95%?

Slide 17

Real world duals…facts

Fact:

The Transportation Research Board (TRB) published a study on real world tire pressure conditions

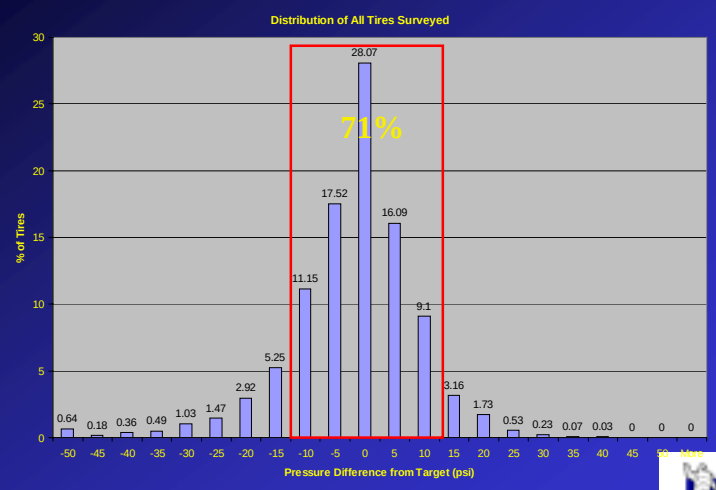
- 71% of duals are within 10% of each other
- 29% of the general population of duals in the real world are more than 10% apart in psi
- 15% of the population is off by more than 20%

Slide 18

Chances are your fleet is under pressure:

TRB Survey

"Commercial Vehicle Tire Condition Sensors" FMCSA-PSV-04-002, Federal Motor Carrier Safety Administration, December 2003



Slide 19

Real world duals…facts

Fact:

14% of duals on the road today are impacting the pavement as 1.2 to 1.6 tires

15% of duals on the road are impacting the pavement as 1 to 1.2 tires

- 100% of single tires have one air pressure
- eliminating mismatched dual pressures will have a large positive impact on pavement damage on the order of 15 to 20%

Slide 20

Pavement & the real world

Under test conditions:

HMA – singles present slight positive in summer, slight negative in spring thaw

Subgrade – singles are neutral as strain is distributed over the same area

Under real world conditions

29% of mismatched duals create far more negative impact than single tires

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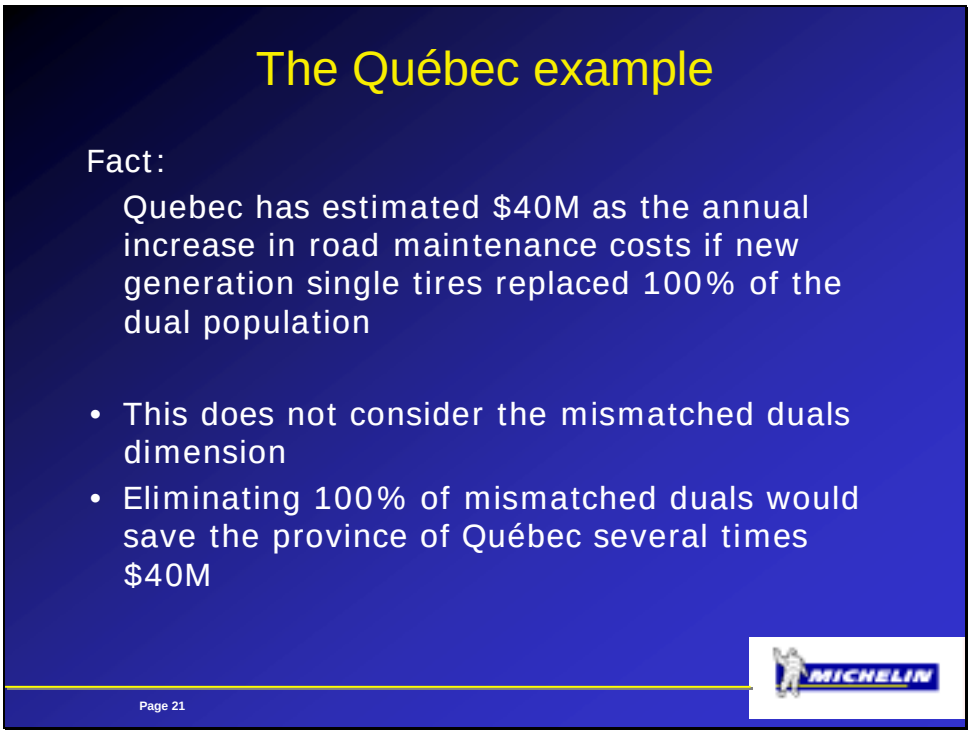

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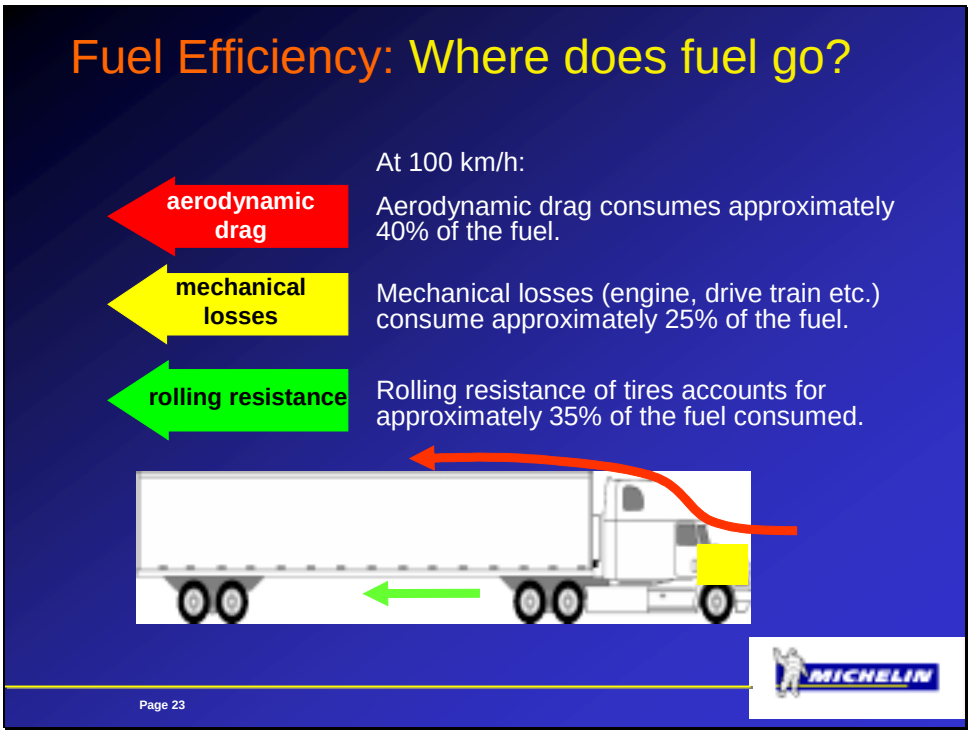

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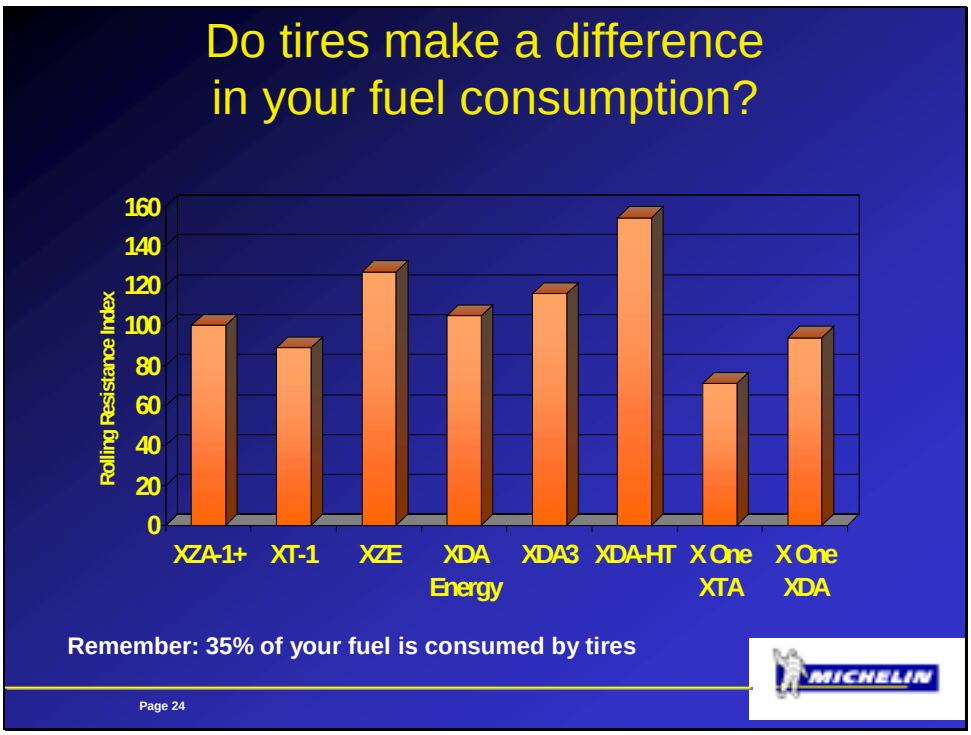

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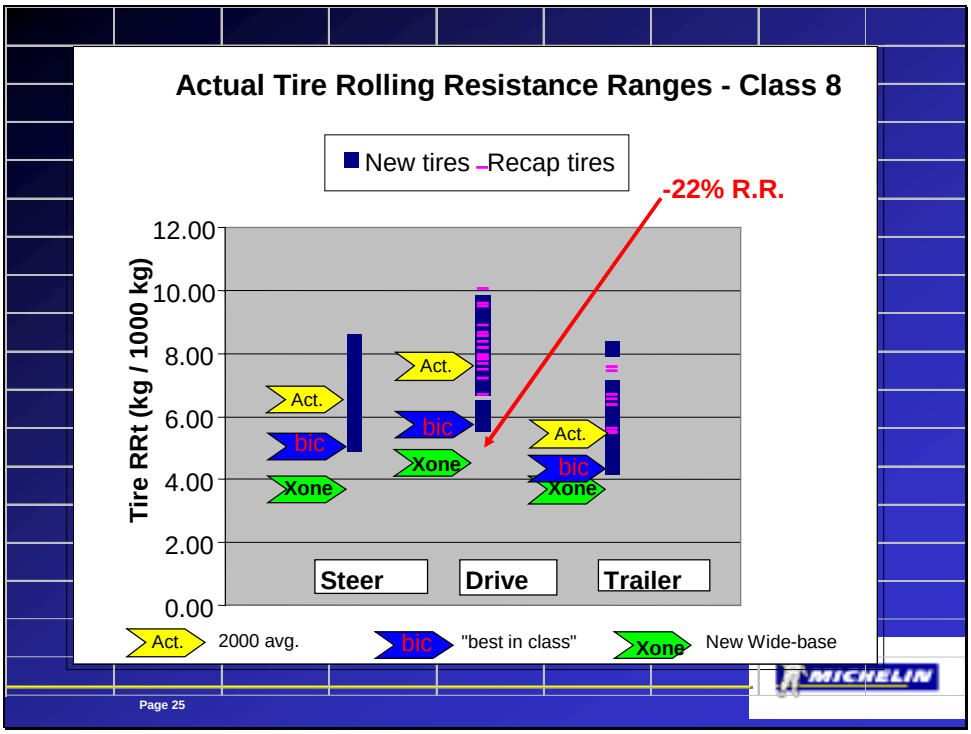

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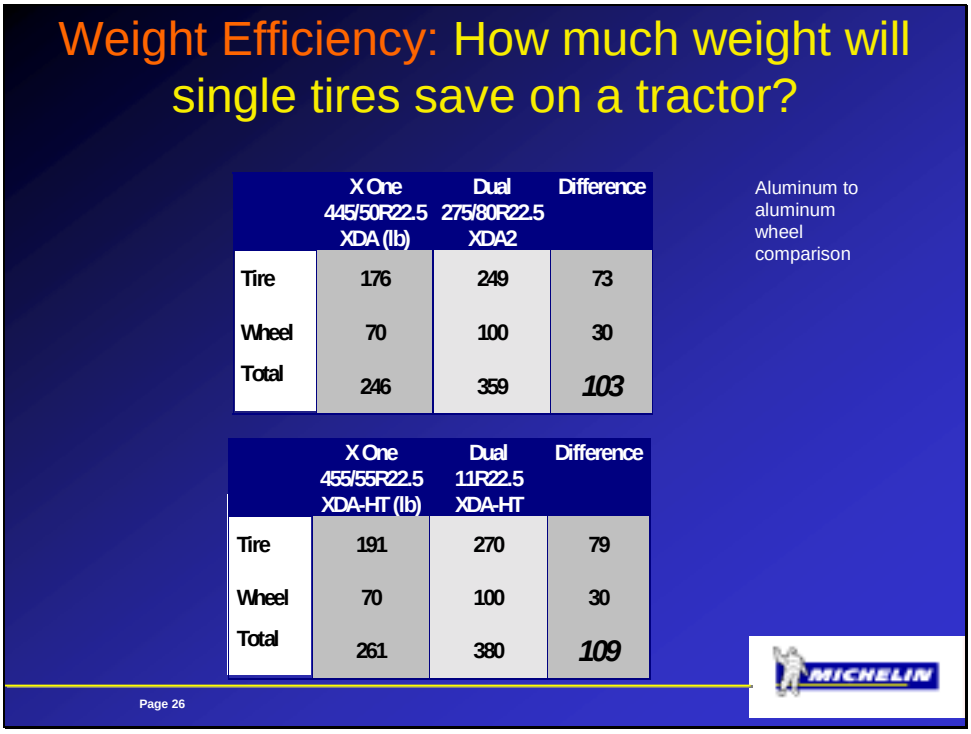

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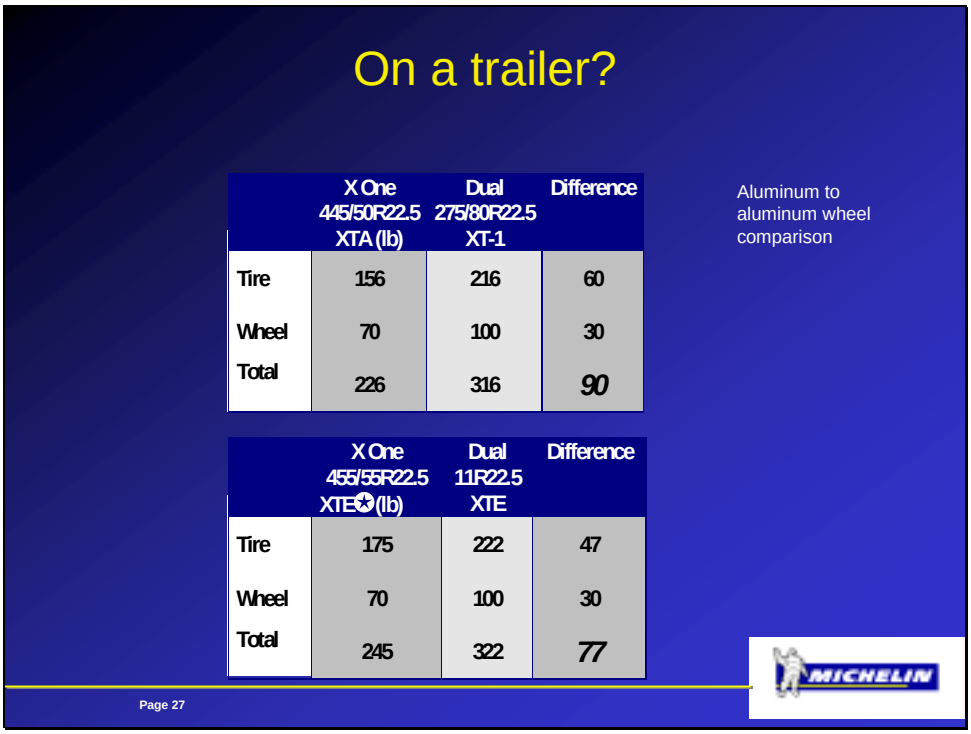

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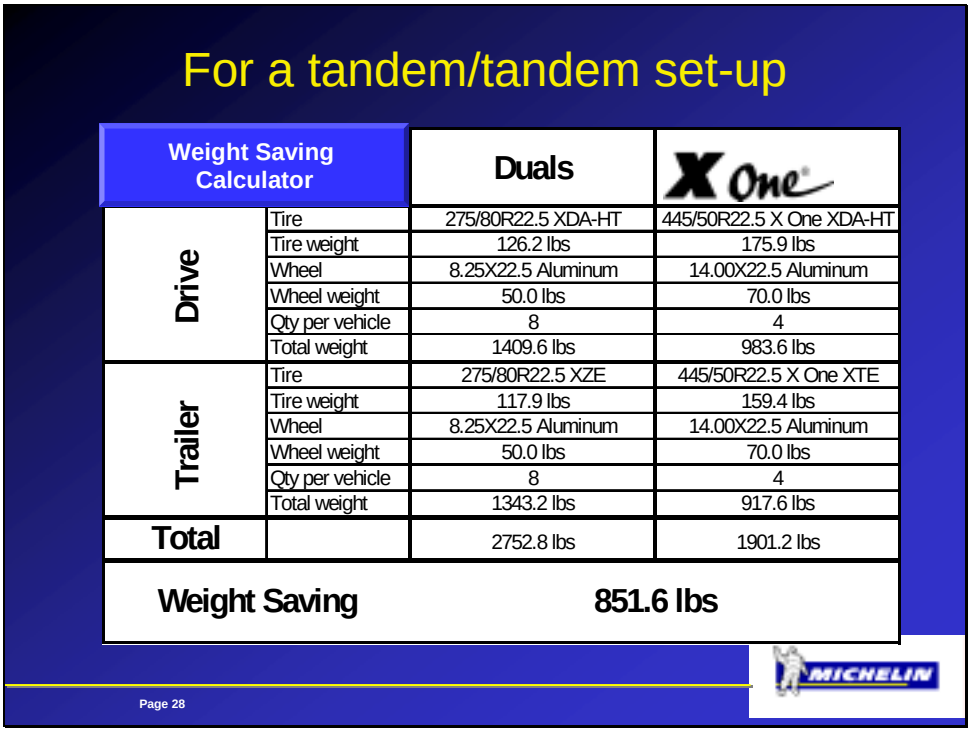

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Maintenance Efficiency: How can singles reduce maintenance costs?

Pressure checks
Mismatched pressures
One tire to mount
No hidden dual

Slide 30

Will single tires reduce your flats?

Where do flats occur?
Trailer (54%)
Drive (43%)
Steer (3%)

Why?
Air pressure maintenance!!!

- One valve stem
- Outside – easily accessible
- No “camouflage” from inside dual

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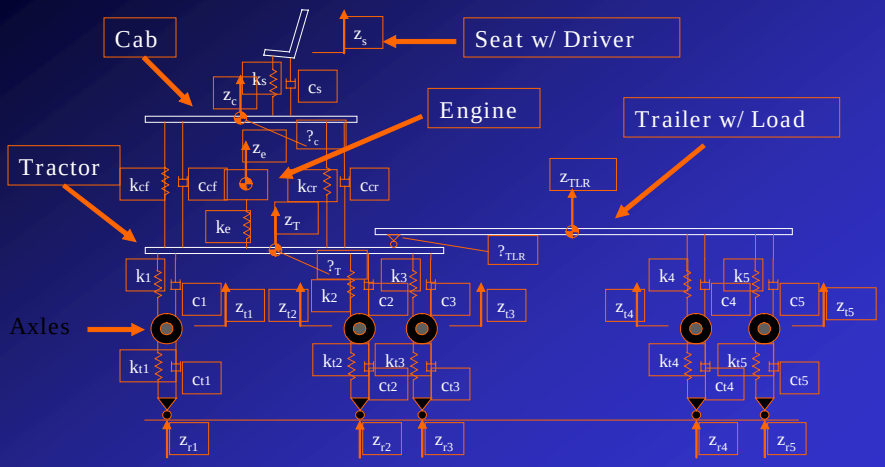
Comfort Safety: 14 DOF Model

Note: Beaming DOFs not shown



I don't get excited by engineer's drawings, but it gives you an idea of the depth of the research

Slide 32

Dual vs. Wide-Base Tires

X-One Drive and Trailer Tires @ Smooth Highway – 65 mph (per Axle Loads)

Axle	Static Axle Load (N)	Probability = 68.3% Dyn. Load Range (N)	Probability = 95.45% Dyn. Load Range (N)
Steer*	4.0434e+004	± 4.7061e+003	± 9.4122e+003
1st Tractor Drive	8.3041e+004	± 5.0498e+003	± 1.0100e+004
2nd Tractor Drive	5.6362e+004	± 5.1569e+003	± 1.0314e+004
1st Trailer	8.3149e+004	± 5.4067e+003	± 1.0813e+004
2nd Trailer	7.8599e+004	± 5.3703e+003	± 1.0741e+004

Standard Dual Drive and Trailer Tires @ Smooth Highway – 65 mph (per Axle Loads)

Axle	Static Axle Load (N)	Probability = 68.3% Dyn. Load Range (N)	Probability = 95.45% Dyn. Load Range (N)
Steer*	4.0434e+004	± 4.7004e+003	± 9.4009e+003
1st Tractor Drive	8.4041e+004	± 7.2585e+003	± 1.4517e+004
2nd Tractor Drive	5.7362e+004	± 7.4685e+003	± 1.4937e+004
1st Trailer	8.3169e+004	± 6.8590e+003	± 1.3718e+004
2nd Trailer	7.8619e+004	± 6.7071e+003	± 1.3414e+004

Average Dynamic Axle Load Range Reduction with Wide Base Tires

25.6%

* Steer Axle tires are XZA2 275/80R22.5 for both cases

Slide 33

Summary of Results

Average dynamic axle load range reduction with wide base tires = 25.6%

Wide base tires reduce vertical and longitudinal rms accelerations of driver by about 38% at wheel-hop frequencies (~11 Hz)

A perspective check:

Steel frame to leaf-spring – 15 to 20%
Leaf-spring to air-ride 20 to 25%
Add the X One and the improvement is huge
Comfortable and alert

Slide 34

Stability Safety: What factors impact vehicle stability?

Vehicle stability is a function of its track and the height of its center of gravity

Center of Gravity

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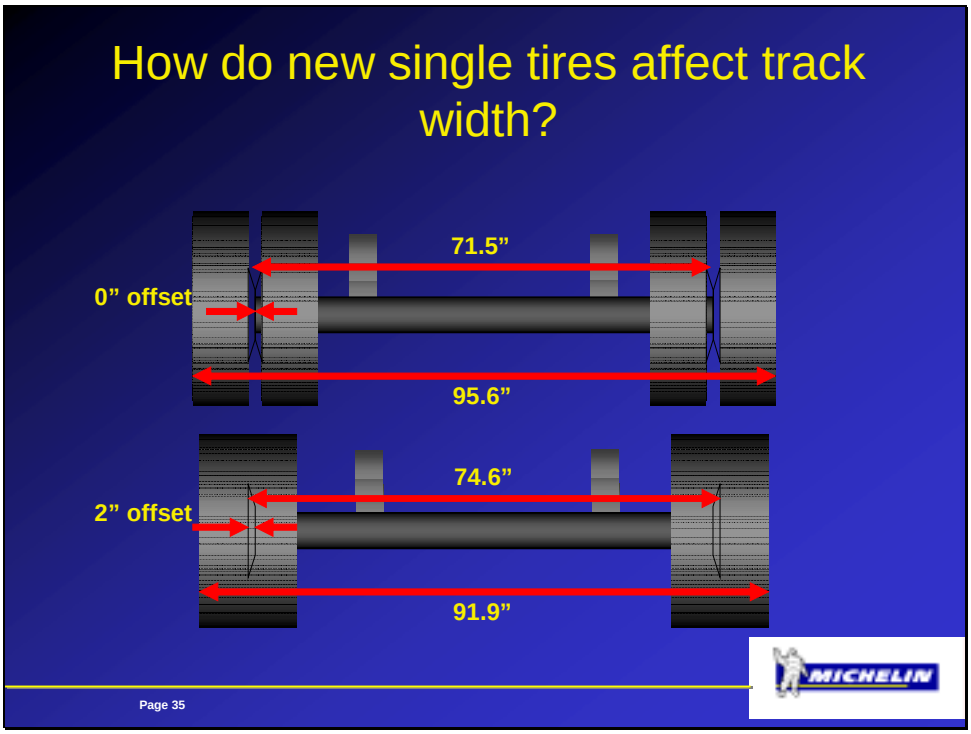

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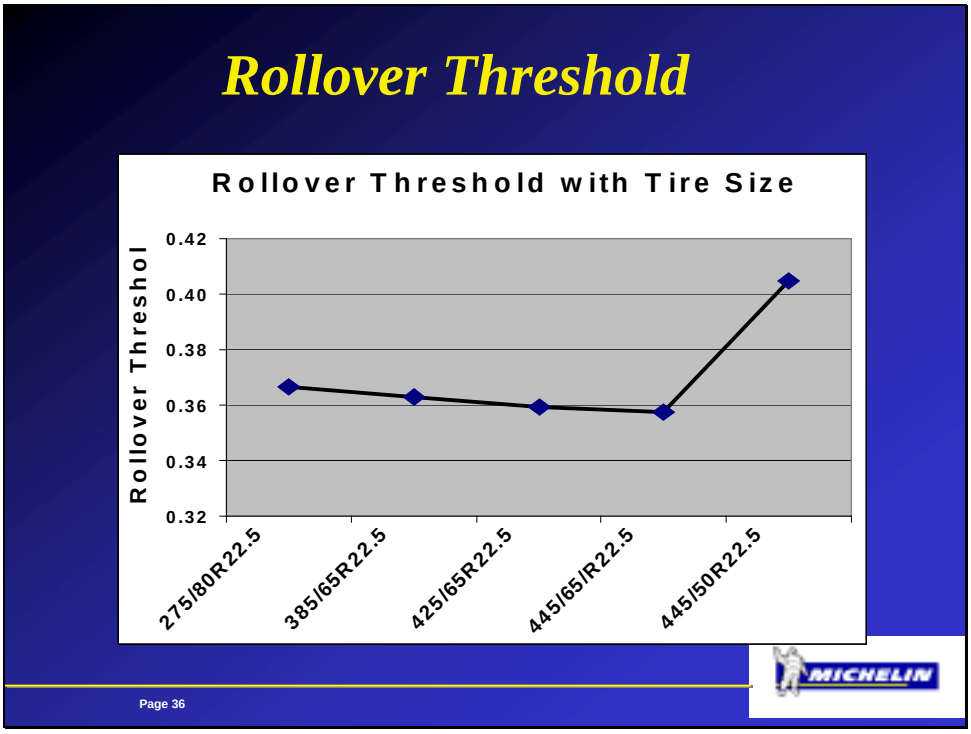

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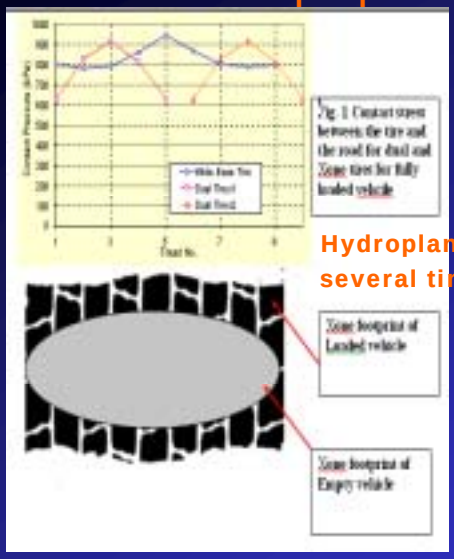
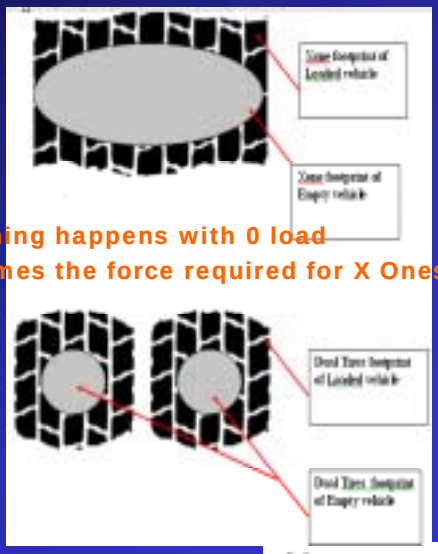
Aquaplaning Safety





Hydroplaning happens with 0 load
several times the force required for X Ones

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What New Generation Single Tires Deliver

Improved efficiency

- Minimum 4% on fuel
- Weight savings ~ 200 lbs/axle
- Maintenance

Improved safety

- Alertness
- Stability
- Aqua traction

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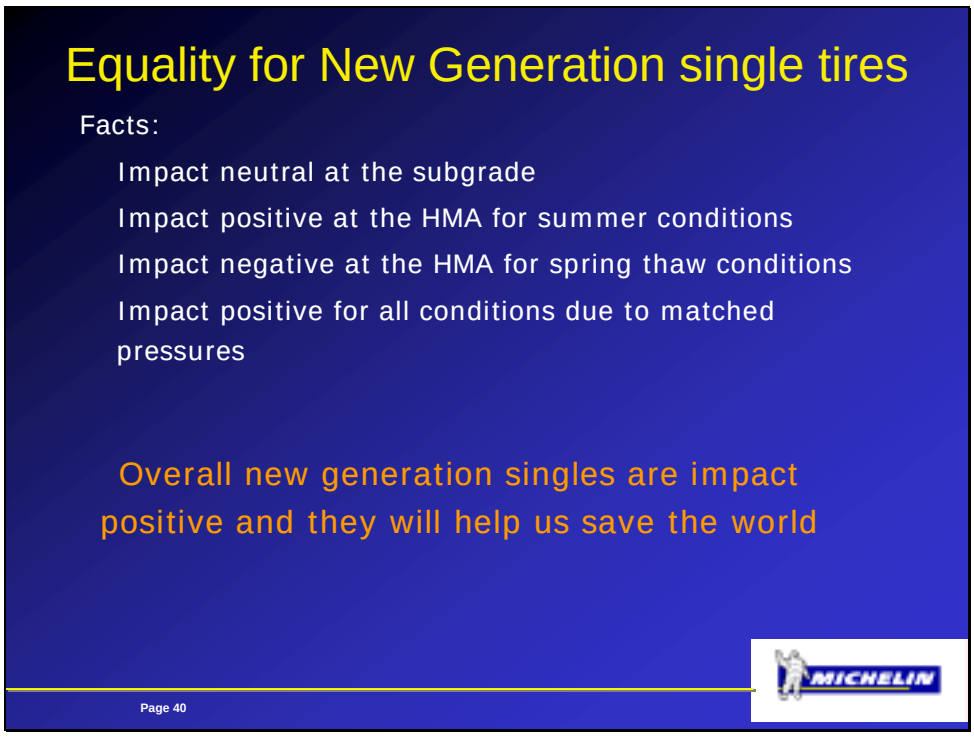

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Challenge

Fact:

Old generation singles have a huge negative impact.

Fact:

If full equality is given single tires there is a likelihood of old generation single tires being used.

- Traditional single tires are more complex to install on existing vehicles and do not deliver the same advantages as the new generation singles
- Do we need to differentiate?

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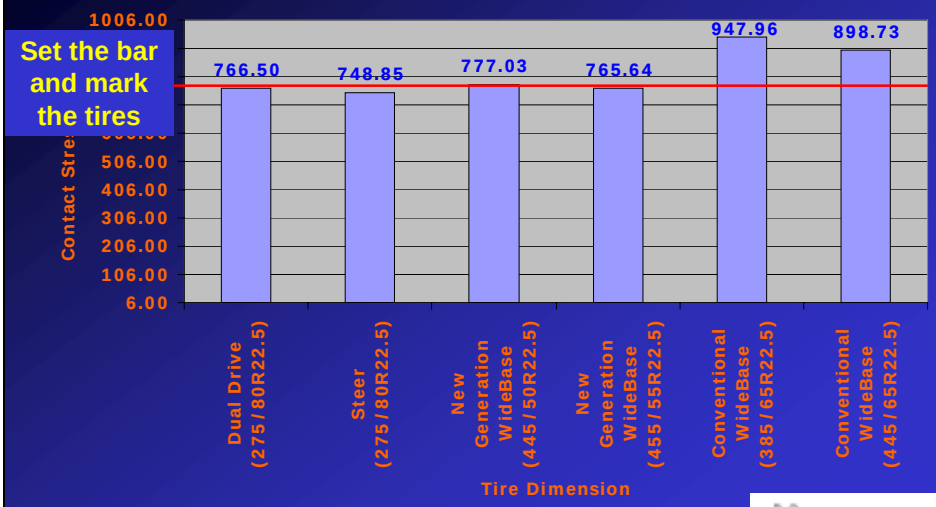
Avg Contact Stress Per Tire Size



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