Technical Torque #22

Where traction meets the road; Part 1 - Russell Walsh

The.assistance.of.Bill.Prebble.is.acknowledged.in.the.preparation.of.this.article¡

There have been three key developments in truck tyre technology over the years:

Early developments

In the early days of moving goods by road the wheels were not dissimilar to those used on horse drawn carts, some still employed iron bands as tyres as they would last longer than traditional wood rims. In the 1880s, however, solid rubber replaced the iron bands but, as this photo shows, steel and wood were still in use some years later especially for trailers.
Significant issues did arise, however, with the use of solid rubber tyres in that comfort was almost nonexistent and drive traction was seriously impaired. At the speed trucks moved at however comfort was not a major concern for those that used them, the truck in the above photograph has a travelling speed of 6 to 8 MPH.

Air filled tyres arrive.

In the later part of the 19th century a Scot, John Dunlop, developed a tyre that used compressed air encased in a ballon arrangement, these provided a smoother ride, increased loading capacity, and improved traction.

World War I intervened and slowed tyre development but by the mid 1920's pneumatic tyres were almost universally adopted.

Radial tyres.

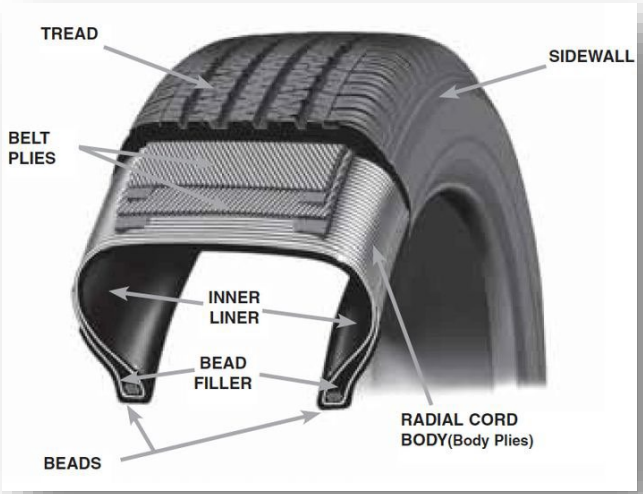
Although the development of tyres continued at pace, they were still based on the Dunlop pneumatic principle, and these are still the framework for tyres in use today.

The 1950s was the next significant development in the history of the tyre, the introduction of the radial ply tyre.

Components of a commercial tyre

The components of a typical commercial tyre are as shown in this drawing..

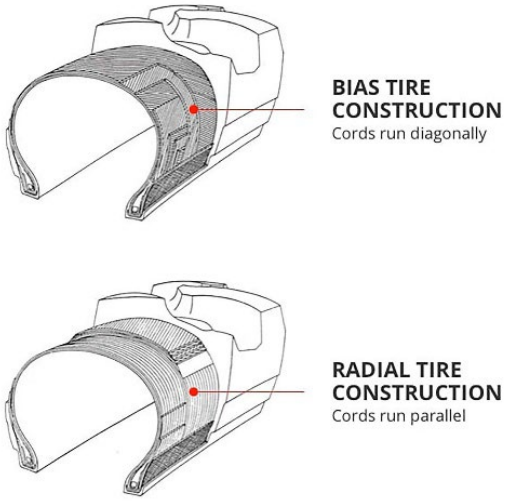
(Retrieved.from¿What.Are.the.Different.Parts.of.a.Tire?.№irestone.Complete.Auto.Care)



Cross ply v's radial

Whilst cross ply tyres, sometimes referred to as bias ply, and radial tyres, both use layers of fabric, the cords, in their construction it is the way in which these cords are layered within the tyre carcass that sets them apart.

In a cross-ply tyre the cords are manufactured so they crisscross the tyre at an angle to the direction of travel. In radial tyres the cords are manufactured so the cords run across the tyre from one side bead to the other at right angles to the direction of travel.



Retrieved from¿Understanding the Anatomy of a Tire.№ irestone Commercial Tires

What are modern commercial tyres made from?

Modern tyres are a compound of as many as 25 different materials based upon rubber either natural, sourced from trees, or synthetic, a mix of various chemicals. Both processes end up with the compound formed into blocks of rubber, which are extruded before the tyre building process continues.

Five key differences between cross ply and radial ply tyres.

Cross (bias) ply	Radial ply
More suitable for extreme off-road applications than radial ply.	Low rolling resistance
Can withstand greater side impact than radial ply.	Improved traction and road holding
May generate more heat when in operation.	Smoother riding
Reduces risk of punctures and failures when operating in arduous conditions.	More expensive to manufacture than radial ply
Firmer ride than radial tyres	Suitable for a wide range of applications

Tread

Original tyres had little if any tread design but over the years this has changed a lot. Now there are tread designs for almost every conceivable application. From tread designed for use in snowy conditions, through off-road use to linehaul and specialist use, all applications are covered.

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Rating tyres

In order to provide a level of certainty to tyre purchasers the industry recognises an informal tier system, tiers 1, 2 and 3, based upon specifications and retreadability of the casing.

Tier 1 tyres are often considered to be the premium brands of the major manufacturers such as Michelin, Bridgestone, Continental, and Goodyear.

Teir 2 tyres are those in the mid-range that performance-wise sit between Tier 1 and 3

Teir 3 tyres are the budget or value brands generally identified by their low overall cost.

Retreadability

A point overlooked when making the tyre purchase decision is the retreadability of the tyre carcass. Whereas it may be possible for the carcass of a premium tyre to be retreaded two, three or more times providing better whole of life value, this may not be the case with lower cost tyres.

Tyre markings

On the side wall of a commercial tyre there are many markings and words, all of which have some meaning. The following description and diagram was retrieved from [Understanding Your Commercial Tyres | Goodyear](). Most tyre manufacturers can provide guidance as to how to "read" their tyres.

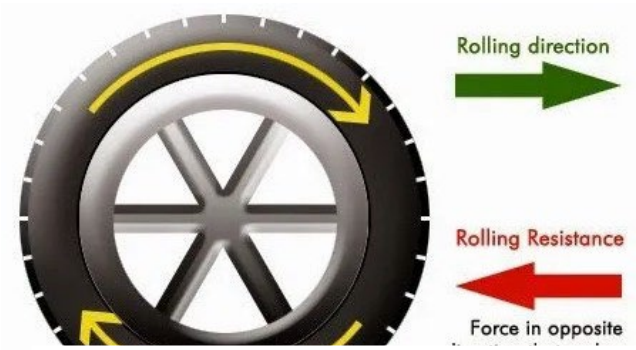
1. Tyre Section width (mm or inches)
2. Aspect ratio SH / SD Radial construction
3. (R=Radial)
4. Rim Diameter (inches)

5. Load Index (Max. load per tyre - single tyre)
6. Load Index (Max. load per tyre - dual mounted)
7. Speed Symbol
8. Alternative load indices when used with alternative speed
9. TWI - Tread Wear Indicator
10. ECE Homologation number
11. Date code (week, year)
12. DOT Manufacturing Code
13. Noise number - indicates that the tyre conforms to ECE noise regulation

Fuel efficient tyres.

Many tyres now are marketed as fuel efficient. What this means is that the tyre has lower rolling resistance under normal operating conditions.

Rolling resistance is one of the forces that must be overcome to move a vehicle along the road, the other forces are, inertia, mechanical friction such as friction generated in the drive train, aerodynamics and gravity.



Retrieved from: STL Rolling Resistance Capabilities

Information in this bulletin has been sourced from a number of places including, but not limited to, Understanding Tire Tiers: Assessing Quality in Tire Manufacturing | Counteract Balancing Beads