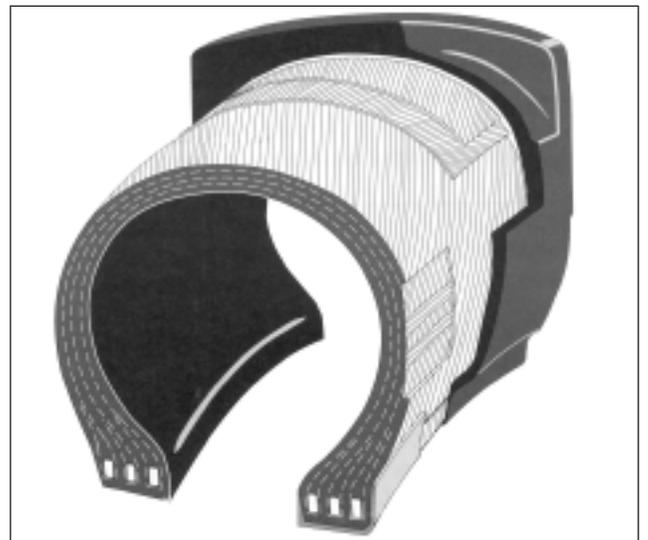


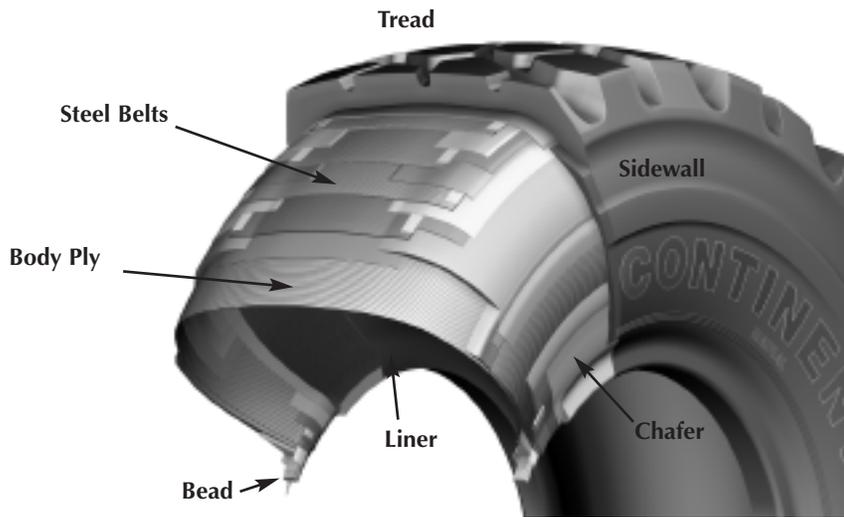
Radial Versus Bias Tire Construction

Continental Tire North America, Inc. produces two types of tires for Off-The-Road applications, Radial and Bias. There are many differences in the construction of these two types of tires. Each construction has advantages in certain applications. In order to select the appropriate tire for a specific application, an understanding of the two constructions is required. The following will explain the differences between the two constructions.

Radial Versus Bias Tires



Radial Tires



Radial Components

The **tread** of a tire consists of specially compounded rubber which can have unique characteristics ranging from wear resistant, cut resistant, heat resistant, low rolling resistant, or any combination of these. The purpose of the tread is to transmit the forces between the rest of the tire and the ground.

The **sidewall** is a protective rubber coating on the outer sides of the tire. It is designed to resist cutting, scuffing, weather checking, and cracking.

The **chafer** of a radial tire acts as a reinforcement. It increases the overall stiffness of the bead area, therefore restricting deflection and deformation and increasing the durability of the bead area. It also assists the bead in transforming the torque forces from the rim to the radial ply.

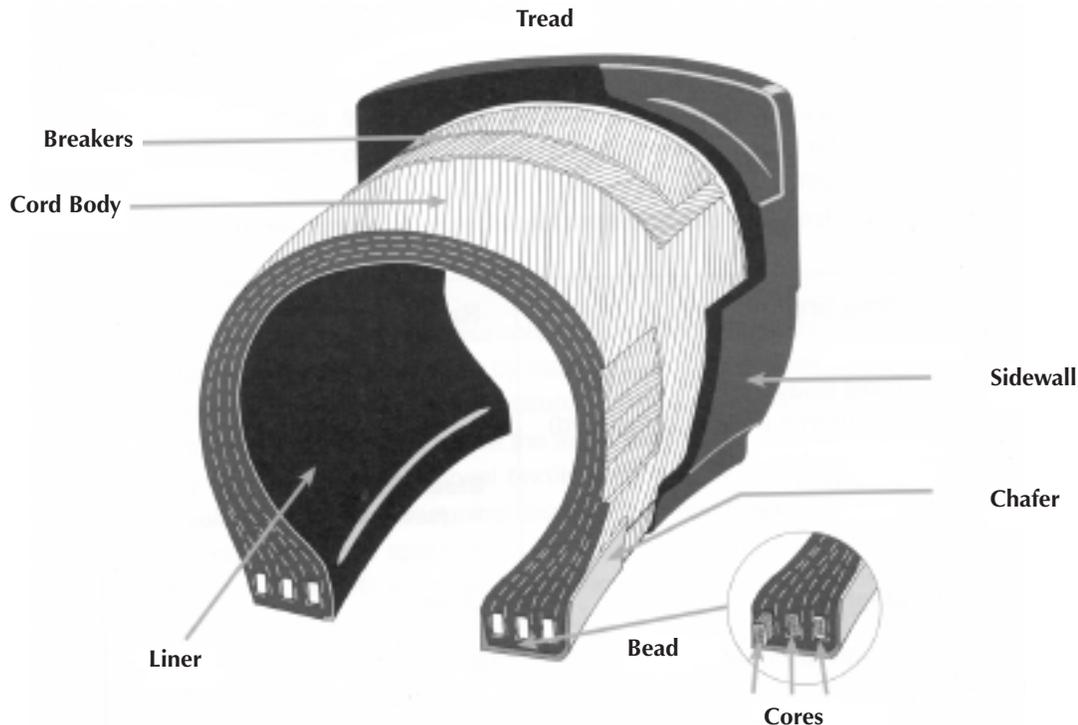
The **liner** is an integral part of all tubeless pneumatic tires. It covers the inside of the tire from bead to bead and prevents the air from escaping through the tire.

The **bead** of a radial tire consists of one bundle of bronze coated high tensile strength steel wire strands which is insulated with rubber. The bead is considered the foundation of the tire. It anchors the bead on the rim. The end of the ply of a radial tire is wrapped around the bead.

The **body ply** of a radial tire is made up of a single layer of steel cord wire. The wire runs from bead to bead laterally to the direction of motion, the design is called "radial". The body ply is a primary component restricting the pressure which ultimately carries the load. The body ply also transmits the forces (torque, torsion, etc.) from the belts to the bead and eventually to the rim.

The **belts** are layers of steel cord wires located between the tread and the body ply. Continental Tire North America, Inc. makes radial OTR tires with 2, 3, 4, or as many as 5 belts. The steel wire of the belts run diagonally to the direction of motion. The belts increase the rigidity of the tread which increases the cut resistance of the tire. They also transmit the torque forces to the radial ply and restrict tire growth which prevents cutting, cut growth and cracking.

Bias Tires



Bias Components

The **tread**, similar to a radial tire, of a tire consists of specially compounded rubber which can have unique characteristics ranging from wear resistant, cut resistant, heat resistant, low rolling resistant, or any combination of these. The purpose of the tread is to transmit the forces between the rest of the tire and the ground.

The **sidewall** is a protective rubber coating on the outer sides of the tire. It is designed to resist cutting, scuffing, weather checking, and cracking.

The **chafer** protects the bead and body from chafing (wear from rubbing) where the tire is in contact with the rim.

The **liner** is an integral part of all tubeless pneumatic tires. It covers the inside of the tire from bead to bead and prevents the air from escaping through the tire.

The **bead** of a bias tire consists of bundles of bronze coated high tensile strength steel wire strands which is insulated with rubber. An OTR bias tire bead usually has two or three bundles. The bead is considered the foundation of the tire. It anchors the bead on the rim.

The **cord body** is also known as the carcass. It consists of layers of nylon plies. The cord body confines the pressure, which supports the tire load and absorbs shocks encountered in service. Each cord in each ply is completely surrounded by resilient rubber. These cords run diagonally to the direction of motion. They transmit the forces from the tread down to the bead.

The **breakers** are sometimes referred to as belts. The breakers provide protection for the cord body from cutting. They also increase tread stability which resists cutting. Breakers can be made of nylon, aralon, or steel wire.

Radial Versus Bias Performance

	Radial	Bias
Vehicle Steadiness	-	+
Cut Resistance - Tread	+	-
Cut Resistance - Sidewall	-	+
Repairability	-	+
Self Cleaning	-	+
Traction	+	-
Heat Resistance	+	-
Wear Resistance	+	-
Flotation	+	-
Fuel Economy	+	-

Radial Versus Bias Cost

Numerous influences affect the overall cost of a tire. The initial cost of a radial tire is higher than that of a bias, however the cost per hour depends on the application. An application which has a high risk of sidewall damage, such as loader applications, would greatly benefit from bias tires. On the other hand, it is advantageous to place a radial tire in an application where good traction is required on vehicles driven at high speeds, such as articulated dump trucks. In order to choose the best tire for an application, knowledge of the application must exist.