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Can this marriage
be saved?

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Can this marriage be saved



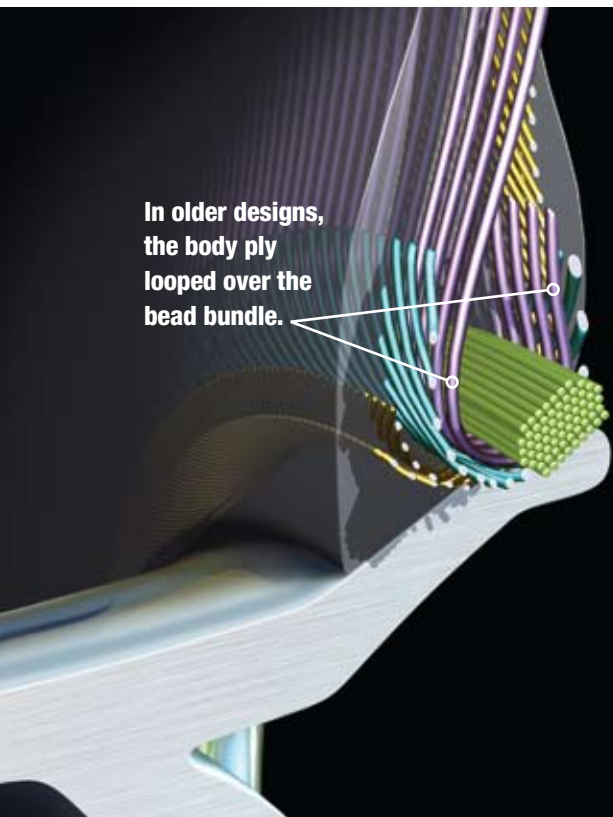
In an earlier issue of REAL ANSWERS Magazine, we explored how Bridgestone "married" steel and rubber. As you may recall, these two elements don't naturally stick together without a professional counselor.

What happens when stress threatens their relationship?

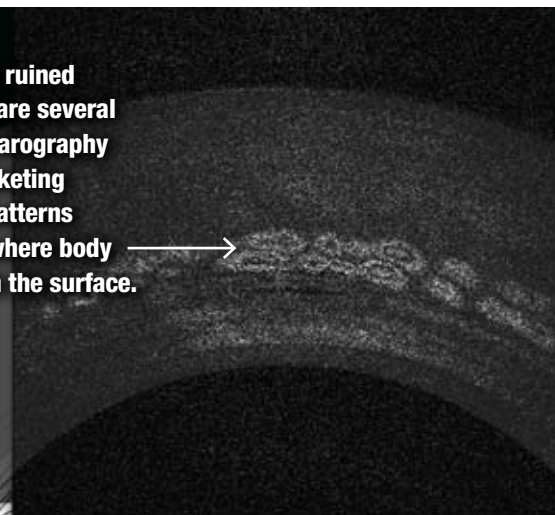
Bridgestone's new Turn In Ply® structure – or T.I.P. as we call it – dramatically reduces ply end stress and increases bead durability.

Let's see how.





You may never know the casing is ruined until it's time for retreading. Here are several images from Bandag's Insight shearography casing analyzer that captured socketing damage. The "double bulls-eye" patterns indicate changes in the sidewall where body ply separation lies hidden beneath the surface.



Tell me again – what's a ply end?

The body ply is the foundation of the entire tire. Steel cords and rubber naturally don't stick together. So they are "married" or squeezed together between heated rollers in a process called "calendering."

The ply ends are simply the ends of these steel cords, cut by a machine. When the tire is built, the ply ends are folded around the bead bundle.

Keeping this marriage together – and withstanding a good deal of stress – is an engineering marvel.

How is the ply end subjected to stress?

The ply end is located near the bead bundle – one of the most stressed areas of a tire.

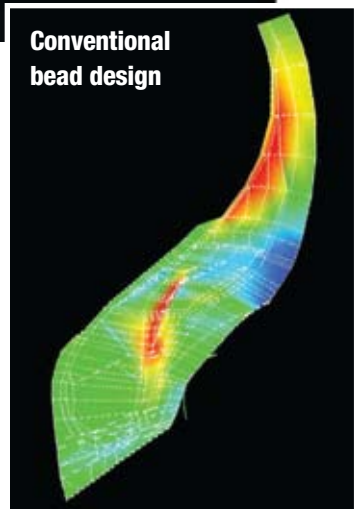
The bead area takes the heat, pun intended, as the tire flexes and unflexes, squashing in and out of its footprint. This stress continues with each revolution.

It's not unusual for some tires to experience a bit of "socketing" – where ply ends wiggle and move, making small pinpoint holes in the surrounding rubber.

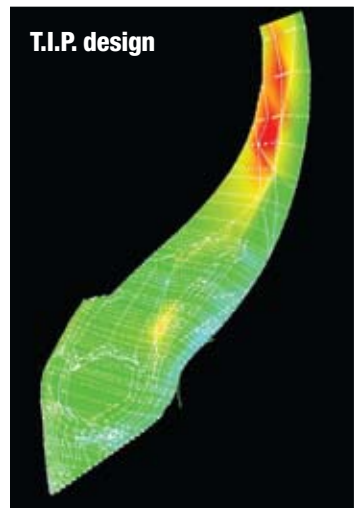
While socketing sounds dreadful, it's typically not a problem under normal situations.

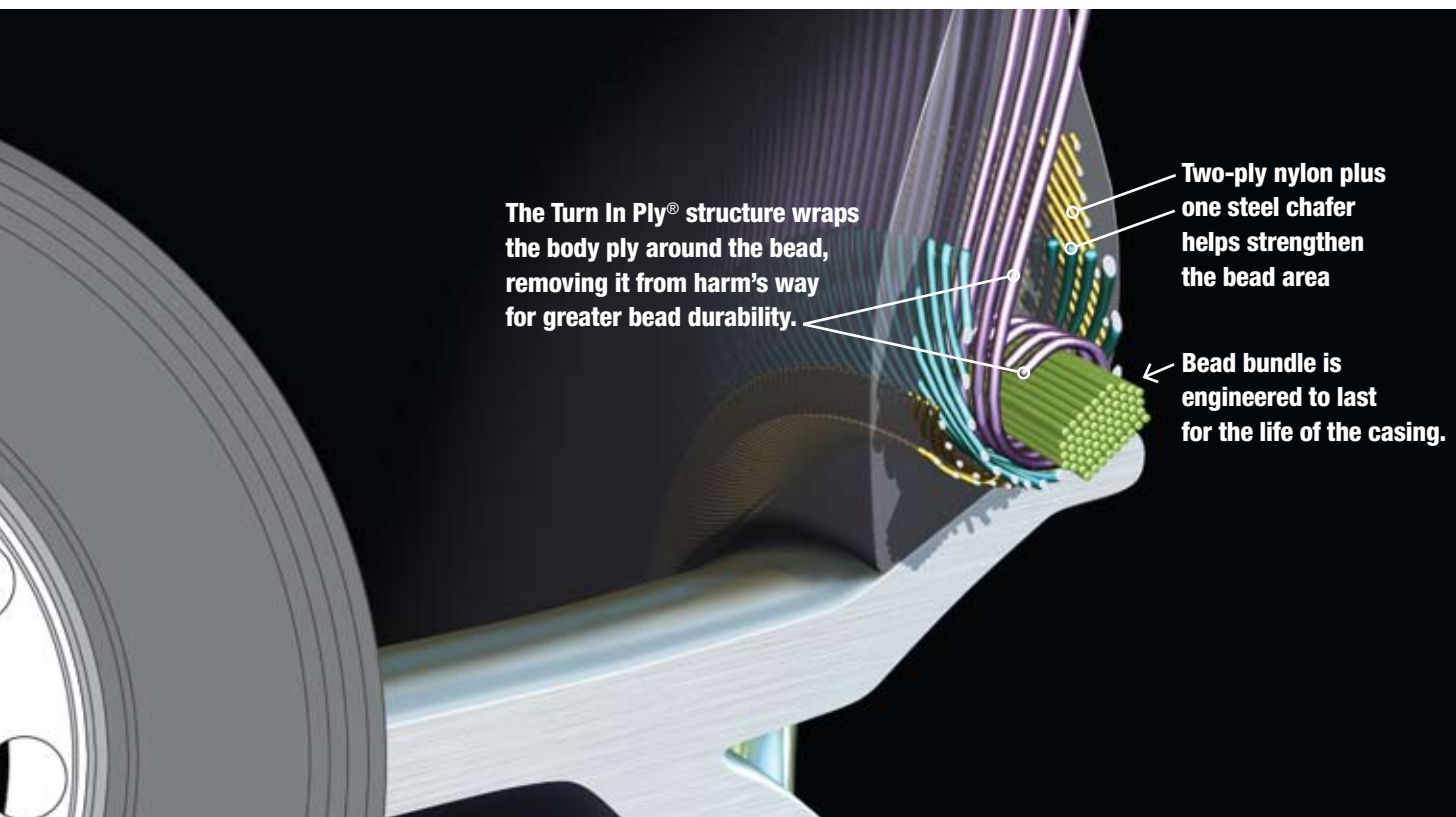
However, under remarkable cases of poor maintenance, such as underflation and overloading, the socketing can grow and the body ply can detach. You may have heard it called "body ply separation."

The red indicates harmful heat caused by the tremendous flexing and unflexing of an underinflated tire. Heat destroys casings.



Much less stress here! The T.I.P. "cooler" design promotes casing durability and superior retreadability.





What happens then?

If it's serious, you could be forced to pull the tire from service and scrap the casing. At this point, you probably won't see one tiny hole but a gap so large you can use a screwdriver to push aside the rubber and see the exposed steel ply ends.

Does this happen with all tires?

As you know, heat is a tire's biggest enemy. It shortens tire life and reduces casing durability. However, socketing is more likely to happen on low-profile tires than standard 90-series. Since low and ultra-low profile tires have smaller sidewalls, there's less area to absorb the energy of the flexing and unflexing. And that energy can be transferred to either the shoulder or bead areas. Although socketing can occur on any tire, it's likely caused by poor inflation pressure.

How can the T.I.P. design help?

The T.I.P. structure significantly reduces the stress in the bead area. It does this by wrapping the body ply around the bead bundle, removing it from harm's way. Essentially the ply end is looped over the bead bundle.

Aren't chafers used to reduce stress?

Depending on the application, a combination of nylon and steel chafers are used to wrap around the body ply. Yes, chafers are an important component in protecting the bead

area against stress. However, the T.I.P. design does a better job because it removes the ply ends from the stressful area. And that allows extra chafers and therefore extra weight to be removed from the tire because ply ends need less protection.

What else?

Rolling resistance is also improved. The T.I.P. design dramatically reduces stress, which improves rolling resistance.

How soon can we see this new design?

The new technology is being used on Greatec drive and trailer radials. New tire-building machines had to be developed to produce these tires with the T.I.P. structure. While it sounds simple at first, there's quite a bit of complexity involved in making a "wrap and tuck" as opposed to a fold.

The European version of the Greatec was one of the first to use this technology. Since trucks using single tires rather than dual assemblies carry much more load per tire, Greatec does the work of two, carrying loads over 10,000 pounds – twice the amount many dual tires are rated. And it does it with half the number of sidewalls and beads to support the weight.

The T.I.P. design is especially helpful in ultra low profile tires for reducing stress in the bead area and improving casing durability. 