

Tire slippage on McLaren Wire Wheels

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June 1, 2020

I have had an ongoing problem with tires and tubes slipping on my McLaren wire wheels.

The problem has occurred on front and rear wheels.

As the tire rotated on the rim, the inner tube stem would lay over and no longer be perpendicular to the wheel. Looking back, I believe I have had this problem since I have owned the wire wheels (about 14 years).

Every time I would notice the stems leaning over, I would apply a simple "fix".

I would let the air out of the tires to about 10-15 PSI.

I would then drive the car backwards slowly until the stem "stood up straight" again and then put 55-60 PSI back in the tire.

If I didn't keep an eye on the valve stems, they would lay over until they sheared off causing a blowout.

I have had several blowouts over the years.

Over the years, I have tried many "fixes" for this problem.

I have tried with flaps, without flaps, duct tape, electrical tape, 60 PSI, 70 PSI and other shade-tree fixes.

None of them worked.

So, I began to investigate as to why the tires and tubes were slipping.

My findings are based on my experience, observations, measurements and documentation.

My findings

In the course of this investigation, I have measured a variety of 30" x 3.5" clincher rims. Test samples included wood wheels, wire wheels and demountable rims.

I have observed two major issues that I believe are causing the problem.

First – The McLaren Clincher rim profile is different than the Ford clincher profile.

Second – The Universal T Driver tire bead profile does not seat well in a McLaren rim.

(Universal T Drivers - Purchased July 2007 – Made in Vietnam).



The Problem – Tire & Tube have shifted relative to the rim.

The Ford Clincher Rim Profile.

Figure 1 is an excerpt from the dimensioned original Ford drawing of the clincher rim profile for a rear wood spoke wheel.

The curvature of the sidewalls is a complex series of three curves of different radii and different centers.

The gap between the clincher lips is dimensioned as 2.003" to 2.097" (dimension from original drawing).

The depth of the clincher profile is dimensioned as 0.618" to 0.642" (interpreted from original drawing).

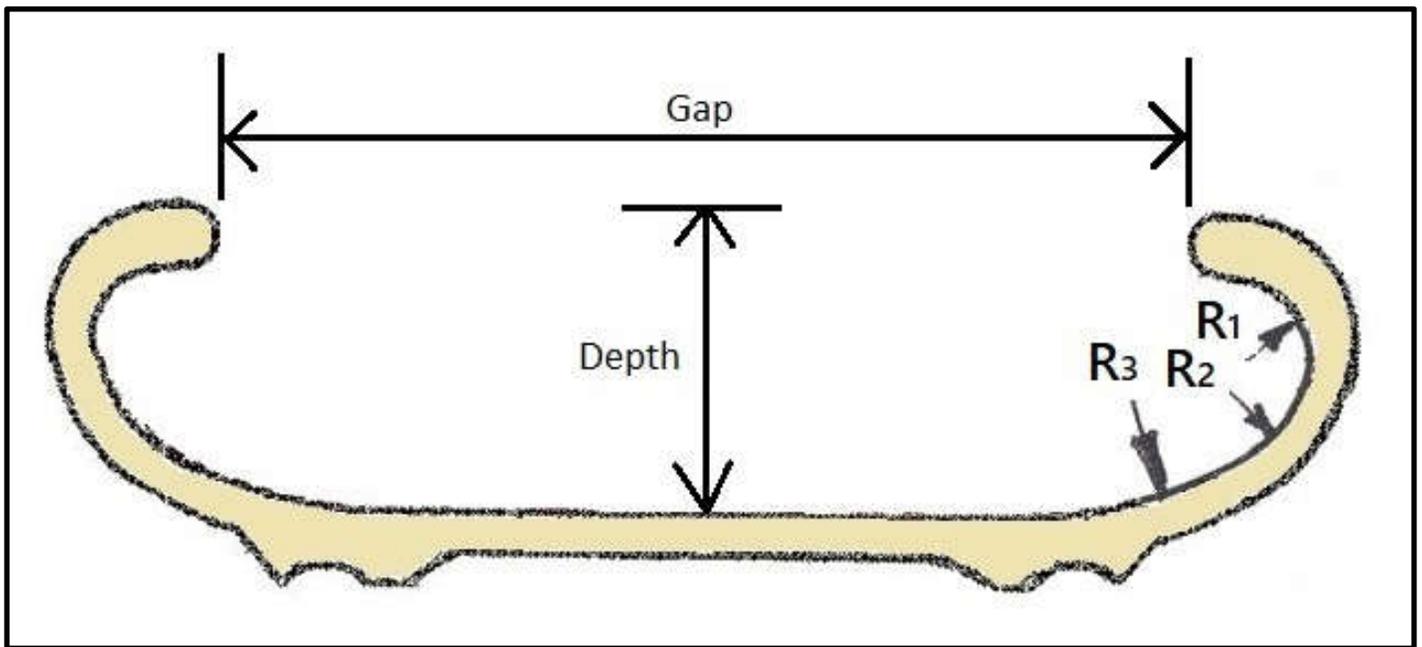


Figure 1. Clincher rim profile.

Figure 2 shows how the tire fits into the rim.

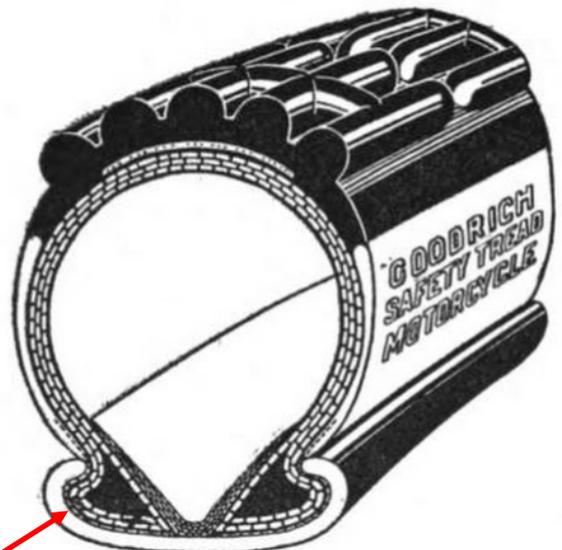
There is full surface contact between the rim profile from the tire's clincher bead profile.

The tire and rim profile are the same.

This contact between the tire and the rim holds the tire in place.

The larger the area of contact between the tire and the rim, the greater the friction will be to keep the tire in place.

The shape of the clincher tire bead matches the rim profile.



Full Tire Bead Contact

Figure 2. Clincher Rim with tire

Ford and McLaren Clincher Profiles



Figure 3. Standard Ford Clincher Rim

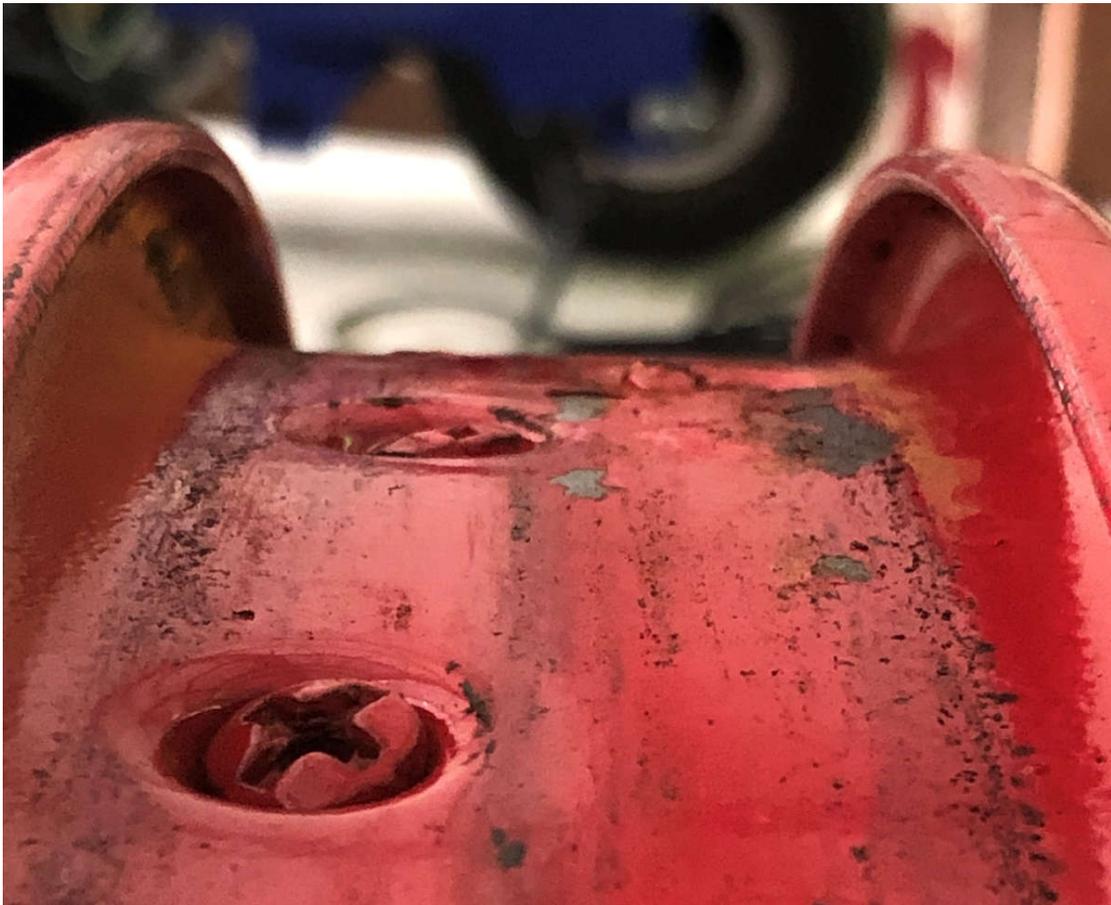


Figure 4. McLaren Wire Wheel Clincher Rim



Figure 5. Standard Clincher Rim

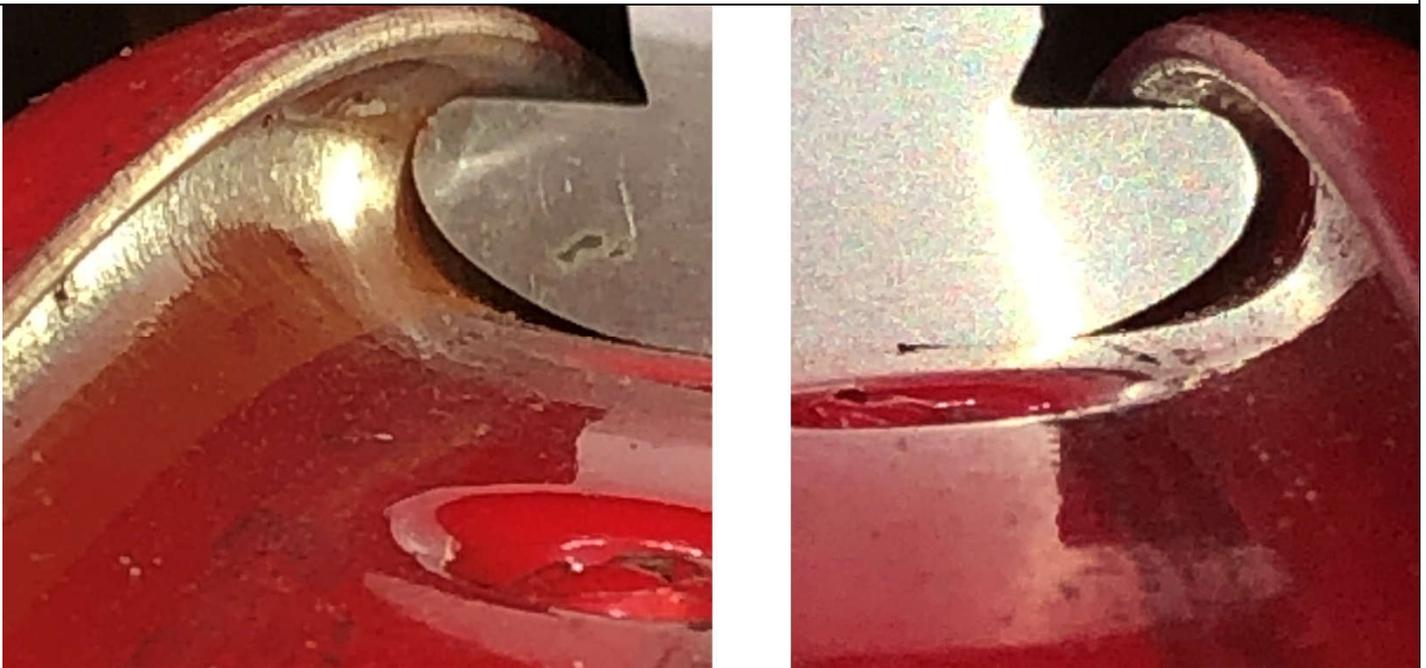


Figure 6. McLaren Wire Wheel (Left & Right sides)

These are closeups of the same point on a McLaren rim. Individual photos were taken of each side of the same rim. As can be seen, the McLaren profile is different than the Ford profile.

Test Setup



Figure 7 Universal T Driver Tire Segment.



Figure 8 Universal T Driver Tire Segment



Figure 9. The Setup

This is the setup for the photos in this document. The tire segment is from one of tires that was slipping on my McLaren wire wheels.

The tire segment was placed in the rim and the tube was inflated until it was stiff. Photos were taken of the resulting assembly.

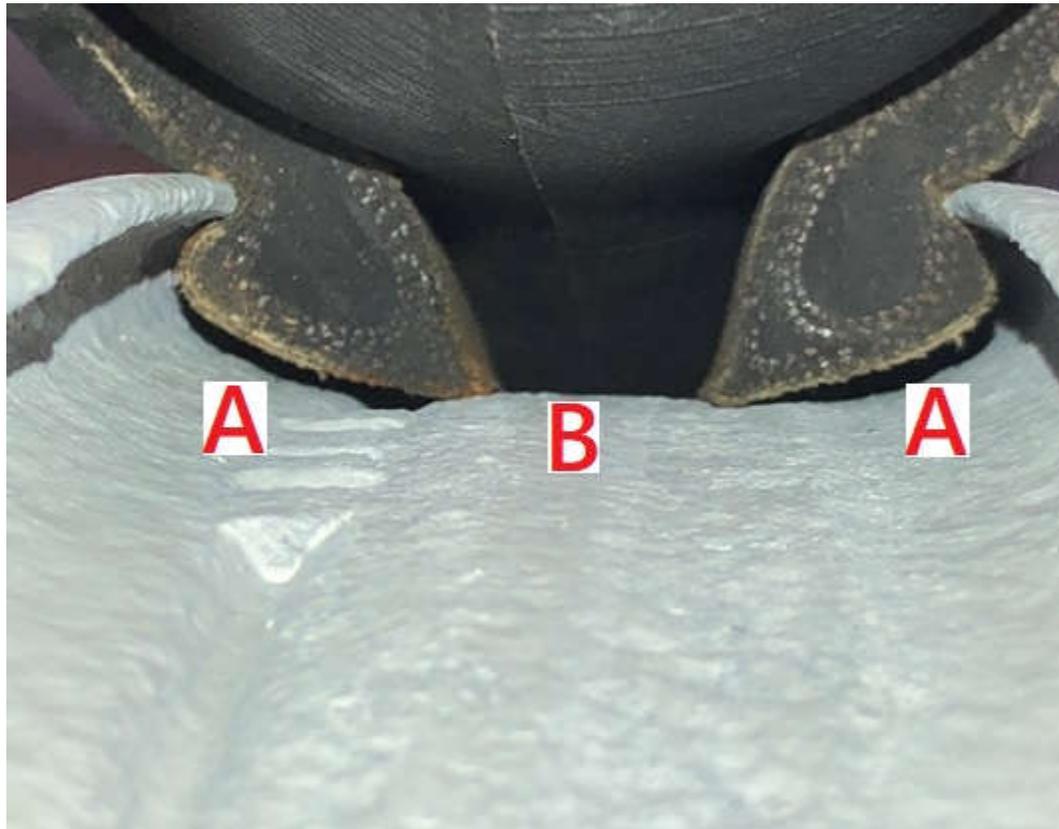


Figure 10 Fit - Demountable Rm

Universal T Driver Demountable Rim

This is tire segment and tube on a demountable rim. The tube only has about 7 PSI in it. If this were a full inflation the tube would expand and fill in the gap at "B" between the tire beads. The beads at "A" would be forced outward by the tube filling in the matching profile at "B" until they have near full contact with the matching profile of the rim.

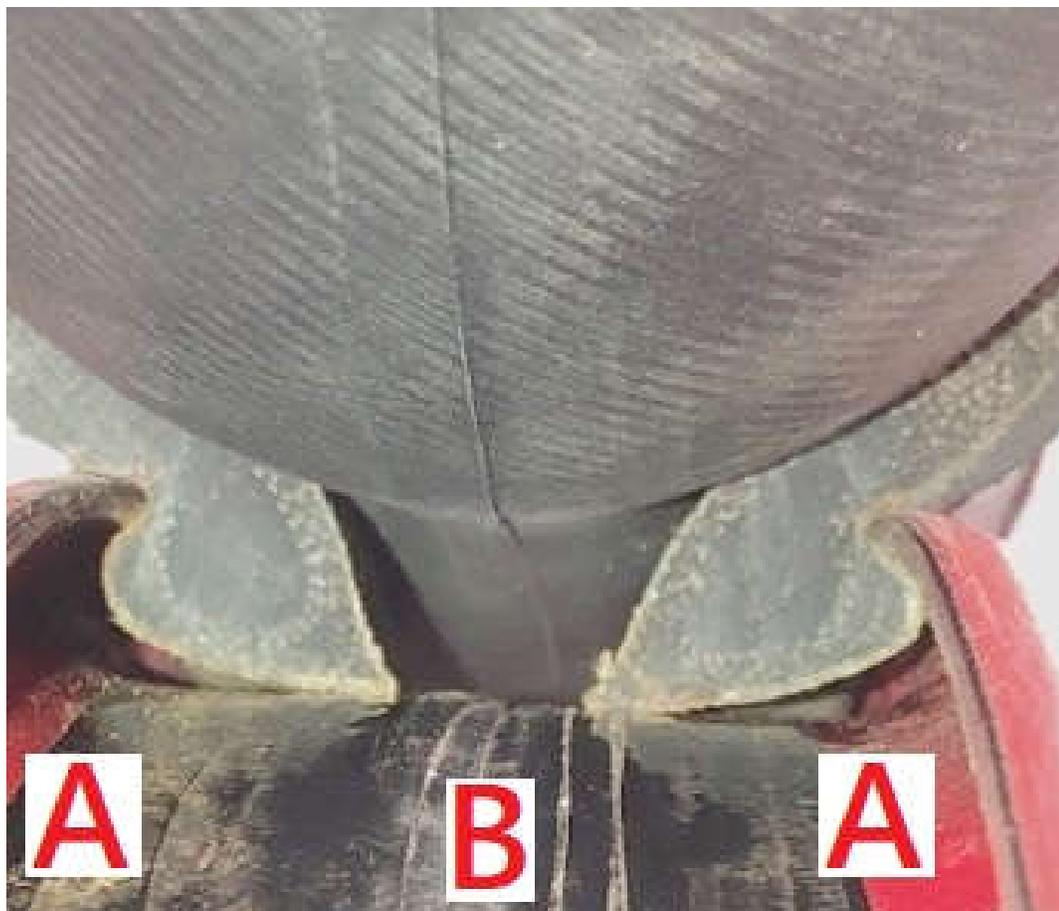
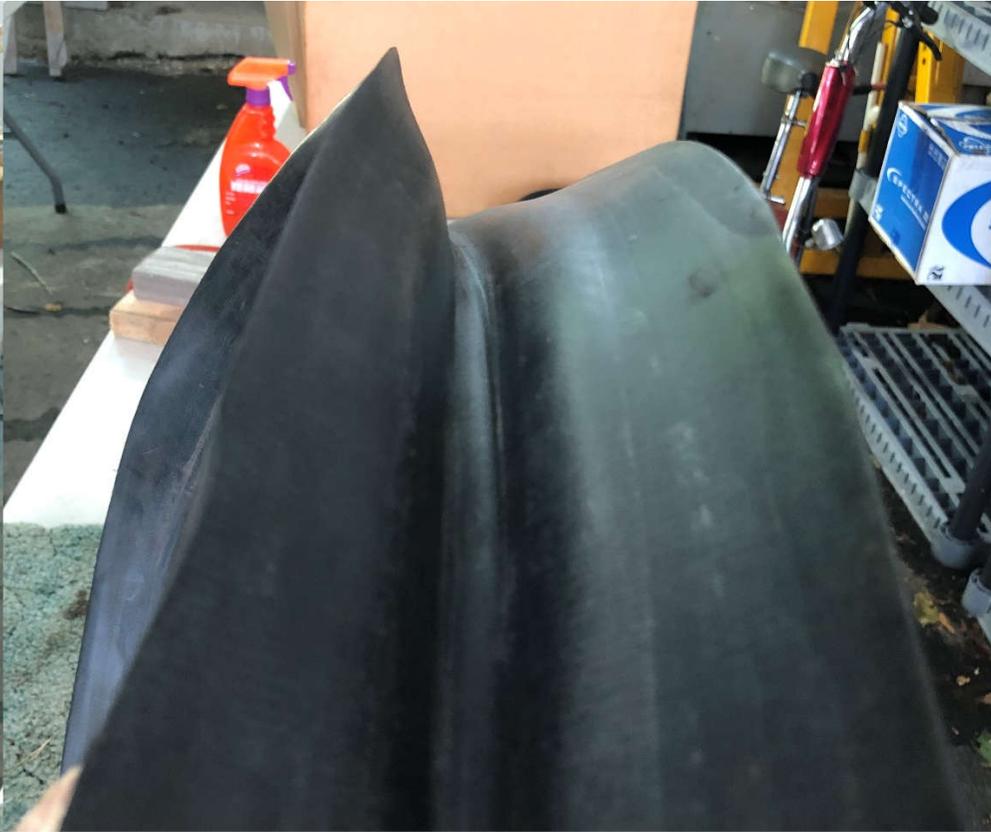


Figure 11 Fit - McLaren Rim

Universal T Driver McLaren Rim

This is the same tire segment and tube inflated as before. The tire only makes two points of contact with the rim – at the bead to rim notch and at the tip of the tire bead. There is a gap between the bead and the rim at "A". even under full pressure, the tire bead will not match the McLaren rim profile. The end result is less contact between the tire and rim.

Flaps



These are the heavy duty flaps that I ran for several years hoping they would make a difference. They did provide protection between the tube and the rim. They did not prevent slippage.



The flaps filled in the gap between the tire beads and actually deformed to a new shape. This deformity demonstrates the gap that existed between the beads of a Universal T Driver.

Figure 12 Deformed Flap

Measurements

Clincher rim gap width and depth was measured on 18 Ford rims and 4 McLaren wire wheels.

# Ford Samples	Gap Range	Gap Average
18	2.024" – 2.130"	2.065"
# McLaren Samples	Gap Range	Gap Average
4	1.863 – 1.947	1.928"

The gap on the McLaren rims is a little over 0.1" narrower. It is not clear if this is a contributing factor to tire slippage.

Tire bead width is different from one brand of tires to another. Figures 15 – 17 show three examples.

The Universal T Drivers (UTD) bead width and shape is a contributing factor in tire slippage on McLaren rims.

The Universal T Driver tire bead is the smallest of the tires I measured.

Figure 8 shows the shape of the UTD bead.

The bead does not extend wide enough to make sufficient contact with a McLaren rim to prevent tire slippage.

I recently replaced my Universal T Drivers with new Firestone tires.

The construction of the Firestone tire bead is wider and tapered to a sharp edge.

Figures 16, 18 and 19 show the Firestone bead.

The Firestone bead is about 0.250" wider and tapers to a sharp edge.

When installed, the edges of the beads extend to nearly touch each other (Figure 18).

After putting the first bead on the rim, the tube was inserted.

The stem of the tube could not be inserted into the hole because it was covered by the first bead.

A notch had to be cut to allow the stem to be inserted (Figure 23).

The firestone bead contacts a much larger area of the McLaren rim.



Figure 13 Gap Width 2.043



Figure 14. Depth at Centerline (net)



Figure 15 Universal T Driver Segment 0.949



Figure 16 New Firestone 1.201" (Vietnam)



Figure 17 Vintage Wards Riverside 1.077



Figure 18 New Firestone – Feathered Edges extend to a sharp edge

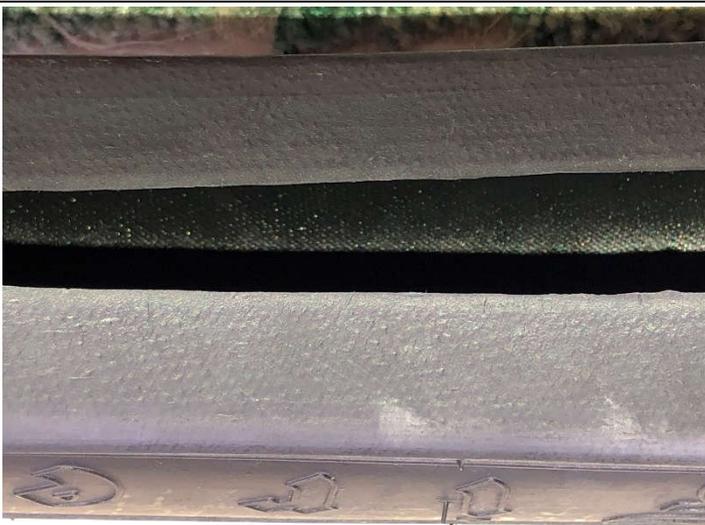


Figure 19. Firestone tire beads.



Figure 20. Clincher Profile Test Gage

This test gage was drawn from the Ford drawing on a computer with an engineering CAD program. It was then fabricated on a computer controlled (CNC) milling machine

The gage in Figure 19 was used to compare the clincher profiles of the Ford and McLaren rims. The results are shown in Figures 20 and 21. The differences are clear.



Figure 21 Rust-Oleum Pickup Bed Coating



Figure 22 Rust-Oleum Coating Application

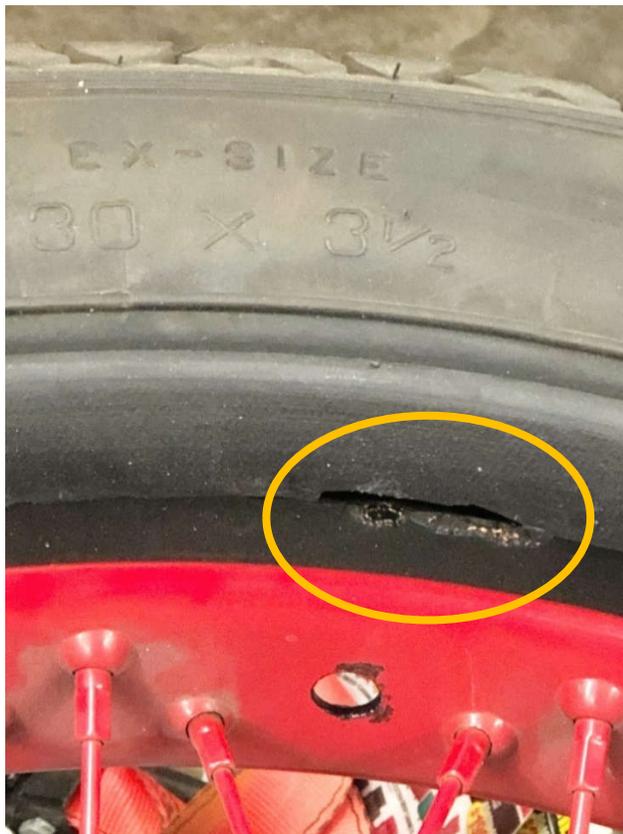
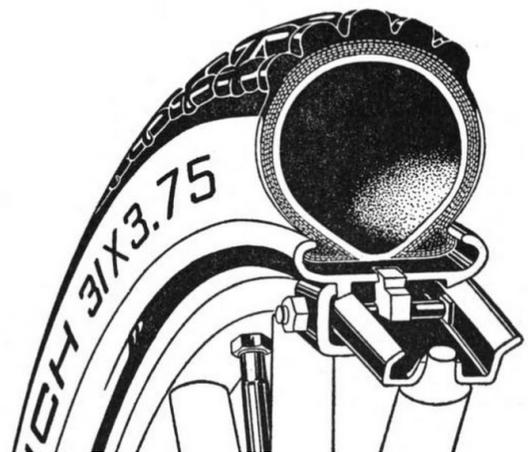
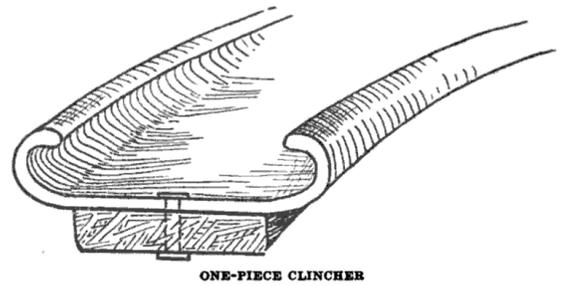


Figure 23. Notch was cut to facilitate the insertion of the inner tube stem into the rim hole



Final Thoughts

The combination of Universal T Driver tires and McLaren Wire Wheels created a condition that allowed the tire and tube to slip rotationally relative to the wheel.

If the tire slippage is not monitored, the slippage would reach a point where the inner tube stem would shear off from the tube causing a blowout.

The clincher profile on the McLaren wire wheel is different than the Ford clincher profile.

The McLaren profile contour does not match the clincher tire bead contour.

Contact between the McLaren wire wheel and the Universal T Driver tire bead was only two points.

Overall surface area contact between the tire and rim is not sufficient to prevent slippage.

Flaps and various types of tape placed on the rim did not help.

The Universal T Driver (2007 vintage) clincher bead does not extend to a feathered edge like the Firestone tire.

This is not an issue on standard Ford clincher rims because the tire bead and clincher profile match.

There is sufficient surface area contact to prevent slippage.

Prior to purchasing McLaren wire wheels, I ran wood spoke demountable rims and Universal T drivers for many years with no slippage problems.

It is my hope that the Firestone tires with the wider feathered edge bead and increased rim contact area friction with pickup bead liner coating on the inside of the rim, will mitigate the problem.

Preliminary results are promising.

I have had the car out a couple of times and the tire position is holding.