

Glue & Tubular Tires

Ken Hart



Where Old School meets New School

With the increases in clincher tire quality, tubular tires have nearly disappeared from competitive cycling. Tubular tires were practically a niche market of the track cycling community.

The recent rapid growth of cyclocross has brought a resurgence in the use of tubular tires, and with that, a new need of how to work with tubulars, which is now almost a lost art.

What is a Tubular Tire?

When John Dunlop invented the pneumatic bike tire in 1888, he did so by sewing an inner-tube inside of rubber coated cloth, he also invented the tubular tire. Tubular (sew-up) tires typically using cloth in making the casings. The tire is sewn together with the inner-tube inside of the casing.

Tubulars are lighter because there is no bead on the tire, no hook on the rim, and use lighter materials in the casing, inner-tube and tread. This change in construction allows a tubular tire / wheel to be 3-4 ounces lighter than a clincher tire / wheel. With 2 wheels on the bike, the savings in weight can be almost 1/2 pound!

This weight savings provides an increase in performance which is another reason that tubulars are popular.

Tire Types	Rim Types
 <p data-bbox="305 1591 617 1617">Tubular .vs. Clincher Tires</p>	 <p data-bbox="993 1602 1305 1627">Tubular .vs. Clincher Rims</p>

Glue

Since there is no hook or bead to hold the tire in place on the rim, a semi-permanent glue is used to hold the tire to the rim. Technique in applying glue is important to ensure that the tire stays on, especially under the extra pressures of cornering or on the banking of the velodrome.

Several different types of adhesives are available for gluing on tubular tires.

1) Traditional glues, usually come in a small tube, similar to a toothpaste tube. With some hunting, you can find some brands that can be purchased in a can, with an application brush in the lid. These glues come in two styles: non-hardening & hardening. Usually glue vendors sell both styles of glue, and differentiate between the two styles by calling them different colors. An example would be Clement white glue versus Clement brown glue.

A) Non Hardening glues actually do harden, but when dry, look like rubber cement. Also, non-hardening glues will always be a little tacky to the touch, even when dry.

B) Hardening glues, when completely dry, have no tackiness to them. Think of “Elmer's glue”, when thinking of this (But do not use Elmer's glue!)

There are several reasons for the difference. Since non-hardening glues are always a bit tacky, they are popular for road riding. If you have a flat on the road, you can put on a spare tubular tire, and the tackiness of the glue on the rim, plus the tackiness of glue on the spare tire, will keep the spare from rolling off the rim, allowing you to complete your ride safely.

Because non-hardening glues are on the “rubbery side”, they always have a bit of flexibility in the contact gluing surface. This allows the tire to move around a bit, which causes an increase in the coefficient of friction of the wheel. This increase in drag is slight, but is measurable.

Hardening glues do not have this issue, as there is no springiness in the glue when it is dry. This makes hardening glue the “traditional” glue of choice for timed events and track events, where there is no need to change the tire “on the road”. A hardening glue will improve the coefficient of friction by about .002 to .004.

2) Rim tape, looks like cloth handlebar tape that has been dipped in adhesive, and is sticky on both sides. The rim tape is stuck to the rim, and then the tire stretched over it. TUFO makes the most popular version of this.

3) Alternative glues, are glues that not made specifically for mounting tires, but do work successfully for the task. The most popular glues come from the auto industry and are used to stick the rubber trim molding to the sides of cars, and the most popular of these is the 3M product “Fast Tack trim adhesive”, 3m part # 08031. It is similar to the non-hardening glues from above, with an easier clean-up, and faster drying time.

4) Shellac, is the “vintage way” of gluing on tires, and is rarely seen, except at the national and world level. It is a time intensive process, but creates the hardest bond, as well as the strongest bond. Imagine taking a piece of cloth, soaking it in varnish, then placing it on a piece of furniture. When dry, the cloth is a part of the furniture, and is not coming off. Tires that are glued on with shellac are destroyed during the removing process and cannot be recycled.

Traditional Glue	Rim Tape	Fast Tack 3M 08031
		

Gluing on a Tubular Tire

A) Pre-Stretch the tire.

New tubular tires are smaller than the rim they go onto. This forces you to stretch the tire, creating a tight fit, once the tire is in place. This tight fit, although holding the tire on the rim, is not tight enough for riding. Glue is still needed to hold the tire in place. Pre-stretching the tire make the tire mounting process less physically difficult, as well as less messy.

Using an old tubular rim or wheel, stretch the tire onto the rim. Start by putting the valve in the valve hole. Next, grab the tire about 12 inches to the left of the valve with your left hand, and about 12 inches to the right of the valve with your right hand.

With both hands, stretch the tire away from the valve hole and onto the rim at the same time. Pull the tire evenly onto the rim with both hands at the same time; working down the left side and right side of the rim at the same time. If you do not, the valve may become crooked in the valve hole.

When this section is seated and stretched, grab the tire another 6 inches farther away from the valve hole, stretching and seating the tire as you go. Repeat this process, working around the rim.

You will eventually get to a place on the rim opposite of the valve hole, with perhaps 12 inches of tire yet to be mounted. If you did a poor job of stretching (or pre-stretching) the tire, there might be 16 inches of tire remaining to be mounted. If you did a good job of stretching (or pre-stretching) the tire, there might be 6 inches of tire left to mount. If you have not stretched the tire enough to get to this point, it may be nearly impossible to stretch the remaining part onto the rim.

At this time grab smaller sections of the tire, perhaps only 1-2 inches worth, prying the tire onto the rim. This section of the tire often goes onto the rim crooked, so once the tire is on the rim, pay extra attention to this section to ensure that it is centered on the rim.

Some tires are tighter than others. If you want "Extra stretch", put 2-3 clincher tire irons between the tire and rim, spaced evenly around the rim.

There are good photos of this at the Park Tool website:

<http://www.parktool.com/repair/readhowto.asp?id=101>

NEW (or Clean) rim mounting process

1) Check the gluing surface of the rim for burrs, flash, etc...

I am gluing up some cane creek wheels right now, for a local college rider, and 80% of the spoke hole have metal flash left behind from the drilling process.

1A) Some people take a fine emery cloth to gluing surface on both alloy and carbon rims, Sand just enough to take the gloss off of the gluing surface. I do not do this, but thought you would like to know.

2) Use a solvent to clean rim / gluing surface.

(Most aluminum rims are shipped with an oil coating to prevent tarnish. (Many carbon rims have "Mold-release compound" remnants on them) I have talked to Zipp, and acetone is ok on carbon, so I use acetone for both alloy and carbon rims

3) Pre-stretch the tire, preferably on an old rim that has no glue on it.

Since we will be putting glue on the wheel we will be mounting the tire on, a separate rim is preferred for stretching.

Start by putting the valve in the valve-hole. Grab the tire in each hand, about 12 inches each side of the valve hole. With both hands, stretch the tire away from the valve hole and onto the rim at the same time. When this section is seated and stretched, grab the tire another 6 inches farther away from the valve hole, stretching and seating the tire as you go. Repeat this process, working around the rim.

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4) Inspect and stretch tire

Once the tire is on the rim, pump up the tire to 30 pounds or so, and center on the rim. Once centered, inflate the tire to 100 psi. Tires do have a warranty, but that warranty is void, once glue is placed on the tire. Let tire stretch at least 24 hours.

When we come back to it, check air pressure, to ensure tire is good.

Tires usually come in bundles of 12 – 24, and usually, if 1 tire is bad in a bundle, others in the same bundle tend to be bad, too.

If the tire is bad, return it, and try to get a tire from a different bundle (this may be hard to do at a smaller bike shop, where a bundle may last 6 months).

****NOTE:** Make sure that the tire holds air **BEFORE** you glue it on. Tires with glue on them cannot be returned.

5) Put 1st coat of glue on the rim,

Make sure to get glue from edge to edge.

Let dry 6-24 hours depending on brand of glue and humidity of air.

6) Put first coat of glue on tire base tape.

Check tire pressure, for warranty, then deflate and remove from rim. put about 10 pounds of air in tire, just enough to make it round, but not enough that it twists sideways on itself (flat-molded vs. round-molded tire) Imagine a white cotton shirt, if you sprinkle water onto it, and the water does not get "into" the fabric, the fabric is still white. but when the fabric is "soaked", it now looks grey. Make sure to work the glue into the cotton base tape. work it in enough that the base tape becomes "soaked", and not just covered with glue. let glue dry 1 -2 hours, then place tire back on to rim to keep the tire stretched. (if not place back on rim, the tire will try to shrink back to its un-stretched size)

7) put second coat of glue on rim,

wait 6-24 hours

We are now ready to glue tire to rim

8) Glue rim first. The glue should "tack" in 20-45 minutes, depending on glue, humidity, heat.

9) Glue tire second. The base-tape will absorb the glue, and should "tack" in 10-20 minutes. if your timing is good, the rim and tire will "tack" around the same time.

10) Stretch tire onto rim. Once tire is on the rim, work around the tire, centering it on the rim. flip wheel over, check other side for centering.

11) Put wheel in truing stand, with 30 pounds of air. Inspect the tire to ensure that it is centered on rim. Sometimes base-tapes are crooked, and if you center tire based on base-tape, the tread may be crooked. Center tire as needed.

12) Pump tire up to 100 psi. Clean off any glue that may have gotten onto the sidewalls of the tire, or onto the braking surfaces of the rim. The longer you wait, the more difficult it becomes to remove the glue.

Depending on brand of glue, heat, humidity, wheel is ready in 1-24 hours.

Of course waiting longer is ok. Humidity and cold slow down the drying process.

Park Tools has some good info at:

<http://www.parktool.com/repair/readhowto.asp?id=101>

What to do when you get a flat on the track

Even though the track is cleaner and has fewer “hazards” than riding the road, flats still occasionally happen on the track. There are two types of flat tires, with each having different characteristics, requiring different reactions to getting off the track safely

Slow leaks can come from several sources. “Snake-bites” are the most common source, where an under-inflated inner-tube gets pinched between the rim and some surface. Latex inner-tubes also lose air by their design, often going soft in 24 –36 hours. A sticky presta valve can cause slow leaks. If the tire has a slow leak, you will notice a change in the handling as the soft tire makes the bike overly sluggish. You will notice that you have to overcompensate to get the bike to do what you want.

To confirm the tire is soft, shift your weight a couple of times, loading and unloading your weight on the tire that is suspect, looking at it while you do this. If you see any visible deflection in the tire, then it is soft. If this is the case, slowly move down track, trying to ride a steady line, and plan on getting off of the track in a lap or two.

Punctures are a more serious issue. They can come from hitting something, such as a screw or nail. I have seen promoters use staple guns to hang banners on the balustrade, leaving staples on the banking during the event, and even more staples after the event, when the banners are torn down. Rapid deflation can also come from old, worn, or improperly cared for tires where the casing or stitching burst from the high pressure typically used for track racing.

When a tire punctures on the banking, it is obvious. The best way to handle the situation is to keep the rims as perpendicular to the tracks surface as possible and aim for the apron as soon as possible without interfering directly with other riders. Most likely, they will realize you have a flat as soon as you do and they will avoid you at all costs. The reason you want to keep the rims perpendicular to the tracks surface is that you want to keep as much traction as you can between the bike and the track. Hopefully the tire does not roll off the rims and there is rubber between the rim and the track. This is most desired.

There is also a difference between a flat on the front wheel versus a flat on the back. The front wheel is the primary steering wheel. If you experience a flat on the front, immediately shift your weight from the front wheel to the back of your bike to the best of your ability and try to steer more with your hips than the front wheel. Rear wheel flats are easier to handle, just make sure that the bike is perpendicular to the track and shift your weight more forward.

[Technical FAQ: Gluing tubular tires for cyclocross](#)

by [Leonard Zinn](#)

November 17, 2009

As promised, here's the procedure for gluing a 'cross tubular tire so it won't come off. Though it can still ruin your day, the downside of rolling a tubular in 'cross is generally not as big as in a criterium or on a winding mountain descent.



Photo 1: From left, Mavic GP4, Ritchey WCS Apex, Mavic Reflex tubular rim bed profiles.

That said, the likelihood of a rolled tire is higher in 'cross, as you can see in three races that Jonathan Page was either the victim of a rolled tire or two or the winner who benefited from a competitor's rolled tire (see "[Compton, Powers rule USGP opener](#)," "[Planet Bike 2: It's Compton and Vervecken](#)" and "[Page doubles](#)").

Rarely do you hear of pro riders rolling tires on the road, despite many more events and competitors than in cyclocross, partly because high pressure in a road tire helps hold it on the rim. The low tire pressures used in 'cross (often around 25 psi compared to often around 125 psi for road racing) combined with: the bigger tire size providing more leverage against the ground to roll the tire, the fact that the bigger tires don't fit down into rim channels designed for a smaller road tire, and the frequent mud soaking and washing that the wheels and tires receive, means that holding the tire on the rim is a more difficult proposition. Also, a 'cross rider generally utilizes more wheels and tires for a given set of events, since different tread patterns and tire sizes can be advantageous, so travel to races with all of the equipment plays a role, as you can see in [Jonathan Page's blog](#) on his three rolled tires in a weekend this past September shows (scroll down to the "Rolled tires update").

Note also in Photo 1 how much flatter on the gluing surface the old Mavic GP4 is on the left than the 50mm-deep Ritchey carbon rim (center). That deep gluing surface is fairly representative of the rim bed shape on many carbon rims, as are the sharp edges as opposed to the GP4. The new Mavic Reflex rim on the right has more rim bed curvature and sharper edges than the GP4, but less than the carbon rim.

Gluing tubular cyclocross tires

While it is fine for the road, I don't recommend glue alone for 'cross, and while it is fine for triathlons and time trials and may also be for road racing, I also don't recommend using just tubular gluing tape and no glue. Using glue and "Belgian" tubular tape was suggested to me by Stu Thorne, owner of [Cyclocrossworld.com](#) and mechanic to Tim Johnson, Jeremy Powers, and Jamie Driscoll, and it really holds the tire on. But also pay particular attention to the second step if you have a Vittoria or similar tire, because all the rim cement in the world will not keep your tire on if the cement is not adhered to the tire. Before gluing a new tubular, stretch it first over a rim, inflate it, and leave it overnight or longer, making sure it holds air before you invest any more time in it (all tubulars with latex inner tubes bleed air and become softer, but not flat, overnight). To stretch it on, install the tire without any glue on it by using the method described in step 9.

If it has a coating over the cotton, scrape the base tape of the tubular with the edge of either a serrated table knife or a half-round metal file to produce a good gluing surface (don't chafe the sidewall with it). The woven cotton base tape on Vittorias and some other tubulars has a coating of latex over it to which the rim cement will not bond well. The tire can roll cleanly off of the rim, leaving no glue on the tire, if the base tape has not been properly prepared. Skip Step 3 for most Continental, Challenge, and Tufo tubulars, which usually have no latex over the base tape.

Start by pumping the tire (not on the rim) until it turns inside out and the base tape faces outward. By using the serrations of a table knife or the rough side of a metal file, scrape the base tape back and forth until the latex coating on the tape balls up into little sticky hunks. Knock the bigger sticky globs off, but you can leave the smaller ones.

Prepare the rim for glue. Sand it with sandpaper and remove the dust with alcohol (or acetone while wearing rubber gloves and a respirator). Roughing up the gluing surface with sandpaper does not help the tire stick to the rim better, but solvent will not remove everything (Teflon and mold-release compounds, for instance), and sandpaper can remove some invisible contaminants that would prevent the glue from sticking to the rim. I do the sanding, cleaning, gluing and taping on a truing stand, but if you don't have one, don't sweat it.

With a rim that has been glued before, you can just apply a uniform layer of glue, unless there is a really thick, lumpy layer of old glue on the rim. In this case, scrape the big lumps off, and get the surface as uniform as you can, or strip the entire rim with acetone.



Photo 2: Brushing glue on a rim.

Put a thin layer of glue on the rim, edge-to-edge (Photo 2), and a thin layer edge-to-edge on the base tape of the tire. After reading the [gluing studies by Chip Howat](#), I recommend Vittoria Mastik 'One. I get it by the can and use a cheap acid brush to spread it on as in the photos. This is the most cost-effective way if you're gluing more than four tires or so. I can probably glue 10 tires with a can. I wear rubber dish gloves to keep from getting my fingers sticky. If you're using glue in a tube, I recommend having a couple of tubes per tire on hand. Squeeze a bead out of the tube and then put a plastic bag over your finger and spread the glue on the tire and rim thinly and uniformly. If you let the layer on the tire get too thick, the base tape of the tubular can become so rigid that it can tear. I now only recommend a single glue layer on the tire for this reason, unless you see that the glue has really soaked into the tape, in which case you should go ahead and put a second layer on as soon as you finish the first layer on the other tire. Let it dry overnight in a warm place (not in the cold garage), with the tire deflated, so the glue doesn't hold it in a shrunken state.



Photo 3: Applying tape over the glued rim bed.

After the layer of glue on both the rim and tire has dried overnight, brush or smear another layer of glue on the rim. Let this set for maybe 15 minutes (or for how long it takes to glue the other rim), and put on a layer of the gluing tape, pulling it tight and centered onto the rim (Photo 3) and pushing it down into the rim bed with your thumb (with the top backing still on). Start at the valve hole and cut it off there as well. Peel the backing off of the gluing tape (Photo 4) and brush or smear another layer of glue on over it (Photo 5). Let this layer set for 15 minutes or while you brush the other rim.

Deflate the tire, but leave enough air in it to give it a little shape. At this point, if you have a clean rim around, I can recommend local bike legend Pete Webber's "best gluing tip," namely, once the glue on the base tape has set up, stretch it onto an unglued rim and leave it inflated until you've put the final layer on your rim. Deflate the tire – not completely! – and move it straight over from that wheel to the glued wheel. It does seem to make the final installation of the tire easier.

Mount the tire as follows:

(a) Stand the wheel up with the valve hole facing up.



Photo 4: Peeling off the tape backing.

(b) Put the valve stem through the hole, and, leaning over the wheel, grab the tire and stretch outward as you push the base tape into the top of the rim. Keep stretching down on the tire with both hands, using your body weight, as you push the tire down around the rim. I like to lean hard enough on the tire that my feet lift repeatedly off the ground. The farther you can stretch the tire at this point, the easier it will be to get the last bit of tire onto the rim.

(c) Lifting the rim up to horizontal with the valve side against your belly, roll the last bit of the tire onto the opposite side of the rim. If you can't get the tire to pop over the rim, peel the tire back and start over, pushing down again from the valve stem. You want to avoid the temptation of prying a stubborn tire onto the rim with screwdrivers or other tools, as you will likely tear cords in the base tape and tire casing, leading to a bulge in the tire in this area.

By pulling the tire this way and that, get the edge of the base tape aligned with the rim. Your goal is to see about the same amount sticking out from the rim all the way around on both sides around the wheel.

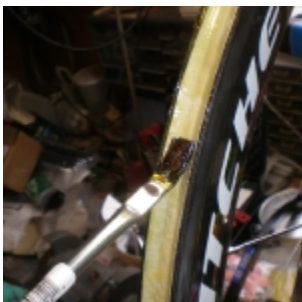


Photo 5: Brushing glue on over the tape.

Pump the tire to 100 psi and spin the wheel, looking for wobbles in the tire. If you find that the tread snakes back and forth as you spin the wheel, deflate the tire and push it over where required. Re-inflate and check again, repeating the process until the tire is as straight as you are able to get it. The final process will depend somewhat on how accurately the tubular was made; you'll find that some brands and models glue on straighter than others.

Pump the tire up to 120–130 psi and leave it overnight to bond firmly.

You can get an even better bond by using a woodworker's band (miter) clamp around the entire inflated tire. A miter clamp is a piece of nylon webbing with a cam-lock buckle on it. Depress the tab on the buckle to let out enough strap to surround the inflated tire and wheel. Pull the end of the strap to tighten the loop around the tire. Use a wrench to tighten the clamp and put extra pressure down on the tire to conform its bottom surface to the rim and bond it tightly.

Tomorrow you can drop the pressure and go ride or race on this wheel. I recommend [putting sealant in it first](#).

Gluing carbon rims

As a deep rim section is an advantage for steering in mud and sand, and aluminum deep rims are prohibitively heavy, carbon rims are extremely popular in 'cross. But Howat's research indicates that tires tend to snap off of carbon rims, rather than peel off, meaning that it may take as much force to get them started off of the rim, but then they can roll right off, rather than requiring pulling and peeling to continue to get them off.

I think that the best thing you can do to preclude this is follow the above multiple-layer gluing and taping procedure with clean rims and scraped base tape. I theorize that the gluing tape, by having some structural integrity (the "[Belgian tape](#)" sold by cyclocrossworld.com consists of woven threads covered with sticky stuff) will tend to reduce the likelihood of the tire snapping off, since it will not peel easily off of the rim or the tire. I've found it to be a real bear to get a tire off the rim if it's glued this way.

It's still a good idea to re-glue at the beginning of the next season, however, as the glue can dry out and become brittle and less sticky, although the tape will still help with that.
Using Glue and Tufo tape instead

This fall, cyclocrossworld.com was out of stock for a long time on the Belgian tape, so I glued three sets of carbon wheels using the above method but substituting Tufo Extreme Tape. It seemed (and still seems) like they were really on there, but I rolled a front one at the [Boulder Cup](#). The entire tire did not come off, just a 10-15cm section. I was amazed that it had happened at all and confirmed something about Tufo tape that I have received correspondence about in the past.

When I peeled the tire off (which was dishearteningly easy to do), I found the first, 20mm-wide, clear plastic layer pulled away fairly easily from the rim. It also was pulled away from the tire and torn where it had rolled. I could pull the rest of the entire clear strip off of the tire and rim all of the way around in a single piece, and when it came off, it was not at all sticky on either side.



Photo 6: The wider (top) and narrower clear layers of Tufo Extreme tape.

While I have had many people write me about the great success they have had with Tufo tape alone not only holding their tires on in criteriums and other road events while being much easier to use than glue, I have had one letter from a furious reader who was injured when his Tufo tape delaminated and his tire rolled off, leaving a layer of tape on the rim and a layer of tape on the tire. Now I have had a similar experience, but with only mild scratches on my nose and knees to show for it.

Below that first transparent layer, there was yet another clear plastic layer, narrower than the first (13mm wide; see Photo 6), that had also peeled back a bit and was torn in that in one spot. With more effort, because it was fairly sticky on both sides, I was able to peel that layer off of the tire all of the way around in a single piece as well.

Still left on the tire was a narrow, white, gooey layer that is the white strip you see on a new roll of Tufo tape through the clear tape when you peel off the pink backing and apply it on the rim. That white layer I left on, because it was not only very gooey and sticky, but it also had no structural integrity and could not be peeled off in a strip; it would have had to be scraped off.

Now, however, I finally got more “Belgian tape” and glued my tires with it before this past weekend.

I cannot see the point of the multiple layers in the Tufo tape. It seems like a perfect tape would be essentially duct tape that had the same sticky surface on both sides and no shiny lamination on the top – just the woven fabric with sticky stuff on both sides, and that pretty much describes the “Belgian tape.”