

## **How to make your own tubeless wheels**

### **By Walt**

Many of my idiot friends, and others, have been asking me how exactly the homemade tubeless system works. I can't take credit for inventing it (I never figured out how to make a decent sealant, so my experiments all originally ended in failure) but Stan of Stan's Tubeless ([www.notubes.com](http://www.notubes.com)) solved the problem by inventing a sealant made of latex. More on that later. Regardless, the system seems to work well for most people who are mechanically inclined and like to futz with stuff. If this doesn't describe you, you may want to stick with tubes, or blow a wad on a UST setup. Then again, UST is \$500 or so, and this system should cost you under \$50, even if you splurge on all the optional equipment.

### **So how does it work?**

Like a tubeless car tire (around since the 1950s) tubeless bike tires are simply airtight versions of their non-tubeless brothers. With enough pressure, the rubber edge of the tire forms an airtight seal with the bead of the rim. Or, that's the theory, at least. In practice, commercial tubeless tires tend to be heavy (most are 700+ grams), leaky (many first generation UST tires lost 10-20 psi overnight) and unreliable. The homemade system solves all these problems when used with non-UST (standard) tires, though there are some additional concerns. The system also allows you to run UST tires on regular rims without buying another wheelset – or vice versa.

Basically, a liquid latex sealant (similar to Slime) is used to seal small leaks left over from the rim sealing process which I'll describe in a minute.

### **Supplies:**

There are both mandatory and optional items necessary to construct your homemade tubeless wheelset.

#### **Mandatory:**

- 1 roll of rubber (vinyl) electrical tape, regular width. ~\$2
- 1 roll of fiber-reinforced packing/strapping tape ~\$2
- 2 old valves from a presta OR schraeder tube, with about ¼ inch of rubber left around the valve. Free, hopefully. Schraeder valves from bicycles generally will NOT work. You have to find some from a motorcycle tube if you want to use schraeder. Note that the drilling of the rim is irrelevant to which valve type you can use, as long as the valve will fit through the hole.
- Set of tires with rubber sidewalls, in decent condition. Older/worn out tires work poorly, at best. Also free, since you presumably already have some tires.
- Jar of liquid latex. This is available from craft/hobby stores and is usually labeled "moldbuilder". A big jar with enough latex for hundreds of tires should run about

**\$12. If you or anyone you live with has a latex allergy, do NOT attempt to use this system!** Having trouble finding it? Buy it from Alpine:

[http://www.alpineimport.com/cgi-bin/webc.cgi/st\\_main.html?catid=146&sid=4sxEDW0W52h@EJ6-58102071543.9b](http://www.alpineimport.com/cgi-bin/webc.cgi/st_main.html?catid=146&sid=4sxEDW0W52h@EJ6-58102071543.9b)

-Water. Free.

-Access to an air compressor or air tank, or a CO2 inflator and cartridges. Free if you're willing to drive to the gas station.

-Medium-grit sandpaper. \$2.

-Bottle of dish soap. \$2.

-Bottle of Slime tire sealant (I recommend the tubeless variety). \$5.

All the mandatory components should cost no more than \$30 total.

### **Optional (but nice):**

-Michelin plastic rim strips. These are the kind that come on cheap wheelsets. You can also get them from [www.notubes.com](http://www.notubes.com) for a very fair price. Or maybe you've already got some lying around. Cloth rimstrips will work in a pinch.

-Air compressor or air tank. Air tanks are cheaper and will work fine. You can get them at any hardware store in the paint section. These generally cost \$25 or so. DO NOT get a compressor intended for emergency auto use (like the ones that plug into the cigarette lighter). They will not produce enough air.

-Presta/schraeder adapter. Nice if you use a presta valve, so that you can use a compressor to inflate. They cost a buck at any bike shop.

-Jug of windshield washer fluid. This is useful as an antifreeze ingredient, and also helps prevent evaporation of your sealant, since it contains ethylene glycol. Keep it away from pets and small kids!

-CO2 inflator and cartridges. These are good if you don't want to buy the compressor or don't have access to a good one at a gas station. They cost about \$20 at any bike store. Buy the NON threaded, 12 oz type, because you can use BB gun cartridges (fifty cents) instead of bicycle specific cartridges (several bucks each).

### **Ok, jeez, I've got all the stuff. What the hell do I do with it?**

This will take you a few hours the first time. And you'll make a huge mess. So find somewhere to work where you don't mind spills and get to it!

### **Step 1:**

This one is relatively straightforward, but annoying. Remove your old tires, tubes, and rimstrips from your wheelset. In other words, get everything off of the rim until you can see bare aluminum. Now you can get out the sandpaper and sand off the inside surface of the rim until it's really, really clean. Get rid of **all** the residue from the rimstrip glue and any dirt, as well as removing any burred edges of the spoke holes. The inside of the rim should be clean and smooth when

you're done – if it's not, keep working on it! Wipe the rim off with a CLEAN rag to remove any residual dust/dirt or moisture.

**Step 2:**

Now things get a bit more tricky. Tear your roll of strapping tape (this is easy to do, thanks to the fibers) so that you can pull off the tape in a ~1/2 inch wide strip (the tape needs to be wider than the spoke holes, but just barely). Using a LOT of tension, tape over the rim holes with one continuous strip of strapping tape, making sure that it is VERY tight and no air bubbles form between tape and rim. Overlap the tape 3 inches or so – you should only need a single layer. Again, take a clean rag and wipe down the tape/rim to help remove the sweat/grease/grime that was all over your hands.

**Step 3:**

Next grab your roll of electrical tape, and tape over the strapping tape, making sure that the electrical tape covers both sides of the strapping tape. This should be easy, since the electrical tape is much wider. This time, DON'T use tons of tension when installing the tape – only enough to make sure that NO bubbles or loose spots pop up. Again, overlap the tape by 3 inches or so.

**Step 4:**

Using the clean rag (well, hopefully it's still clean) press the electrical tape onto the rim and rub out any air bubbles that formed when you were taping. Make sure the tape is relatively even and covers the strapping tape completely.

**Step 5 (optional):**

Cut the Michelin rim strip so that the valve hole portion of the strip is chopped in half. Then press it onto the rim (make sure you remember where the valve hole is). This helps to prevent damage to your taping job when installing and removing tires on many types of rims. It adds 20 grams per wheel, though if you're a complete weight freak, you can take a hole punch and reduce this to about 10 grams. If your rim isn't skinny enough to hold the rimstrip in place, don't cut it, just work it onto the rim like you would a tire, making sure that the valve holes of the rimstrip and rim line up.

**Step 6:**

Using a punch or small screwdriver, punch a hole in the tape where the valve hole in the rim is. Be VERY careful not to pull the tape away from the rim on the sides in the process! It's usually best to use a tiny file (available at a hardware store for \$5 or so) to slightly enlarge the hole before proceeding further, since the tape can be pulled away from the rim when you install your valve if you're not careful. It's best to file away most of the tape so that you can see the metal around the edge of the valve hole.

**Step 7:**

Take your valve and dip the rubber end in the liquid latex. Then push it through the valve hole and install the metal donut until it's about as tight as you can get it by hand. This will seal the valve to the rim. There should be latex all around the rubber part of the valve. It's usually best to let this dry a bit (for 15 minutes or so) but not necessary.

### **Step 8:**

Things will begin to get messy here. Take a heaping spoonful of the liquid latex and add  $\frac{1}{4}$  cup of water, plus a tablespoon of windshield washer fluid if you're using it, and a tablespoon of slime. An old jar is a decent container to mix in, since you're pretty much going to make a sticky latex mess – don't use anything you want to drink out of ever again. Mix these ingredients up until most of the big chunks of latex are gone (you actually don't need to mix all that well, riding your bike around will do a better job of this than you ever could anyway).

That recipe again:

Tablespoon of latex.

$\frac{1}{4}$  cup of water.

Tablespoon of windshield washer fluid.

Tablespoon of Slime.

Set this mixture aside for a moment.

### **Step 9:**

Now grab your tire and your dishwashing liquid. Set the tire on the ground and put a thin bead of dishwashing liquid all the way around the bead (where the tire seats on the rim). Install this side of the tire on the rim. Now put the dishwashing liquid all the way around the other bead of the tire, but don't install this side onto the rim yet.

### **Step 10:**

Pour the latex/water/washer fluid mixture into the tire while holding the wheel upright (as it would be if you were riding your bike). Now carefully (don't spill!) install the remaining bead of the tire onto the rim.

### **Step 11:**

All that remains is the inflation. If you're using a presta valve, you'll probably have to get an adaptor so that you can use a standard compressor chuck. Occasionally it's possible to inflate the setup with a floor pump, but not often. So take your gooey, liquid-filled tire to the gas station (one with a high-pressure compressor) and inflate it. **BE CAREFUL NOT TO INFLATE PAST 60 PSI!** Most mountain bike rims will explode at pressures significantly beyond 60. You can also use your home compressor or air tank, or use a CO2 cylinder to do the initial inflation. Once the tire seems to be holding air, you'll need to rotate it in all different directions and lay it on both sides in order to make sure that the latex

finds all the holes and seals them. If you're having trouble getting the tire to inflate, try some of the tips in the FAQ section.

### **Step 12:**

Take your bike out for a ride! Remember, if you DO get a flat, you can just remove the valve stem and put in a tube. Don't count on the system being foolproof, and definitely take some time to experiment with it before you try to race.

### **Frequently Asked Questions:**

#### **-How much lighter is this setup than my old tubes or a UST system?**

The weight savings are not huge, but they can be significant. Let's add it up, assuming that you have a 700 gram front wheel with a 15 gram rimstrip, a 170 gram tube (standard weight) and are running the popular Hutchinson python tires (for the sake of maximum weight savings, I'm assuming you'll run the Python "Airlight" at ~500 grams).

Standard setup:  $700+15+170+500 = 1385 \text{ grams}/3.05 \text{ lbs.}$

UST setup (w/Crossmax and Python Tubeless):

Wheel: 690 grams

Tire: 730 grams

Sealant (optional): 40-60 grams

$690+730 = 1420 \text{ grams}/3.13 \text{ lbs (no sealant)}$

$690+730+40 = 1460 \text{ grams}/3.22 \text{ lbs (with sealant)}$

Homemade tubeless: Wheel: 700 grams

Tire: 500 grams

Valve+tape: 15 grams

Rim strip (optional): 20 grams

Latex/water: 60 grams

$700+500+15+20+60 = 1295 \text{ grams}/2.86 \text{ lbs.}$

Of course, you can get away with running an ultralight tube (90 grams or so) and basically negate these weight savings – but ultralight tubes suck pretty bad, as anyone who's ever ridden them will testify. UST weight comes close, but only by using a \$600 wheelset. You can buy a non-UST front wheel around 700 grams for well under \$100. If you're running a totally standard tubed setup, you'll probably end up saving around a half pound for the entire wheelset. Not bad!

**-Ok, UST sucks. But I already have a UST wheelset. Can I use conventional tires on it?**

Yes, as long as you also use the sealant.

**-Will all tires work?**

No. Tires with cloth sidewalls work very poorly. Tires thinner than 1.9 work very poorly. Here's a list of tires that are confirmed to work well, and a shorter list of those which don't. Your experience may vary from mine.

Good tires:

Any UST tire.  
Hutchinson Python Gold or Airlight.  
Hutchinson Mosquito Gold or Airlight.  
Bontrager Revolt (any type).  
IRC Mythos XC.  
Any Schwalbe tire.  
Most Panaracer tires.  
Most WTB tires.  
Most Ritchey tires.  
Tioga Factory DH tires.

Bad tires:

Any Michelin non-UST tire.  
Tioga XC tires.  
IRC DH tires.

Your tires aren't on the list? Well, you'll just have to try them and find out!

**-I'm obsessed with saving weight. What's the lightest tire I can get away with using?**

The Hutchinson Python Airlight (around 500 grams) is the lightest tire known to work well with this system. Lighter tires tend not to have the stiffness necessary to stay on the rim.

**-Ok, what rims will work?**

Pretty much any rim works fine as long as there aren't big dings/gouges in the bead.

**-What about road wheels?**

No.

**-I have an asymmetrically drilled rim. It won't seal. What's going on?**

Small holes are drilled in these rims during the manufacturing process. You'll have to fill them in with epoxy. JB Weld will work – buy it at any hardware store.

**-I've heard that I'll never get a flat again. Is this true?**

Probably not. This system won't seal large tears in the tire, so if you hit a sharp enough rock, you'll still flat. Thorns and very small cuts in the tire should seal immediately. To date, I have had two flats on the system in 9 months of riding and ~20 races, and one flat was caused by using a loose-bead Michelin tire which came off of the rim. You can see lots of testimonials, both good and bad, at <http://forums13.consumerreview.com/crforum?14@@.ee7b9a2>

Notably for you DH freaks, I have flatted some DH tires set up like this, mostly by having rocks punch completely through the casing. It's **possible** that a tubed setup wouldn't have flatted in these circumstances, but not likely, in my opinion.

**-Gah! Your tire came off the rim? Is that likely to happen?**

It has happened to a number of people, mostly when running loose-fitting tires under low pressure. If you run one of the tires on the "Good" list and at least 40 psi, you should have no problems.

**-Can I run super-low pressure like a UST system?**

Pretty much only if you use a UST tire. Normal tires at low (less than 35 psi) pressures don't have the heft and stiffness to handle the kind of lateral loads you generate when mountain biking.

**-It's been 2 months, and suddenly my tire went flat. What's going on?**

The sealant tends to evaporate over time. Generally you want to dismount the tire and add sealant about once a month, though you have to do it less often in cooler weather.

**-What about those new tubeless rims from Bontrager and Mavic?**

They're great if you want to skip the taping and screwing around, and they'll work just fine with this system. Just start at Step 8 above. The Bontrager rim actually uses a plastic strip which is pretty much the same idea as the tape, but a bit more professional.

**-Your instructions suck, Walt. Where can I go for some more competent help?**

If you have a question I haven't answered here, feel free to send me an email at [wehnerw@sobek.colorado.edu](mailto:wehnerw@sobek.colorado.edu). Otherwise, buy Stan's official "Kit" at

[www.notubes.com](http://www.notubes.com). It comes with a good set of instructions. The new rimstrip system he is selling is supposedly pretty foolproof.

**-I just can't make the tire seal. What's the deal?**

Try these tips:

1: Remove the tire and install it on a wheel with a tube for a day or two, to make sure any creases/folds in the bead are flattened out, then reinstall.

2: If air is coming out near the valve stem, install the tire, then loosen the donut on the valve stem and push the stem up into the tire a ways. Now pull it back down and re-tighten the donut. Try inflating again.

3: Make sure you're using a high-pressure compressor. You should get a SERIOUS blast of air when you hit the pin on the chuck. Many gas stations do NOT have this type of compressor! If you can't find one, use a CO2 cartridge (buy them from a sporting goods store in the BB gun dept.) and inflator instead.

4: Rotate the tire around the rim to make sure the soap is evenly distributed.

5: Install the plastic rim strip if you haven't already. This helps to push the tire up onto the bead of the rim and eases installation.

6: Try a different tire.

7: Maybe this isn't the system for you. Keep trying!