

G-SPOT

Wheel Building Masterclass

Most riders eventually teach themselves to build wheels. A few simple instructions can make this seemingly daunting task relatively straightforward. If you are already familiar with the basics of how to true wheels then the following instructions should be all you need to start building them too.

As an example I have shown how to build a typical 48 spoked 4-cross wheel, but the instructions would be much the same for a 36 or a different crossing pattern.

PLEASE read ALL the instructions before starting out, and heed the warning about spoke tension....
Good luck.

G.



Okay, fairly obviously you are going to need; a rim, some spokes (of the right length), nipples, and a hub. Also usefull though not essential is a "cranked screwdriver" and you should already have a spoke key (I cut the edges off mine to make it fit between spokes on a 48 better).

Now get comfy, with all the bits within reach. Also it is a good idea to have a BIG mug of tea at this point because you need to be relaxed and happy to stay in the chair for a while...

Here you can also see that I need a haircut and a shave and YES, there is a blow torch next to the sofa...



Right, enough banter, down to work.
Pick up your hub and bung a spoke through every alternate hole in the top flange.
These are called "IN BOUND" spokes and have their heads on the outside of the hub, they have to be fed in towards the centre of the hub, hence the name.
I usually start with the freewheel side but either will do.

Lay the rim on your lap with the valve hole directly opposite you.
It is very important to get the orientation right at this point or you may cock the whole wheel up.
Notice that the spoke holes are offset slightly in the picture. The holes will feed to the flanges of the hub on the same sides of the wheel.

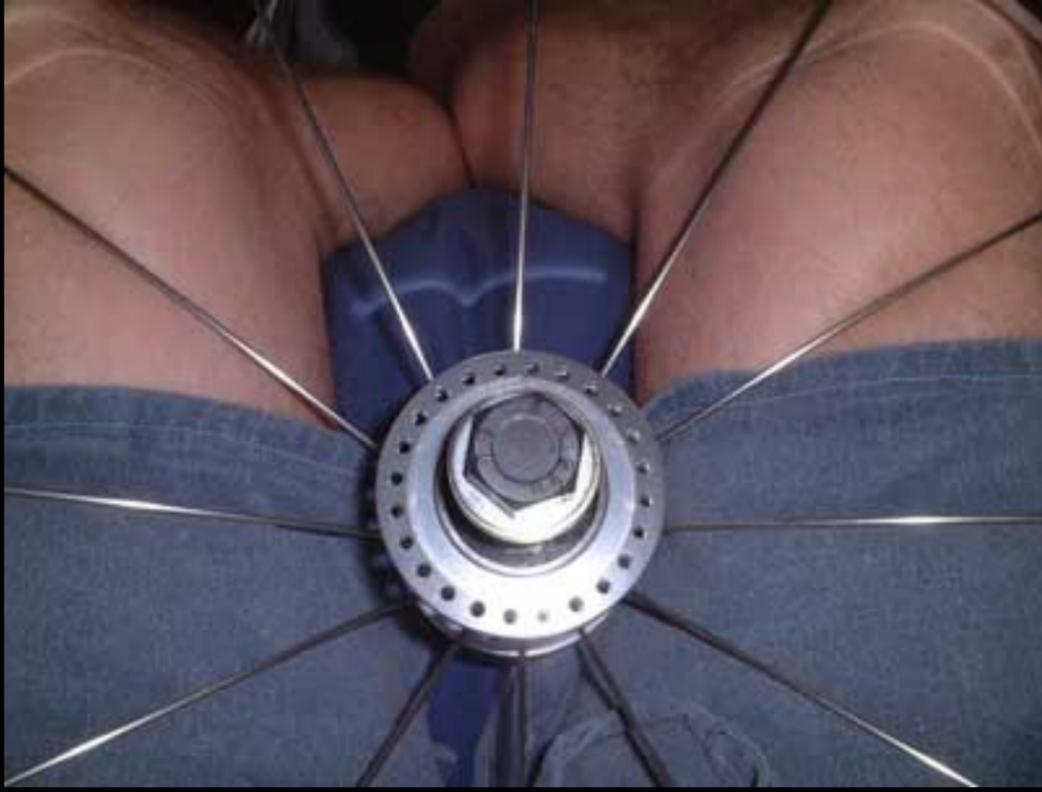


So, in goes the first spoke. Notice that the hub is still the same way up as in the picture above with the flange with the spokes at the top. We take a spoke and put it into the hole nearest the valve hole WHICH IS ORIENTATED TOWARDS THE SAME SAIDE OF THE WHEEL. This is very important so take the time to be sure you understand it.

Screw a nipple onto the end of the spoke enough to be sure it isnt going to fall off about four turns should do. If you want you can put a little drop of oil on first to make it run smooth but keep the oil off the sofa...

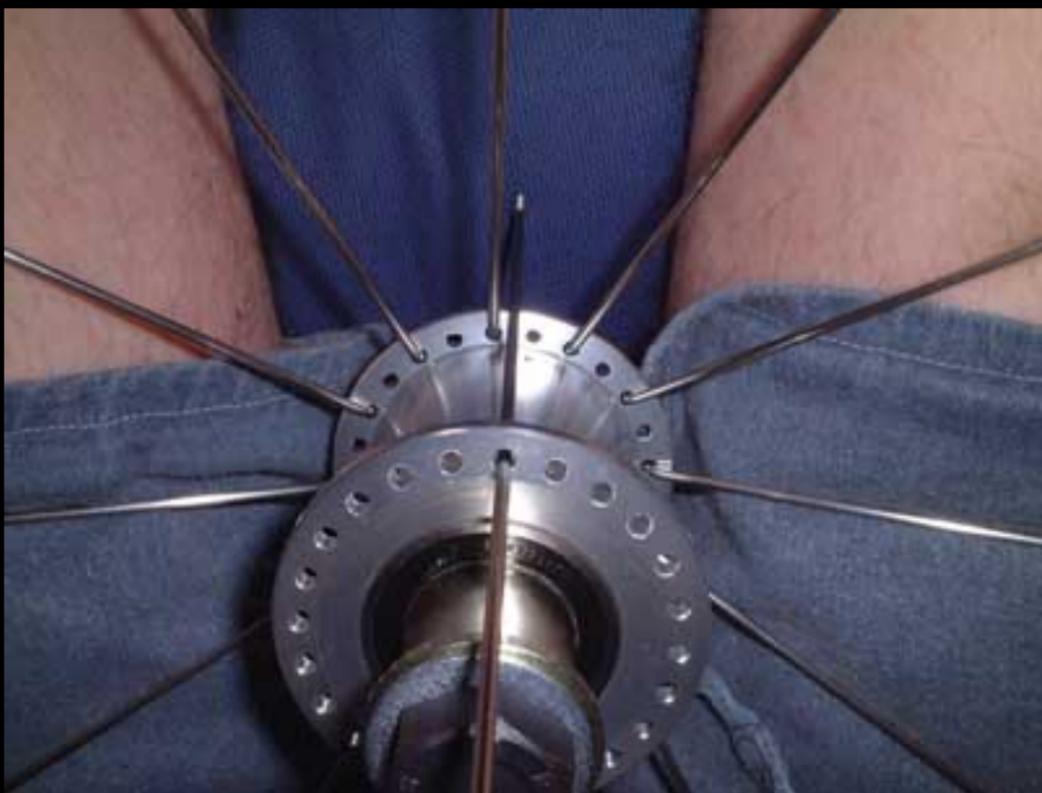
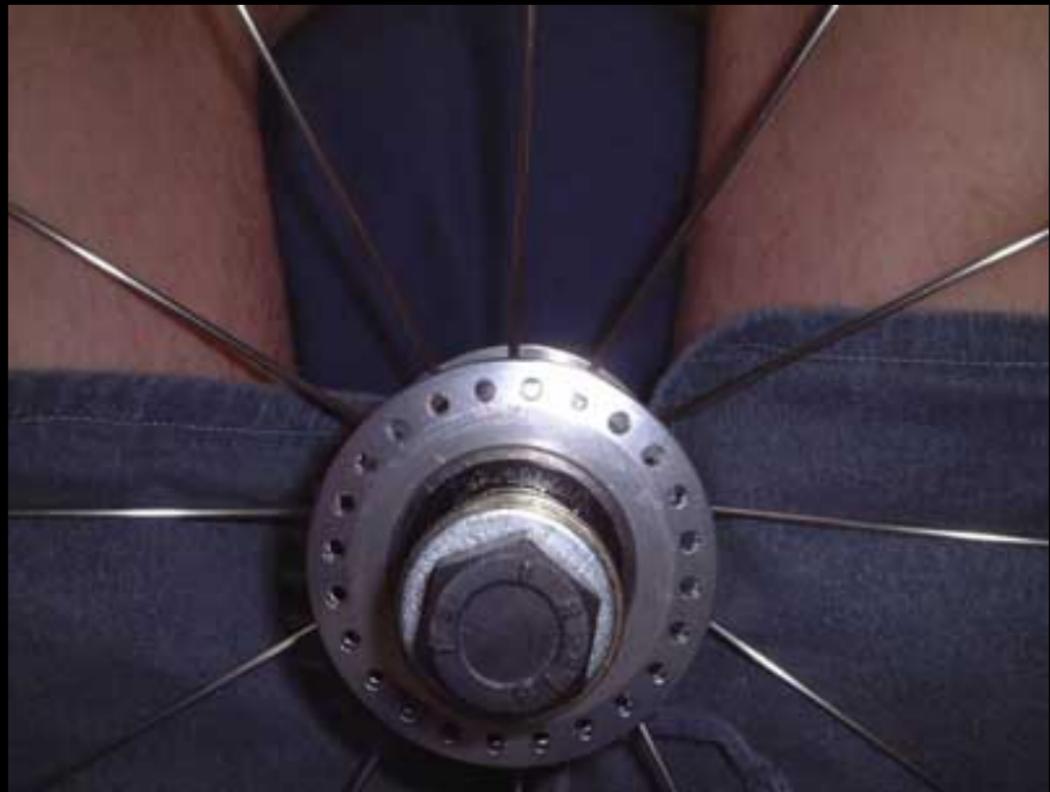
We carry on with this set of spokes putting them in every fourth hole. Note that ALL of these spokes should be offset towards this side of the wheel. Have a good look at it before you go any further and check they are evenly spaced.





Turn the wheel over.
Notice how the spoke holes in the top flange DO NOT line up with the spoke holes in the flange below.

Looking down from the top you can see the offset more clearly, in a minute we are going to put some more "in-bound" spokes in this flange but they need to be orientated correctly.



Because we have turned the wheel over the first of the previous sets of spokes is now to the right of the valve hole. This next spoke needs to go away from the valve hole so it starts just to the right of the spoke below. The following pictures should make it clear but be sure to get it right.

Okay, you should be able to see it here clear enough. The only spoke in the top flange so far is immediately to the right of the first spoke we put in the first flange. It lies away from the valve hole...



Looking from above you can see it more clearly, though the valve hole is now hard to see. Note that the newest spoke does NOT cross any others.

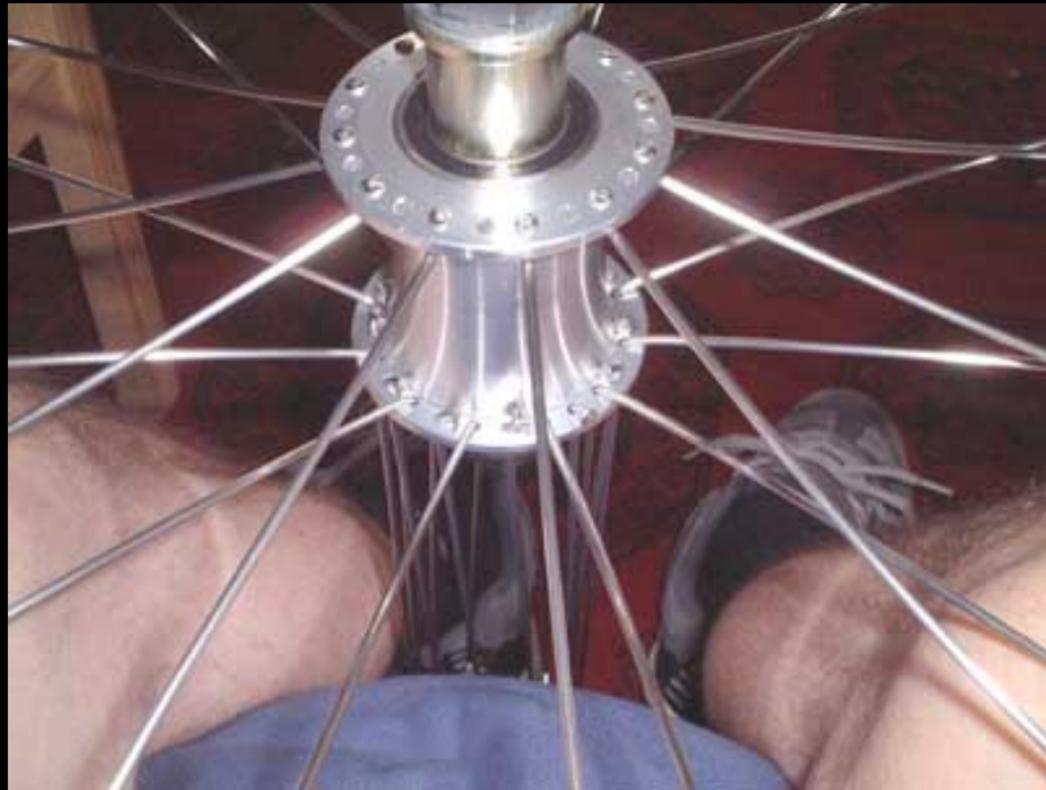
Once you are absolutely certain that you have this right you can continue to put the rest of this set of spokes in. Again they go in every other hole and each one lies next to the one from the first flange. With all of them offset the same way.





This picture isn't very clear, but hopefully you can see that I have now inserted the first set of "OUT BOUND" spokes. These can (just about) be seen hanging from the bottom flange. They were dropped in with the wheel the same way up as before and now we will turn the wheel over...

This shot makes it a bit clearer.



Whizzing along now, we have switched the wheel back over and all the spokes are held up to stop them falling back through the holes...

But now comes the tricky bit... We need to "twist" the hub to make the spokes we have installed lie more



tangentially to the hub.

This can be quite hard and needs to be done in the right direction.

We want the spokes to sweep away from the valve hole (to make connecting a pump easier) so in this case we need to rotate the hub anti-clockwise relative to the rim.

To help rotate the hub you can grab a handful of the loose spokes but beware that you dont damage the freewheel threads by levering the spokes against them... Another usefull tip is to push the hub hard down into your lap (from both sides) a few times to help the spokes seat slightly and lie flat against the hub flange. "Bouncing" the hub as you turn it can also help with the twist.



With the hub rotated you can see that the spokes now come away from the flanges at the familiar angle. Again notice that the spokes angle AWAY from the valve hole to make it easier to attach the pump...



With the hub twisted and the next set of spokes ready to go in we can look at the pattern. This pattern is referred to as 4-cross. This means that each spoke crosses four others that come from the same flange. If you look at the picture you can see that this first spoke will cross one spoke with the flange still inbetween. To further enhance the ability of the wheel to resist grind impacts etc I will be building this wheel "interlaced under the third". Normally wheels are built interlaced under the fourth. So if you look at the spoke that I am holding it would go under the fourth (last) spoke it crosses. Instead I will be "weaving" this spoke under the third crossing and then over the fourth.



To get this spoke under the third it needs a bit of bending, but this is not a problem, just try to avoid kinking it.

As you can see the spoke straightens back out fine, bung a nipple on the end and get on with the other eleven...





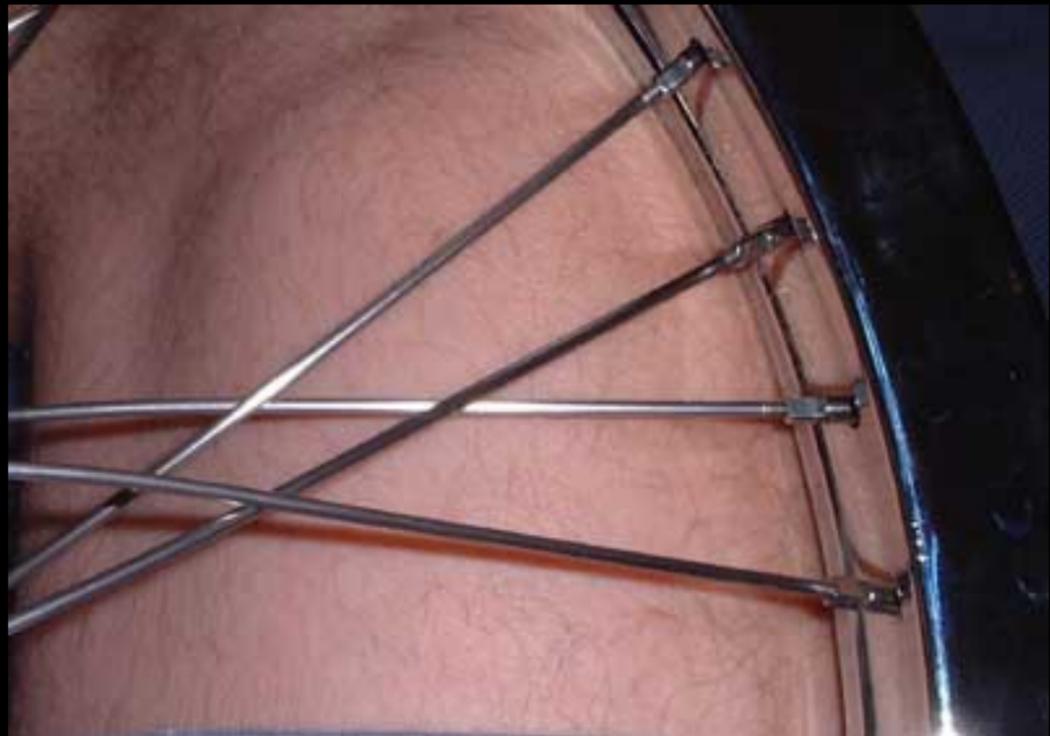
All of these are now in. The last one is always a bit tricky and the interlacing makes them bow out a bit, but this will all come together when we tension it.

Last set have been dropped in, then the wheel flipped over and we are in a familiar position. We just repeat the last few steps as before, remembering to interlace each spoke.



All the spokes are in. They should all be nice and loose at this stage. The valve hole should be sitting in one of the more open gaps.

Here is a close up of a typical group.
Notice the even spacing and arrangement of 'X's if it
doesn't look like this something is wrong.
Also notice the visible thread below each nipple, there is
still plenty of slack in the wheel at this stage.



Time to start putting some tension into the wheel. Notice
the wheel is held sideways. This is so that if a spoke
should break it will fly harmlessly out to the side and not
through my head.

I also have a nice fresh cup of tea.

Start at the valve hole and work your way round the
wheel, we want to get all the spokes to a similar position
and screw them all up evenly so I start by tightening each
spoke until the last of the thread is just about to disappear
into the nipple.

If the spoke length is correct this should still leave the
wheel quite loose. If it feels like the spokes are tightening
up then STOP.

Here you can see the clearance round the valve hole and
the thread on the spokes just disappearing into the
nipples. The wheel is still loose at this stage, but we can

be pretty sure that it is even.

We will now work our way round the rim from the valve counting the number of turns we put on each spoke.

I usually start with 4 or 5 turns per spoke. By the time I get back to the valve hole the wheel is starting to stiffen up but all the spokes are still far from tight. This is how you want it. If the wheel is starting to gain ANY real tension on this first pass then go back and undo all the spokes back to the valve hole by the same amount as you have just tightened them.



In this photo I have been round once and put a few turns on each spoke. They all started from the same point and have had the same number of turns but some stick up more than others!

If you look closely you can just make out that the bottom nipple in the picture is much higher than the others. Don't worry, this will work itself out.

Do NOT be tempted to add extra turns to any of the spokes or you will fuck it all up.

As the spokes come tight you should put less and less turns on the spokes on each go round the wheel. BUT ALWAYS TURN EACH SPOKE THE SAME AMOUNT!

If you set off round the wheel adding 1 turn to each spoke then each and EVERY spoke MUST get a full turn. If they are getting to tight then you need to undo them the last set of turns back to the valve hole and start again with less turns.

Slowly does it is the way.

By the time you start to get some tension coming into the spokes you should have been round a few times adding just a single turn each time. Don't try to rush it now.

Once the spokes start to tighten up you will need to help them settle in.

After each round of turns, go round the wheel squeezing

the spokes together as shown in this shot. You will feel it give slightly and maybe make the odd noise. The wheel should slowly come tight and should require next to no truing if you have done it right. By now you should have a lovely tight wheel, true it in the normal way and go ride....



Here you can see the finished wheel, look closely and you can see the effect of interlacing under the third, all the spokes "weave" in and out more than normal and this will help protect the wheel on grinds.

[Well that about wraps it up. If you want to know anything else just mail me.](#)

