

dimension to the chassis centerline (perhaps to accommodate a sprocket or rotor mount), although a correctly aligned rim will be, which is really what matters. If you have any doubts about your own wheels, before dismounting them, find a way to measure their left/right distances to fork legs or swingarm sides in order to duplicate the precise arrangement.

Once the wheel runs true laterally, you should recheck the radial runout, and if you make radial adjustments, you should recheck the lateral runout once again. Eventually, you'll have a nice round wheel with most or all of its spokes holding some reasonable amount of tension. At this point, none of the spokes should be very tight. However, check each and every one to make sure none have any actual slack. If you find one that does, gently tighten its nipple until it is snug against the rim.

Gettin' Tight, Truly

Okay, now you've got a wheel that's true, but you've still got to tighten all its spokes to make it strong. Doing so incorrectly could very easily undo all your careful work up to this point, so if your patience is wearing thin, this is a good time to take a break. Come back to the job when you can focus comfortably for another stretch of time.

Choose a unique spot on the rim, such as the valve stem hole, and decide on a direction to rotate the wheel. Call the first spoke you come to number one, the next number two, etc. until you've come to the end of the repeating pattern of spokes in your wheel. In the vast majority of cases, this will be a total of four spokes, as mentioned earlier, so that's what we'll use for our example here. Tighten spoke number one a small amount, such as a half-turn. Count three spokes in your chosen direction of rotation. Now tighten this spoke, which will be spoke number four in the first series, the same amount you tightened number one. Now count three more spokes. This will be spoke number three in the second series. Tighten it the same amount you tightened the others. Count three more spokes. This will be spoke number two in the third series. Tighten it the same amount. Keep doing every third spoke until you've gone all the way around the wheel three times. Keep track of that place-keeper you chose at the beginning, and advance your starting point one spoke at the conclusion of each revolution. If you look closely, you'll see that this method distributes the impact of your efforts as evenly as possible across all four types of spokes—left, right, inner, and outer. This minimizes the possibility of distortion in any particular direction, averaging out any errors that get produced along the way.

Time to check runout again. Correct any unacceptable deviations by the same methods outlined earlier, doing radial adjustments first and then tweaking whatever lateral problems still remain. When the wheel is once again true in both dimensions, perform another round of tightening using the every-third-spoke method, but tightening less, perhaps a quarter-turn. Then recheck runout and adjust as necessary. Continue to repeat these steps with smaller adjustments until all the spokes are truly tight, with the wheel remaining true. How tight? Unless you're using one of the trick "clicker" spoke-torque-wrenches, it's about as tight as you can make it without stripping the nipples. To make sure you have equal torque on all the spokes, you can also check your spokes the old-fashioned way—by ear. Just as a guitar or piano string produces a higher pitch when pulled tighter (and struck), a spoke's tension will be revealed in the sound it makes when tapped by another metallic object. Spokes with inadequate tension will make a relatively lower-pitched, short-lived note, while those with adequate tension will create a relatively higher-pitched ring of longer duration. It's not necessary for all the spokes to emit exactly the same sound—you're not tuning a piano. But they should all "ping" instead of "twang." Simply spin the wheel, bounce your wrench off spokes and listen for the shift in tone.

What if a correction needs to be made in the direction of spokes that are already plenty tight? Remember that each spoke pulls against two sets of opposing spokes—those on the opposite side of the wheel radially, and those on the opposite side of the rim laterally. Corrections can be made by tightening combined with loosening the opposing spokes, keeping all spokes involved within the optimal range of tension.

With all spokes tight and your rim running true, your naked wheel is ready for tire mounting, unless you notice any spokes sticking out beyond the outside edge of their nipples. Carefully grind any protruders down so they pose no threat to your delicate inner-tube. We recommend a double strip of duct tape to replace the standard rubber-band-like rim strap. Torn to width and rubbed down tightly against the rim, it can slow the release of air from a punctured tube through spoke holes enough to let you stop safely.

Spokes can loosen over time. Although there are conflicting opinions about whether or not a correctly assembled/torqued wire wheel actually "settles in" (soon requiring some touch-up retorquing of the spokes), don't be surprised if your brand-new bike's wheels fail

inspection right off the showroom floor. We've found some very loose spokes on factory fresh machinery. Loose spokes make it easier for other spokes to come loose and because they no longer share the load equally, increase the potential for wheel failure; that's a bad thing. So check spoke tension regularly, especially on off-road machines. Inspection and correction of runout is easiest to do at tire-change time—by yourself if you change your own tires or by shop personnel if you don't. You may even discover that proper spoke tension and wheel true solves an elusive vibration or handling problem. But, it will certainly help prevent wheel failure, just as keeping your tires properly inflated makes them better able to handle the stresses to which they're subjected.

Spoke wheels can be things of great strength and beauty, but keeping them that way requires occasional maintenance. Proceeding slowly and carefully through the procedures in this article will yield a true wheel in the shortest possible time. Rushing or attempting to resort to brute force will make for a nightmare of oscillating errors, and produce a disfigured rim that's obvious from ten yards away.

SOURCES

Buchanan's Spoke and Rims—(626) 969-4655; www.buchananspokes.com

Excel—www.rk-excel.co.jp/english

Fasst—(562) 601-8119; www.FasstCo.com

Hallcraft's—(940) 668-0771; www.hallcrafts.com

K&L Supply—(800) 727-6767; www.klsupply.com

Landmark Manufacturing—(800) 497-0312; www.landmarkmfg.com

Pit Posse—(866) 447-6773; www.pitposse.com

Pro-Wheel—(360) 435-8139; www.prowheelracing.com

Rad Manufacturing—(435) 574-2537; www.radmfg.com

Rowe—(805) 349-8243; www.roweusa.com

Spoke Wheel Specialties—(888) 334-4575