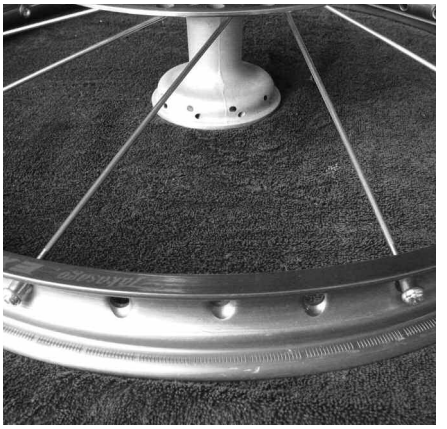
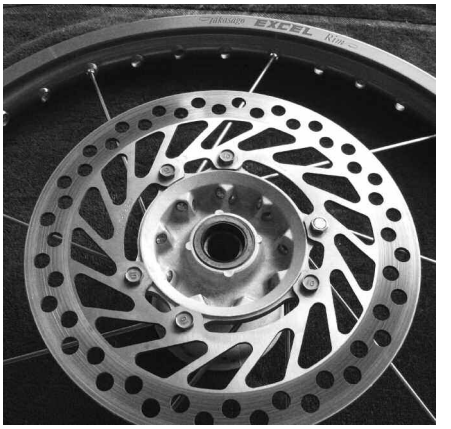




Left: The new pieces, left, are visibly more substantial than the stockers they replace. (Don't be fooled by the narrower threaded section on the Excel spoke; its shaft is thicker than OEM.) Right: The first row of new spokes, with nipples loosely attached. Right: Notice the even spacing along the rim.

Start by getting all the nipples equally snug. Again, you may have to figure out what's possible by trial-and-error. On our example, we found we could get all the nipples tightened to the last visible thread on each spoke before any significant tension was applied to the rim. We arrived at this knowledge by meticulously tightening every spoke on the wheel the same number of turns, time after time. Time consuming, yes, but ultimately it saved time because we didn't end up with one side of the rim pulled in closer to the hub than the other side before we even started the truing process. Remember, the definition of a circle is a line with all points equidistant from a central point and lying in the same plane. It's better to avoid pulling the wheel out of round from the beginning, instead of correcting deviations afterwards.

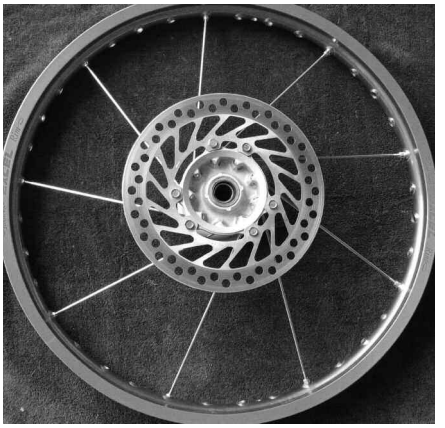
Now, with all the nipples threaded the same distance up on the spokes, the wheel will be much closer to rigid, but there should still be no tension among the spokes. When you lift it up, it should hold its shape, but still jingle just a tiny bit. However, you may notice that—even with all the nipples perfectly the same on their respective spokes, some are closer to the rim than others. This may be because of variations in spoke length or their placement radially on the hub. For example, if all the outer spokes (furthest from the axial centerline) are also a little closer to the edge of the hub's flange, they will protrude further through the wheel unless they compensate for this difference in hub mounting position by being slightly shorter than the inner spokes. If you find such a discrepancy between spoke subgroups, carefully adjust the looser ones in small increments, just as you did with all the spokes at the start of this tightening process, until they have just as little slack as the spokes that were initially closer to snug.

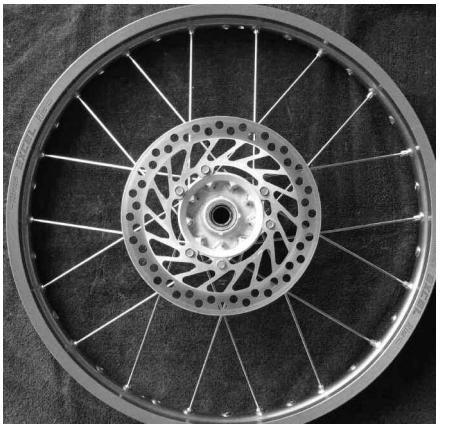
NOTE: Those of you who are only performing a tune-up on your wheels, rather than building them, should join us here. Because spokes will tend to loosen over the miles, you should try to identify the loosest spokes by spinning the wheel and bouceing a wrench off the spokes. The loose spokes emit a dull "dead" sound when tapped, while those that are still tight emit a bright "ping." To get all the nipples close to snug before precise truing, snug the loose spokes first.

If you decided to spring for a truing stand, position your wheel in it now. If you are using a different method, secure the wheel on its axle (or axle-substitute) and set up your runout detector (dial gauge or pointer armature) to check radial runout (distance from the hub center to the outside edge of the rim). Next, check the lateral runout, (side-to-side deviation). If your spokes are all evenly snug (but not floppy), this will tell you if your rim is way out of true, all on its own. A new rim should be nearly perfect, and small deviations in a used rim may be correctable during the truing process.

Now The Fun Begins

We'll address radial runout first. With your detector in position for this measurement, determine where the rim is furthest away from the hub. This will be the "high" zone if your detector is at the top of your wheel or the "low" zone if it's at the bottom. You'll need to tighten the spokes in that zone to pull the rim there closer to the hub. Start with a spoke in the middle of the





Left: One row of spokes finished. The wheel begins to take shape. Center: Detail of the spokes leaving the hub. Notice how the holes point only partway toward the spoke's target on the rim; the spoke's bend (right at the hole's edge) completes the necessary angle. Right: Halfway done; here's the wheel with one side (flange) of the hub laced.