

SPOKE WHEEL BUILDING & TRUING

by Mark Barnes

IF YOUR BIKE has spoke wheels, then you need to know how to maintain, repair and true them, it's as simple as that. This article will cover the basics as illustrated with a dirt bike wheel, but the same principles apply to street hardware. Note that we're using a tube-type rim because most spoke wheels are like that. Less common tubeless spoke-wheel applications, like those on the BMW GS, the Aprilia Capo Nord and various trails bikes, look a little different, but the fundamentals are identical.

Second, you need a way to get your bike's wheels up off the ground, at least one end at a time. If you're changing components, the wheels obviously must be removed. But if you're just giving your wheels a truing tune-up, they can stay on the bike.

Third, you've got to have some way of measuring very small deviations in the radial and lateral movement of a turning rim. Professional truing stands allow for rotation of a wheel's hub in a fixed plane, and include an adjustable armature for mounting a runout gauge or for using as a static indicator all by itself. However, these professional grade tools are rather expensive (from around \$200 to upwards of \$600), and you can probably improvise something adequate for a whole lot less (see sidebar).

A fourth necessity, one that isn't particularly expensive, is a quality spoke wrench. Throw out that pot-metal piece of junk that came in your bike's tool kit—it'll do more harm than good. Spoke nipples are small but require significant torque. And if it's a dirt bike you're working on, the nipples you'll be twisting are probably made of soft,

easily deformed aluminum, and they may resist turning due to corrosion or excessive tension. Either way, a precise, tight-fitting match between the wrench and nipple is absolutely necessary to avoid rounding off and ruining the nipple's flats and crushing it against the spoke threads. You can usually pick up a much better-fitting version at your local motorcycle shop for under ten bucks. But know the exact size you need, as there are half a dozen in common use.

Finally, because the procedures involved are extremely repetitious; use tiny increments of adjustment; and require a meticulously systematic approach, you will need above-average patience and a setting in which you can concentrate for an extended period of time.

Starting From Scratch

If you're replacing only a bent rim plus a broken spoke or two, begin by taping the spoke overlaps together to keep everything in alignment. However, if major disassembly is your plan, and you are replacing your hub, perhaps a full set of spokes and/or rim without altering the original spoke pattern, you should begin by studying your wheel's layout before taking anything apart. Spokes are rarely identical; often with four distinct configurations per wheel, some with the heads angled differently because they are positioned inside or outside a flange and therefore slightly different in length as well, and/or the hub flanges are different sizes or configurations, necessitating perhaps two more different lengths and angles. The distance from the head to the bend is known as the throat length, which varies depending on the thickness of the flange.

Notice, too, how the spokes leave the hub

in different directions; which row of hub holes points its spokes clockwise, and which counter-clockwise? Look to see where the spokes cross one another, and how many make up a repeating pattern (the most common arrangement is a sequence of four, comprised of one inner and one outer from each hub flange). If you have a digital camera, take several pictures from different angles for quick reference later. Or, make yourself a sketch. Spending a few extra minutes at the beginning may save you much frustration later. And if you're building a wheel with all new aftermarket components, you may be given a completely different spoke pattern from your bike's original design, so consult your supplier for instructions. If you're only replacing spokes, you can ensure the reproduction of the existing configuration by simply replacing each one you remove before removing the next one.

In the example shown, we're keeping the stock hub, and installing aftermarket stainless steel spokes and an aluminum alloy rim, all made by Excel. The goal was increased strength, so the replacement pieces are sturdier than stock (however, the weight difference in this particular application is negligible). And while you can't appreciate it in black-and-white photos, the new rim is also flashier, with a deep gold anodized finish. Also, we chose Excel's "spline drive" nipples, which provide a stronger surface for wrenching than conventional square nipples, and they're made from steel instead of aluminum.

The trickiest part is getting everything in place without scratching your new rim. Start by placing your disassembled hub flat in the center of the rim. Hubs with large off-



Left: The stock wheel prior to disassembly. Note that the nipples have Allen heads at their ends, accessible only with the tire and tube removed, but some will have slots for conventional screwdrivers instead. Center: Choose your weapon. From top: Stock tool kit spoke wrench, spline drive wrench included with new spline-drive spokes; the multi-size spoke wrench from Rowe, which covers all six common nipple sizes; Fasst Company's spoke torque wrench, with spline drive head. Right: A little penetrating lubrication can make nipple removal a painless process. Now there's a thought!