




Safety Wire Your Track Bike

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Keeping your nuts secure

Vibration is the enemy, working tirelessly to disassemble your motorcycle as you ride. If you look closely at any racebike, you will notice that many of its bolts, plugs and caps are retained in place with twisted wire. Racing organizations require that each machine's most critical fasteners be secured in this fashion. Should you be using this preparation technique on your trackday bike? YES! Safety wire is by far

the cheapest insurance to be purchased in our sport.



Why not Loctite?

Thread-locking chemicals such as [Loctite](#) can (and should) be used for securing bolts which don't get removed very often; however, this method of retainment is essentially "gluing" the tightened nut or bolt into place by putting an adhesive chemical on the threads. Such products make fasteners much harder to remove, which prevents their coming loose on track but increases the risk that you might "round off" or "strip" them during future maintenance. There are three other major disadvantages to thread locking compounds. First, the parts you're bonding must be spotlessly clean and dry, which makes chemical retention methods impractical for securing oil or coolant drain plugs after a fluid change. Second, there is a cure time with any adhesive,

which can become an issue if you're doing repairs in the paddock and plan to ride the bike again immediately. Third, thread locking chemicals can't be visually checked by a tech inspector, whereas safety wire can be spotted easily.

What does this cost?

If you're just getting started, you'll need to buy a pair of safety wire pliers. These can be had for anywhere between \$20 and \$100. Does it matter how much you spend? Our bottom-end pair has been with us for two decades and is still going strong. A one-pound can of .032 dia. stainless steel wire represents a several year supply and costs about \$25. You'll also need a fine-point Sharpie magic marker. Assuming that you already own a suitable electric drill, your biggest expense for this project will likely be bits. Because you'll be drilling through hardened fasteners, cheap bits will not be sufficient. We prefer DeWalt 5/64 cobalt bits; sourced at our local Lowes home improvement store for roughly \$4 per two-pack. Since these are so easy to break, we grab ten bits at a time. The only thing more frustrating than destroying a brand new two dollar drill bit the first time you try to use it is discovering that it is your *last* two dollar drill bit...

Where should safety wire be used?

First, consult your organization's rules and comply with them. Next, ask yourself which parts you'd least appreciate losing at speed. Most trackday organizers either don't require safety wire at all or else just ask for it on the "Big Three," which would be the oil drain plug, oil fill cap and oil filter. In the TrackdayMag.com shop, we also include the brake caliper bolts, brake pad retaining pins, coolant drain plugs and radiator cap.

Planning



It takes a bit of planning to do a really neat, professional job. First, remember that safety wire is always supposed to hold a fastener in tension. Huh? Think of it this way. The safety wire should look like it's trying to pull the bolt tighter, and there shouldn't be any slack between the bolt and what you've safety wired it to. When preparing to drill a fastener, start by deciding what you'll be using for an anchor point. If you're wiring two bolts which are close together, (brake caliper bolts, for example) you can wire one to the other; if not, you'll want to find something solid nearby to use, such as a bracket or tab that won't be weakened by having a tiny hole drilled into it. Using a Sharpie, mark the bolt which you intend to drill. This should be done with the fastener installed on the machine and fully tightened. This way, you can envision how you will run the wire and can make your mark accordingly.



Stupid Hurts

There are many ways to drill bolts for safety wire, from the ultra-professional to the bloody dangerous. A drill press or milling table would be the most accurate, however not all of us have such equipment at hand. Holding the bolt by its threads in a pair of Vise Grips (or worse, having your significant other hold it) while attacking the head with a two-handed Milwaukee Magnum Holeshooter would almost certainly guarantee a trip to the local emergency room. (Remember that a bolt and a bullet are nearly identical in size and shape, while a drill motor at high revs can supply plenty of propulsion. At the moment of



destruction, the shaft of a broken 5/64 drill bit is a razor sharp, 3000rpm flesh eater, so it would be wise to keep any and all body parts out of the kill zone. When a drill bit breaks, shrapnel can be thrown. This is merely a nuisance, unless the snapped-off tip happens to head for your eyeball at 200mph.

(Disclaimer: Only qualified people should operate power tools! Be sure to clamp the fastener securely into some sort of unmovable fixture, keep your body clear of the drill bit and wear safety glasses for this job!)

The setup

Our favorite method of drilling fasteners is safe enough to be considered common practice at any job shop. Its accuracy depends upon your skill in the use of an electric drill. We use a bench vice to hold the bolt securely and a small electric hand drill equipped with a 3/8 chuck to drive the bit. To protect the bolt threads from being mauled in the vice's jaws, we use two pieces of scrap aluminum angle to act as soft jaws. (See picture.) Since most fasteners are hardened, it is an excellent idea to first dimple the spot where you intend to drill with a hammer and a sharp punch, as this will prevent the bit from walking off-target when you try to start the hole.

Skill with a drill

Patience is the key when drilling



bolts for safety wire. Keep in mind that the bit you're using is not much thicker than a sewing needle and can be snapped very easily. Trying to "muscle" the bit through by leaning into the drill is only going to break it, as is allowing the drill to cock and bend the bit. Keep just enough pressure on the drill to create chips and if forward progress stops, consider that the bit might be dull and swap it for a fresh one.



The most common cause of broken bits is snagging at the moment of "punch through." You're holding steady pressure on the drill, getting a nice stream of chips and making good progress, then suddenly you begin to break through the far side of the fastener. The bit you're using is so small that it hangs up and snaps, usually leaving the broken off end wedged inside the hole! If you're lucky, you can chase the remaining shard back out of the hole with a mechanic's pick but the better answer is to avoid this problem in the first place. How? This takes a bit of feel. First off, monitor your progress by stopping occasionally and pulling out the bit to see how deep you've gone. When you know you're getting close, ease up both on the amount of pressure you're putting into the drill and the speed you're asking for from the trigger. When you sense the bit start to catch, take all pressure off the drill and release the trigger. To break through, back out slightly, get the bit turning full speed in the hole and then "tap" it against the last shreds of metal at the breakthrough point. There's unquestionably a technique required to do this successfully and you'll need some practice before you stop killing bits by the dozen. Oh joy! Something new to master!

Twisting one up

With your holes drilled and fasteners reinstalled to their proper torque specs, it's time to wire. Again, patience will be required as you learn this skill.

- 1) Pull twice as much wire from the can as the length you'll be wiring, plus six extra inches. Cut this wire free from the can.
- 2) Bend the wire in half to make a double strand.
- 3) Push one end of the wire through the first fastener, remembering that the finished wire job must appear to be pulling the bolt tight
- 4) Give the wire a few twists by hand to hold it snugly to the first fastener.
- 5) Pull the two strands tight to the hole in the second fastener. Add about 1/4 inch additional length and clamp the safety wire pliers to the wire. (The extra 1/4 inch makes up for shrinkage of the strands which occurs during twisting.)
- 6) Twist wire until there is no slack left. Do not over-twist or wire will break.
- 7) Push one end of the wire through the second fastener, join the ends, clamp with the pliers and twist.
- 8) Cut off excess wire, leaving about one inch after the second fastener.
- 9) Using a long-nosed pliers, bend that last inch over double and push it against the bolt, to protect you from getting cut on the sharp ends of the wire.
- 10) Dispose of the cut-off wire properly, as if your life depends on it. Discarded safety wire **can and will** puncture soft, sporting motorcycle tires, ruining them at the minimum or in the worst case scenario, causing on-track deflation and a crash.



Special circumstances

Spin-on oil filters are notorious for working loose when subjected to the constant high rpm of racetrack use. Obviously, you can't drill a hole in an oil filter. The solution is to find a



hose clamp that fits around the filter body. With this clamp in place, you have something solid to wire to. Best of all, you can position the clamp anywhere on the filter that suits your purpose.

Radiator caps pose a special problem. If you don't leave a tiny amount of slack when wiring one, you can cock the cap, which will allow it to leak when the bike comes up to full temperature. Also, you must be absolutely sure that the hole you drill in your radiator cap will not compromise its ability to seal in any way.

The best method for this is to remove the cap and drill it from the underside up to prevent the bit from nicking the vulnerable rubber inner seal.



Brake caliper bolts are easy enough to drill but since there are four identical fasteners, it often happens that they can wind up going back into different holes than they came out of. If you've only drilled one hole through each bolt, "in tension" wiring may be difficult to achieve. For this hardware, it's worth the effort to drill each bolt three times, at 120, 240 and 360 degrees. This way, each bolt will always have a hole that's properly aligned for wiring, no matter which of the four mounting bosses it ends up screwed into.

Brake pad pins come in many varieties. You should wire them if you can but with some designs, it's simply impossible. It's important that if you do decide to use safety wire here, you must be sure that you're not doing anything to weaken the brake system in the process.

Some racetrack riders absolutely hate safety wiring their bikes, because it can be a frustrating pain in the neck to do. We won't kid you. Learning how to properly drill fasteners and safety wire a motorcycle is not easy. You'll break some drill bits, ruin some hardware and shed a little blood in the process; however, you'll be proud of this new skill once you've mastered it. Consider it yet another essential step on your journey toward becoming a master racebike builder.

Personally, we love this job. Safety wire gives us the confidence to ride our best, comforted

by the knowledge that none of our bike's vital parts are going to fall off at a critical moment. When you've properly secured a tightened fastener with safety wire, you know that it isn't coming out again until you cut it free.