

Shortening a speedometer or rev counter cable.

The following assumes you've got access to a milling machine:

1. First of all, shorten the outer cable. Because outers consist of a helically-wound metal strip covered in plastic, getting an end fitting off is usually easily achieved by simply unwinding it off the thread-like helicoil.
2. You'll need to re-use that fitting, so now remove the crimp at the end, just sufficient to give a small flare. Best done with a ball bearing of appropriate size\*. However, if the crimp has length as opposed to being just an end roll-over, you'll need to expand the crimp by gently hammering it around a bolt or pin punch of appropriate size. It'll still need a slight flare at the end to help it start on the plastic covering of the outer cable. \*Note: instead of putting discarded ballraces in the bin, wrap them in a piece of cloth, rest on a hard surface and smartly smack the outer ring with a hammer. They'll shatter (hence need for the cloth) and you'll soon have a handy collection of different sizes of ball bearings.
3. Remove inner cable if not already out and cut outer cable to length. Refit end fitting and secure with a light centre-punch dent about halfway along the 'tube'.
4. Measure inner cable (including square at end) and cut to length. Now seal cut end with a small blob of braze or silver solder. Make sure the seal does not exceed the OD of the cable. This seal is not mandatory, but helps to make a neater job when forming the square.

Now to make the die to create a new square:

1. Get a piece of flat iron, 1½" x ½" x 3" long would be ideal.
2. Clean any millscale off one face, ensuring the face stays flat.
3. Put job in vice and mill the 3" x ½" edges clean & square to the 3" x 1½" faces.
4. Now mark out cleaned face into four pieces of 1½ x 1½".
5. If you have a tilting vice, make sure it's square to the mill bed and set to 45°. If you haven't, no worries – grip job between normal vice jaws by its ½" edges (hence need for cleaning those edges under (3) and tilt to 45°. Again, imperative vice is square to machine bed. Doing it this way means you'll be machining using the Y axis instead of the X.
6. The plan now is to cut a vee groove along a line closest to the job's end using an endmill (you have 3 lines, the centre one will be where you cut the metal in half later on).
7. Now, how deep do you cut that groove? Let's suppose the diameter of the cable is 4mm. The circumference is therefore  $4 \times 3.142$  or a shade over 12mm, so your square will have 4 sides of a fraction over 3mm each. So each half of the jig / die will have a triangle with two sides of 3mm+ and an unknown hypotenuse. Using your school science, the square of the hyp = the square of the other two sides ( $3^2 + 3^2 = 18$ ). The square root of 18 (and therefore length of hypotenuse) is thus 4.24. Now picture a vee, 4.24 mm across top, lower sides 3mm each. The depth of cut we need is from the centre of that 4.24 to the bottom of the vee. Imagine a line from the centre to the bottom. It forms another triangle, top is 2.12 and side is 3. Using

the previous formula the vertical is 3.67(mm). So depth of cut is 3.67mm. Better make that 3.7mm or a shade over to allow a little slack.

8. As the job is not overly secure in the vice, take small cuts - feed the slide in small increments until you reach 3.7mm then turn job over and do the same along the other line.
9. Now cut the job in half along the 3<sup>rd</sup>, centre line. You now have two pieces approx 1½" x 1½" with a vee across the middle of each. Clamp those two halves together, using a small drill in the vee to centre things.
10. Now drill two holes through the faces each side of the vee (but not too close to it) so pins can be inserted to keep the two halves of the jig / die inline when you use it. No need to drill / ream holes for dowels – drill 7.5mm and finish off with an M8 drill and cut some M8 bolts (not setscrews) to suit. They must not be so long as to protrude from the jig's faces. These holes must be done in a drill press – trying to do it 'by hand' with a cordless drill won't work because holes will be oversize and not square to face.
11. Now remove the drill used to centre the jig halves and clamp the jig together with those 'dowels'. Take a drill the same size as the cable you need to make a square on (4mm in this case) and drill into the vee for a depth of around ½" but no more.
12. Your jig is now ready to use. Being mild steel it'll be good for perhaps half a dozen jobs before starting to lose its edges. If you plan production, make the jig out of gauge plate instead of mild steel.
13. To use – rest your cable on one half of jig, place other half on top and, with 'dowels' in place, press firmly together. You really need a press for this, but a large, heavy duty vice might just suffice. If you're doing this in the desert under a tree, I guess as a very last resort a hammer might do, but one hefty smack with a 4lb lump hammer as opposed to several taps with the usual 1lb toolbox special.