

Another little job No 5: BA stainless cap-head screws

In the bottom of the smokebox of my Winson GWR 1400 class locomotive the super-heater delivery pipe is secured to the valve chest by two 4BA screws, one of which is very hard to get at to tighten. A cap-head screw here would help a lot. With steam and water around, ordinary steel screws here will soon go rusty and lock solid so they should really be stainless steel - but stainless 4BA cap-head screws are not generally available from our normal suppliers. So what do you do?

Well I was watching some of the excellent videos by Keith Appleton on Youtube (just search for his name and you will find dozens of them) and noticed one in which he supplies the solution: make BA screws from metric screws! Amazing but true. It turns out that the M4 screw thread is not far off the size of 4BA and M4 stainless screws in all types and sizes are widely available and very cheap. In fact 4BA is 3.6mm diameter by 0.66mm pitch whilst M4 is 4.0mm dia by 0.70mm pitch. If you just run a 4BA dia down the M4 thread it will come out surprisingly good. It's not exactly AQR compliant for use on aeroplanes but it will do for most of our applications. To convert stainless cap-head screws you do really need an HSS die rather than carbon but then if you think of the money you might save, let alone the general benefits of HSS dies, the extra cost is well worth it.

It can be done for other sizes too: 2BA is 4.7mm dia x 0.81mm pitch so use M5 which is 5.0 dia x 0.80 pitch. Likewise 5BA is 3.2mm dia x 0.59mm pitch so use M3.5 which is 3.5 dia x 0.60 pitch. 6BA is possibly pushing it a bit (I haven't tried it) but might be worth a try: 6BA is 2.8mm dia x 0.53mm pitch whilst M3 is 3.0 dia x 0.50 pitch. Even 8BA might work as it is 2.2mm dia x 0.43 pitch and M2.2 is the same diameter and 0.45 pitch (or perhaps M2.5 x 0.45 would give a better thread but might need the diameter reduced a tad first). All these metric threads are standard metric coarse – so there is nothing fancy about them. Of course if you are building from new you should really consider using equivalent metric threads instead of BA in the first place but for repairs and renovation work converting metric screws to BA could be very useful.



So, if you find yourself in need of a stainless BA screw in a size you can't obtain (cap or hex head), why not try converting a metric one? It might just solve a problem but do bear in mind it will still have a metric size head. While you wait for the metric screws (and HSS die) to arrive in the post you can be educated and entertained watching more of Keith Appleton's model engineering videos. They really are useful with tips for how to do all sorts of things in the workshop.

These two A2 stainless cap-head screws started as M4 and M5 but after running HSS dies down them are now 4BA (the smaller one) and 2BA. The threads look good even under an eyeglass.