THREADES - CYLINDER STUDS AND OTHERS.

Neville Higgins

Back in March 2001 (it seems like only a couple of months ago) young Hillsey wrote about problems with cylinder studs and nuts, finally reporting that the TC had come to the conclusion that they were BSCy (British Standard Cycle) thread, rather than whitworth form, as I and many others had believed. The holes in my crankcase drawings still specify 9/16” dia x 20 tpi whit form, which is obviously wrong. A couple of weeks ago Micke Glatzl came over to do a couple of jobs on the Comet, bringing with him 4 rather scabby cylinder bolts which needed the threads dressing up. One of these had a head nut jammed onto it which Micke had been unable to remove in spite of heating it to red heat, and he left them in my workshop saying he would tackle them next time he came. Being unable to resist a challenge, I sloshed penetrating oil onto the jammed nut - but no better, so out came the welding torch with a nice big jet to heat the nut quickly without getting the stud too hot; a good ring spanner and Urrrkk! it went a turn. I allowed it to cool a bit, more penetrating oil, and it came off without damaging the threads. I could then see this was one of the head nuts which was only threaded half way through - one of the odd mistakes which the Works made occasionally. In my time I have tapped through many such nuts, using my whit form taps, and have often had problems with them being tight on the studs, and here, it seemed, thanks to Dave, was the explanation.

Since reading Dave's article Tracy Tools Ltd had sent me their 2002 Catalogue, and I noticed a half page of BRASS, CYCLE, & SPECIAL PITCHES taps and dies, including 9/16 dia x 20, 24, 26, 27, 28, 32, 40 tpi, so I decided to buy a new BSC tap and die, and now was my chance to prove them! The tap took a bit more out of the nut - but it was still tight on the stud - which had me worried. I therefore had to use the split die to run down the stud threads, noting that it seemed to take a very slight cut off the top of the thread, but only cleaned up the flanks. The nut then ran down freely. There still seemed to be something that didn't check out here, so I went scuffling back through my old works drawings, finding one sheet of the crankcase drawings which specified "Tap 9/16” x 20 CEI" for the stud holes. The thought "Can there be a difference in CEI and BSCy threads?" came floating into my mind. I therefore went to my incomplete copy of B.S.811 which is titled CYCLE (BSC) THREADS with (FORMERLY KNOWN AS CEI THREADS) beneath it. This told me that the thread was first formulated by the Cycle Engineers' Institute in 1902, and was peculiar in that it included a series of threads applicable to any size of stock, rather than organised and progressive sizes. BS 811, issued in 1938, standardised a selection of the more commonly used sizes, and it was updated in 1950. The standard specifies a 60 deg thread angle, and a basic profile form with well truncated, radiused, root and crest. The truncation is defined as equal to the pitch divided by six, giving a more than usually shallow thread. Neither I nor Janne Ostnas, who tried to help me, have been able to find a basic thread form for the original CEI thread. We know it had the same 60 deg angle, but experience with Vincent's head bolts and nuts makes me wonder if it had less truncation at the root and crest to produce a deeper thread. If this were the case, then a CEI nut would run freely on a BSC stud, but a BSC nut would suffer crest interference on a CEI stud, which seems to be what we are suffering from. Step forward please, all those engineers who can produce a basic thread form profile diagram for CEI - or a better alternative explanation!

For those who have not yet made their acquaintance, TRACY TOOLS LTD, 2 Mayors Avenue, Dartmouth, Devon TQ6 9NF, tel 01803 833134, fax 01803 834588, email TracyTools@aol.com, are a good firm to go to for old British taps and dies, drills, reamers, and many other hand tools needed for our old Vincents. For those with damaged threads who need wire inserts contact Uni-Thread at Marldon House, Love Lane, Marldon, South Devon TQ3 IS, tel 01803 559595, fax 01803 527568, email UniThread@aol.com.

Before we move on, just a thought on cylinder studs; hands up those who know why they are waisted instead of being the same diameter all the way down - surely this would be easier and cheaper, as well as stronger? Quite so, but strangely enough it is much better to have a cylinder head held down by a long slightly elastic bolt, than by a short, or thick and very rigid one which cannot stretch. OK you pull your heads down when the engine is cold, but when it gets hot the aluminium barrels and heads try to expand a good deal more than the steel bolts, increasing the loads considerably. This can cause crushing of the aluminium in exactly the same way as happens when engineering morons pull the head nuts down too tight. So by waisting the bolts and making them of high quality steel which is able to stretch elastically, they allow the heads and barrels to expand as they get hot. So far so good, but our studs have a full diameter "blob" in the middle which seems to do nothing - why is this? Is it to stop them vibrating in the middle? No. If the studs were waisted all the way along, the barrels and heads, which must be drilled to clear the 9/16 dia thread on the top, would be able to rotate 2 or 3 degrees on the studs, and this is enough to throw the pushrod tubes, the carburetters, and the exhaust pipes well out of line and cause major fitting problems. The blobs stop this - cute and simple, yes?

Next up - spark plug threads. Whilst cleaning up and polishing the ports on my new Terry Prince heads (and Man, those are BIG HOLES for a road bike?) I used my holding tool consisting of an old plug body welded to a length of hex bar. This went in tight into the first plug hole, but came out alright when I changed to the other side for easy access (they are twin plug heads). This one also was tight, and when I came to take it out it tore out the top two threads with it - on a brand new head. Needless to say, I
was not a happy camper, but doubtless the Baron will be smiling gleefully! Now Terry supplies an aluminium blank for those customers who do not wish to know about twin plugs, and this fitted his head perfectly - but when tried in a standard head it was an extremely Wobble-you fit. Standard spark plugs would only screw in about 2 turns before being in danger of seizure. I therefore had to dash out and spend nearly £20 on a standard 12 x 1.25mm spark plug tap. When I ran this through my plug holes there was a LOT of aluminium swarf on the bench, and a spark plug fitted nicely. So for those who buy Top End Kits from Aussie - Watch out in case yours are undersize too!

More to make Mr Prince think. He does not use locking rocker bolts, but supplies extra long rocker trunnions which are a size for size fit in the tunnels so that they cannot rattle loose. His instructions say warm the heads up to insert the trunnions - so far so good - but how the heck do you get the darn things out again? I decided to use standard trunnions which are half to one thou smaller in diameter, and a tight push fit in the heads. To make absolutely sure they cannot rattle I went for locking bolts - but not the usual type with piddly little nuts - but the Bob Dunn type which uses a 5/16” BSF thread insert in the top of the trunnion, and the bottom of the standard bolt screwed 5/16” to match after turning off the original 3/8” thread. Terry's bolts, however, are very non standard, though the pin part which engages the trunnion is still 5/16” dia. When I checked the 3/8” thread before turning it off I found it was 10mm - UGH!! And the hexagon on the top, instead of 5/16” whit, was 16mm - MORE UGH!! Why do suppliers of new Vincent parts do these diabolical non-standard things to us? We all have to carry a set of whitworth spanners and inch allen keys with us to service our machines, but we do not want to be forced to carry millimetre sets as well just to suit the crazy idiosyncrasies of our suppliers!