

CHAPTER 9: CONRODS, PISTONS AND BARRELS BACK ON

Posted on the Wildguzzi forum by Pete Roper: January 17, 2006:

Contents: Assembling the engine. Conrods, pistons and barrels back on.

Pic 9-1:

OK, this is the view of the connecting rod and cap, (Ignore the wood chip in the assembly lube, I took that out before I assembled it).

Note that both of the locator tangs on the shells go on the same side of the rod when it is assembled onto the crank.

With Guzzi rods there is a milled face on one side of the rod that should always, on both rods, be assembled facing to the right of the block as viewed from the riding position.

These rods are Carillos and are ambi-sidestrous, they can go in anywhichway. Before installing the shells in the rod and cap make sure that both the back of the shell and the face it sits in the rod are clinically clean. That's what I use the can of 'Start Ya Bastard' for!!



Pic 9-2:

Insert the rods through the crankcase mouth and install the caps using lots of lube and no wood chips! The caps can be put on and the bolts installed.

On Guzzi rods the bolts have nuts that you tighten to 34 ft/Lbs.

The 'Rillos use bolts that screw directly into the shank of the rod and will stretch to 6 thou over with 42 ft/lbs in most cases but CHECK if you're using them with a micrometer.

Tighten them in two or three steps checking as you tighten that the rod will still swing on the crankpin. If the rod tightens up at any point while both bolts are torqued equally there is something wrong.

Once fully torqued the best way to check if things are right are to set the case on its sump and the lift the rod to its highest possible point. With a decent assembly lube in the bearing, when released, the rod should slowly drop to the other side of the crankcase mouth under it's own weight. If it goes 'Clonk!' or doesn't want to move without force then there is something wrong. Obviously if you're doing this in a cold shed in winter you may need to give the rod a prod and if you're doing it in some god-forsaken swamp in Louisiana in high summer it will probably drop fairly quickly. The thing is you've got things the right size and shape it will *Feel* right!!!!



Pic 9-3:

Once the rods are installed check the side clearance, (Yup, it's in the book!). This is vital as if the clearance is too small the oil can't escape taking away the heat generated by the friction within the oil while it's doing its job. Too big and there will be a tendency for the oil to flow out too freely endangering the bearing's ability to wedge properly.



Pic 9-4:

Spread the rings and install them on the piston. I'll cover rings a bit more in the next pic. Then check their side clearance with a feeler gauge and make sure it's within book specs. It's also important to check the ring back clearance but with Guzzi/Gillardoni products this is rarely an issue. Sorry. I don't have a pic of this, I forgot, so it will have to go in the addendum when I've finished the main rant.

Essentially though, if you take the new rings and, before you install them, push the outer edge into the ring groove, then the inner part of the ring should be below the outside of the ring lands. Only by a little bit, but it can't stand proud.





Pic 9-5A

Pic 9-5B:

These pics I just stuck in to show the arrow on the crown of the piston I mentioned before that indicates the direction the piston should be fitted. The arrow points towards the front, (exhaust side.) of the motor.



Pic 9-6:

OK the piston can now be re-installed on the rod. As stated earlier forged pistons the gudgeon, (Wrist) pins should simply slide in at room temperature. The bloody horrible, cast, big-valve pistons need a bit of heating and the pins should be chilled. While I'm not sure you can see in any of these pics there is an arrow on the top of the piston that indicates which way it should face, (The arrow points towards the front of the engine.) but generally the biggest cutaway on a piston crown will be on the inlet side, because the inlet valve is bigger(Derr!).

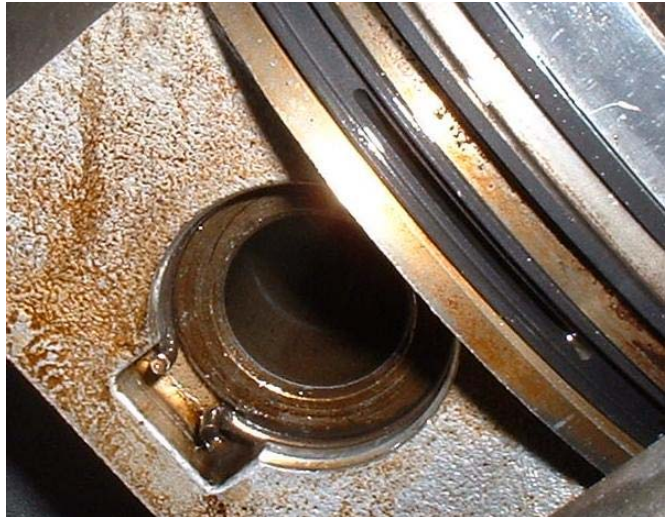
Most important in this pic though is that you can see the profile of the rings. Piston rings aren't simple things, there are lots and lots of different types that perform different tasks, they aren't just cast iron circles with a slot in!

The top ring is a seemingly *plain* ring. In fact it's not, it's chamfered towards the bottom so that it will wear in quickly. Its main purpose is to keep the gas in the combustion chamber.

The second ring has a *step* in it that should always go towards the bottom of the piston, (Flat face towards top of piston.). This is a type of ring called an inverted, taper-face, semi scraper, (Cool eh!) and while it acts as a second line of defence against the gasses blowing by the piston it also flexes in service as the piston goes up and down and the *Step* scrapes oil off the bore back towards the sump. Get it in the wrong way up and it'll pump oil INTO the combustion chamber!!!

The third ring is the oil control ring and its ONLY job is to return oil scraped off the bore to the sump via holes in the piston within the third ring groove. If, as in this case, you are using one-piece cast rings they are usually marked 'Top' on one side.

That should be self-explanatory? No? If not or you are using other rings, (Boy, what a subject, I could drone on for pages and bore your buns off) always look at them in profile and fit the sharper edges down the bore. Remember that the tops of all the rings should always be flat; any step should be on the second ring and facing towards the sump.



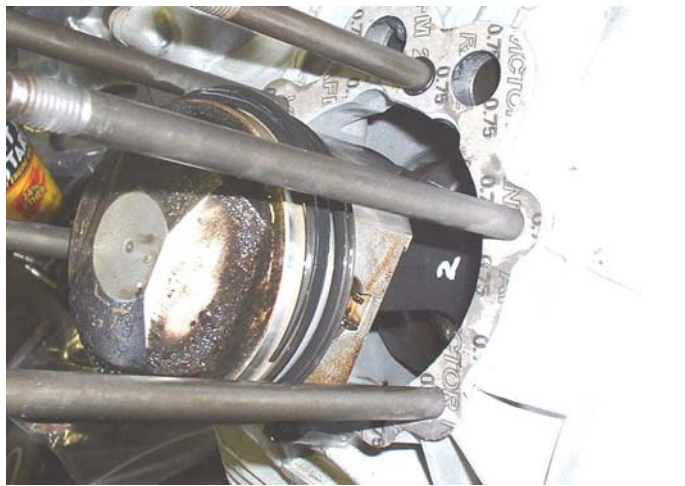
Pic 9-7:

At this point it's important to check that you've got the cam followers in. Also DOUBLE CHECK that you've got the circlips that retain the gudgeon pins in their grooves correctly, all four of 'em! You'll feel like a right goose if a few seconds after you start the motor the pin saws a trench in the barrel! It's also embarrassing if you drop the pushrods in and the fall down beside the cam. Once the base gasket is in place ensure you install the two O-rings on the short studs at 12 and 6 O'Clock.



Pic 9-8

Ensure that the ring gaps are spaced at roughly 120 degrees to one another.



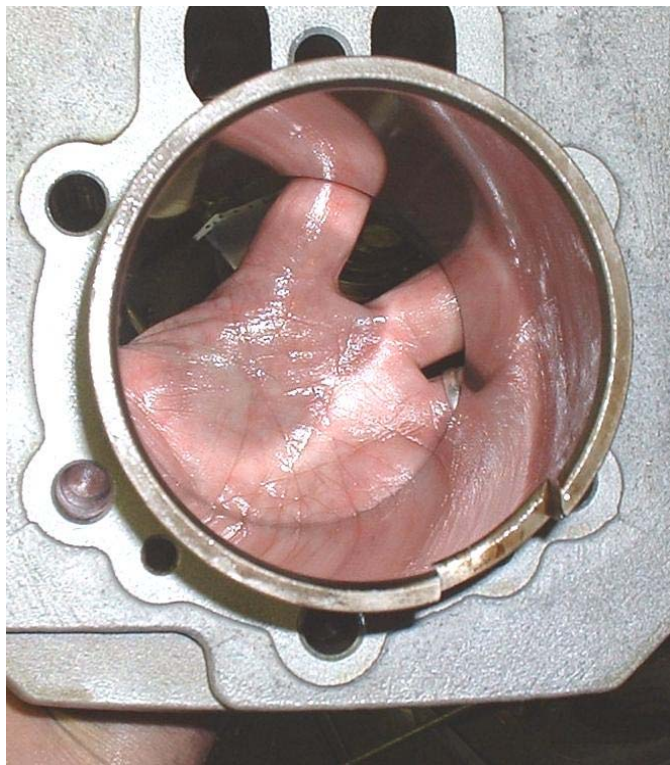
Pic 9-9:

I have absolutely no idea why I included this pic apart from to show people that at the age of 49 I still bite my nails!



Pic 9-10

The underside of the barrel. You can see the two countersinks on the holes where the short studs go through the barrel for the O-rings on those studs. Note also that there is a taper on the bottom of the barrel flange to assist with the installation of the piston rings. Note also, that i have a distinctive palm print which means I can't earn an honest living robbing banks so I have to fix motorbikes for a living, sad eh? Oil the bore up well before offering it up over the studs and lowering it onto the piston, GENTLY!!!!!!



Pic 9-11

Unfortunately it's impossible for me to get a pic of actually getting the rings into the bore as I only have two hands and didn't have an offsider.

Before installation oil the bore and the rings in their grooves and position the gaps 120° apart. Basically you simply slide the barrel down the studs and slip the piston crown into the bore. The base of the spigot will rest on the top ring. By squeezing the ring to close the end gap you can get it to slip into the taper in the bottom of the spigot and the barrel can then be encouraged down until the spigot is on the second ring and the process can be repeated.

The piston should be at approximately TDC as you do this and it's important to guide the piston into the bore squarely. If it tries to cant over to one side it will jam and you will run a far greater risk of breaking a ring. The rings themselves are very frangible and will snap very easily so do take care. Once the bottom ring is in the bore though it should be easy to simply slide the bore down, over the piston and push the spigot into the block.

If you are using a three or four part Deeves type oil control ring which has a separate expander and oil rails at top and bottom it can be very difficult to get the bottom ring in to the barrel. With these types of ring I actually find it easier to install the piston into the bore on the bench using a conventional piston ring compressor and pushing the piston into the bore from the top. It is then possible to push the piston down the bore until the gudgeon pin holes are just below the bottom of the spigot. The barrel with piston inside can then be lowered onto the studs and the gudgeon pin and second circlip installed before the barrel is pressed home to the crankcase.

In this pic you can also see the crosshatch hone on the cylinder wall very clearly.

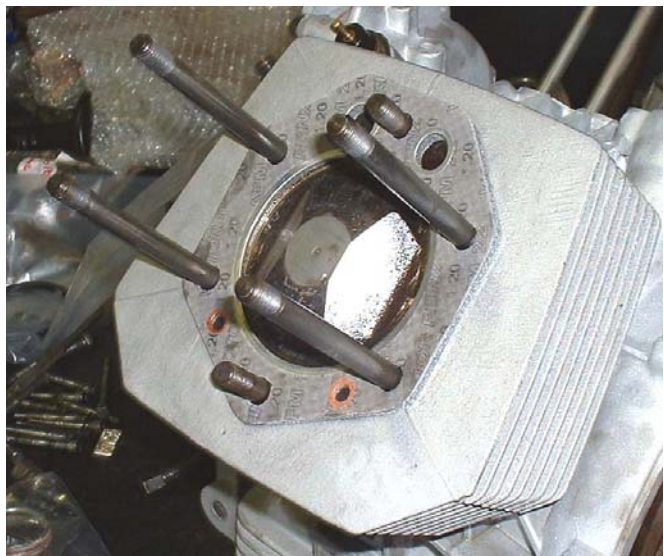


Pic 9-12

Once the barrel is pressed to the case the head gasket can be installed.

Note that on the squarefin motors there are two oil return galleries through the barrel so the gasket is symmetrical.

On roundfins there is only one oil return hole so it's important that both head and base gaskets are put on the right way otherwise the oil can't return to the sump and the rocker areas in the head fill up with oil!!!!



Pic 9-13:
Slip the head back on.

