

Large block – Rapido 200/225

RAPIDO 200 / 225 / 250cc

There are three versions of the Rapido cylinder manufactured and distributed by AF Rayspeed

- 200 Classic Version, 66mm
- 200 Race Version, 66mm and 70mm
- 250 Race Version, 72mm

The 200 Classic and 200/225/250 Race cylinders visibly look the same apart from some differences

- 200 66mm Classic has a small height exhaust port as standard
- 200 66mm, 225 70mm and 250 72mm Race cylinder has a larger in height exhaust port
- 250 Race has a larger spigot of 78mm that fits into the casing and the casing need modifying to suit
- 250 uses a longer 60mm stroke crankshaft, the others use a standard 58 x 107mm crankshaft but can be set up with a 60mm

The Race Rapido was introduced in 2001, on the first day of sale we were asked by a telephone customer "what jets should I fit into my 25mm carb on my Rapido barrel?" Our answer was thanks for phoning but why phone us it's not our kit and we've not even seen one! The customer did phone back to say what jets he had used in the previously running engine and then to say that he couldn't jet in the engine whatever he did. With three phone calls in one week asking us about jetting and numerous calls asking how good are they we decided to have a look at the kit. Now the Rapido has been a very popular kit, especially when people followed some of the tips we laid out below.

THE CYLINDER

The first impressions were how heavy it was! With a closer inspection we found out why! Basically the Rapido cylinder is nothing but an iron cylinder as before, the exception is it has alloy fins. To explain a little further, the cylinder bore, the area around the stud holes, inlet, exhaust and transfer ports are all one as per a normal cylinder. Then cast around it is the alloy finning. The idea of this method of manufacturing is to stop leakage between the liner and ports.

There are two other other methods used for cylinder manufacture

- The Japanese cast their alloy around a liner that is just the bore and the transfer ports
- The repair way is to bore out the existing liner and interference fit a new iron liner with a top hat shape to stop the liner moving. MB have used this method for many years and have repaired hundreds of cylinders. To date we have never known any cylinder leakage using this method! It makes the Rapido method a little over kill! It would have made more

sense to have made a complete Alloy cylinder and have it plated, but I guess costs came into it at the time and then there is the pros and cons of iron liner vs plated bore. The Rapido is what it is so we have to accept it.

The alloy and iron casting is very well made and looks very good quality. On close inspection there are some casting lumps around the ports, especially inside the transfer feeds into the cylinder, but these are nothing to worry about.

One good advantage with the iron casting method is that inlet and exhaust stud holes are still cast iron. Vibrating Lambrettas tend to pull on alloy thread holes as most people found out with the TS1 cylinders. Lets face it 7mm exhaust threads were not strong enough in the first place, modern motors would use 8mm and they still have trouble. But if good studs are fitted correctly with Loctite then these are usually no problem.

EXHAUST PORTS

The main difference apart from piston size with the two style cylinders is the two exhaust port shapes.

RACE CYLINDER

The Race exhaust port looks large but uses the original standard style oval flange shape and requires a big bore exhaust gasket, a standard gasket will mask off the port. Look at the exhaust port on an Indian factory cylinder, the Rapido's exhaust port resembles this shape. Similar to the Factory cylinder, material has been ground away at the bottom of the exhaust making the port 1-2mm lower than the piston when it is at bottom dead centre. The Rapido cylinder goes further still compared to the Indian Factory cylinder. An Indian cylinder gives a port timing of around 168 degrees, ideal for a stage 3 or 4 tune! The Rapido cylinder gives 182 degrees! Which MB would consider a large stage 5 tune or a road stage six tune and good for a road going touring Reed valve engine! I have found going over 175 degrees on a cast piston port cylinder loses bottom end pulling power and torque that a Lambretta needs. Some may argue this point and I may agree, but I have tried it many times and always come back too below 175 degrees for normal road going engines. If you want to increase horse power a larger exhaust port and duration always works but this will lose the drive ability of the engine!

CLASSIC CYLINDER

The port has been decreased in size to look standard and the lower edge of the exhaust port has been raised so the piston isn't exposed at bottom dead centre. The port timings have been reduced to around 170 degrees – ideal stage four porting, as per our tuning spec page and is greatly improved. On our engine jig the exhaust port needs lowering by 0.5 – 1mm to put it flush with the piston at BDC. The exhaust port width is slightly narrow at 42mm but this will look after the rings of the 3-ring piston used. This can be increased to 46mm with no ill effect but would give the extra benefit of increase pulling power and torque.

BEWARE

On some of the early cylinders the exhaust port had been cast badly WRONG! From the year dot a standard exhaust port had a flange that is not equal in shape to the studs. To explain this, as you look at the exhaust port with the spigot on a bench, the bottom exhaust stud (left hand) has a short distance between the stud and port. On the upper stud there is a larger distance between the stud and port. A gasket or exhaust flange matched to the port can be turned around 180 degrees and will still fit over the studs BUT the gasket or flange will mask off part of the exhaust port! This is a common assembly problem people have found over the years on a standard cylinder and can affect performance of a tuned kit. Some of the Rapido kits had the flange made in the opposite way with the top stud closer to the port! And to make matters worse the studs were drilled a little bit more offset to the off side of the bike making lining up a standard style Clubman even worse and the only real cure was to cut and reweld the flange. This is a total nightmare to line up, tune or grind. So a gasket would need turning round, but it went further, the gasket needs opening to get an unobtrusive path and if a flange is turned round on an expansion then its possible the exhaust is hard to fit. We suggest you always check your gasket and flange before fitting. Later cylinders addressed this issue.

TRANSFER PORTS

The transfer feeds and ports into the cylinder are the same as a TS1 cylinder, which means they are now bridged unlike a standard cylinder and has 4 ports leading into the cylinders bore. The feeds at the gasket face are larger than standard – like the TS1 and ideally your casing needs flowing to help the cylinder work. What does effect the Lambretta engine in a big way is the transfer port timings, when checked a Race kit they gave 130 degrees – about the same as I would use on a full race spec group 6 engine! At this duration pumping doesn't work low down but can work on to 10,000rpm, which is totally out of the range of most working Lambretta engines. The later Classic cylinder which we checked on the same jig gave 126 degrees more suited to make a Lambretta cylinder work. With an oversized inlet and transfer duration Rapidos cylinders tend to be on off taps, keep them in the power band and they are fine out of the power band they can be hard to ride!

INLET PORT

The inlet port is piston port set up and is much larger than a Genuine cast cylinder and resembles an Indian inlet port that has been slightly tuned and polished. The major factor with inlet port design is the opening period or inlet port timing. Using the Asso 2 ring piston supplied gives an inlet timing of around 155 degrees. This is around the same as an MB stage 5 or 6-race engine and is ideal at that level. This inlet timing WILL spit back a lot of fuel and will not breathe correctly making jetting a little harder to set up! This large inlet timing will effect carburation especially on the smaller carbs. This inlet size is suited to 30 – 36mm carbs not 18 – 26mm carbs. If however a standard length piston skirt was used, then regardless of the inlet ports size the inlet timing comes down too nearer a standard inlet port size and would be ideal for the smaller carbs. Using the full skirt

piston the duration decreases to 142 degrees, which is more suitable for a standard or mild tuned engine. This would de tune the cylinder for the better and have improved many cylinders with less spit back. On some cylinders the short inlet stud is drilled too far and will show up as a hole in the bore, this causes some concern with customers but is no problem as long as the stud is loctited in position.

THE PISTONS

There are a number of different pistons used as standard from AF

- Asso/Vertex and now Indian copy 2 ring pistons

The standard piston that comes with the Race 200/225 kit is the 66/70mm 2 ring Asso item. This piston has been around since 1984 and well proven to be reliable for all round engines except full race engines. The piston has two problems, the inlet skirt has been cut 3mm shorter than standard, therefore effecting inlet port timings and can over tune the inlet port in some situations especially the in all the Rapido cylinders. The area around the cut outs to feed the transfer ports below the gudgeon pin has sharp triangular edges unlike a modern piston, this is a design fault going back to Innocenti. Long term with a large piston to bore clearance the inlet skirt cracks and falls off! The later Indian copy pistons have had problems with rings breaking.

- Mahle 3 ring piston

This is a standard SIL Indian 66mm piston, the good part is the inlet skirt is standard and back to 3mm longer, this reduces inlet timings in both the Classic 200 and Race Rapido kits and improves low down running and jetting. The down side is, it uses 3 cast iron rings and in the Race cylinder tends to eventually break rings. This piston also has the same problem with the skirts cracking off if run with excess piston to bore clearance. But even though they are Indian there seem very good as a standard piston.

- Asso 2 ring 250 forged piston

This was a new piston to all Lambretta cylinders, it's a one off forged piston and is used only in the 250 cylinder with a new diameter of 72mm. To get to 250cc it uses a longer 60mm stroke crankshaft with a 107mm as does the 200/225 kits. The main difference with the 250 piston is the dome shape is much flatter than the normal Lambretta style piston, the dome is the same as a Honda MTX flat top piston.

THE PISTON TO BORE CLEARANCE

With the first cylinder that we set up, the bore clearance was .002" we have known them to come even tighter than that at .001" with a Mahle piston! If it was a cast iron cylinder then it is .001" – .002" too tight! This doesn't seem a lot but believe me it's a massive difference! So again beware, seizing could occur, as the Rapido cylinder is half a cast cylinder and half a lined alloy cylinder and every cylinder should be honed to give at least .003" clearance. We have come across many cylinders where the bore pulls to

tight in the wrong direction; normally a cylinder will wear in the direction the piston goes up and down from the inlet port to the exhaust port! We think because of the cast iron cylinder and thick transfer castings the cylinder pulls, tightening it up where you need clearance, so always check clearances.

MB CONCLUSION

The port timings are hit and miss on the Race cylinder, by this I mean a large inlet and transfer timing along with a very large exhaust port timing. Put together in this order the engine will be on and off the power, this makes jetting hard to do! Changing exhausts will help control how the engine works but what combination works is just skirting around a bad design! Using a low powered Clubman helps mask the symptoms. If you can ride in the power all the time then you may like the cylinder, if however you ride slower, round town or two up then expect the cylinder to be hard work to ride with. The Classic cylinder does improve because it comes with a 3 ring full skirt piston which lowers the inlet timing, it also improves as the exhaust port is decreased in size and reduces the port timing, but the transfers are still a little large. The Race cylinder can be improved a little by fitting a full skirt piston.

The head is a typical head from AF and can be improved by fitting a head done the MB way (cut as per pistons dome, combustion chamber opened for unleaded fuel) this always improves speed and reliability.

Beware of speed bumps, the casting around the exhaust flange is very weak and can break fully off.

The Race cylinder is ideally suited to a 30 – 35mm carb and race type expansion chamber, where as the Classic cylinder with reduced inlet and exhaust timings can be used with much smaller carbs even down to a standard carb and any exhaust.

WHAT MB CAN OFFER

MB used to offer Japanese piston conversions BUT this will then get expensive going away from what the cylinder seems to be designed for, a cheap bolt on alternative to the TSI cylinder kit. These days MB offer our forged Race-Tour pistons with full skirt length's which comes in sizes from 66 – 71mm there is a piston to modify or repair any of the 200/225 cylinders and fit straight onto a standard con rod. We also make our version of the 250 piston, which is improved as the transfer feed cutouts now match the cylinder where as the original is from a bike engine.

Changing the con rod to a Yamaha 110mm long rod would give more scope by using a combination of packing plates and thicker head gaskets to set the port timings a little better by reducing the transfer and exhaust timings. This makes the cylinder more ride-able, drive-able and reliable.

We can offer tuning based on our improved RT pistons, inlet ports are matched to an inlet port and flowed, transfers are cleaned and flowed, we also recommend matching the casing and mag housing and we flow and widen the

exhaust port along with modifying to a better designed head.

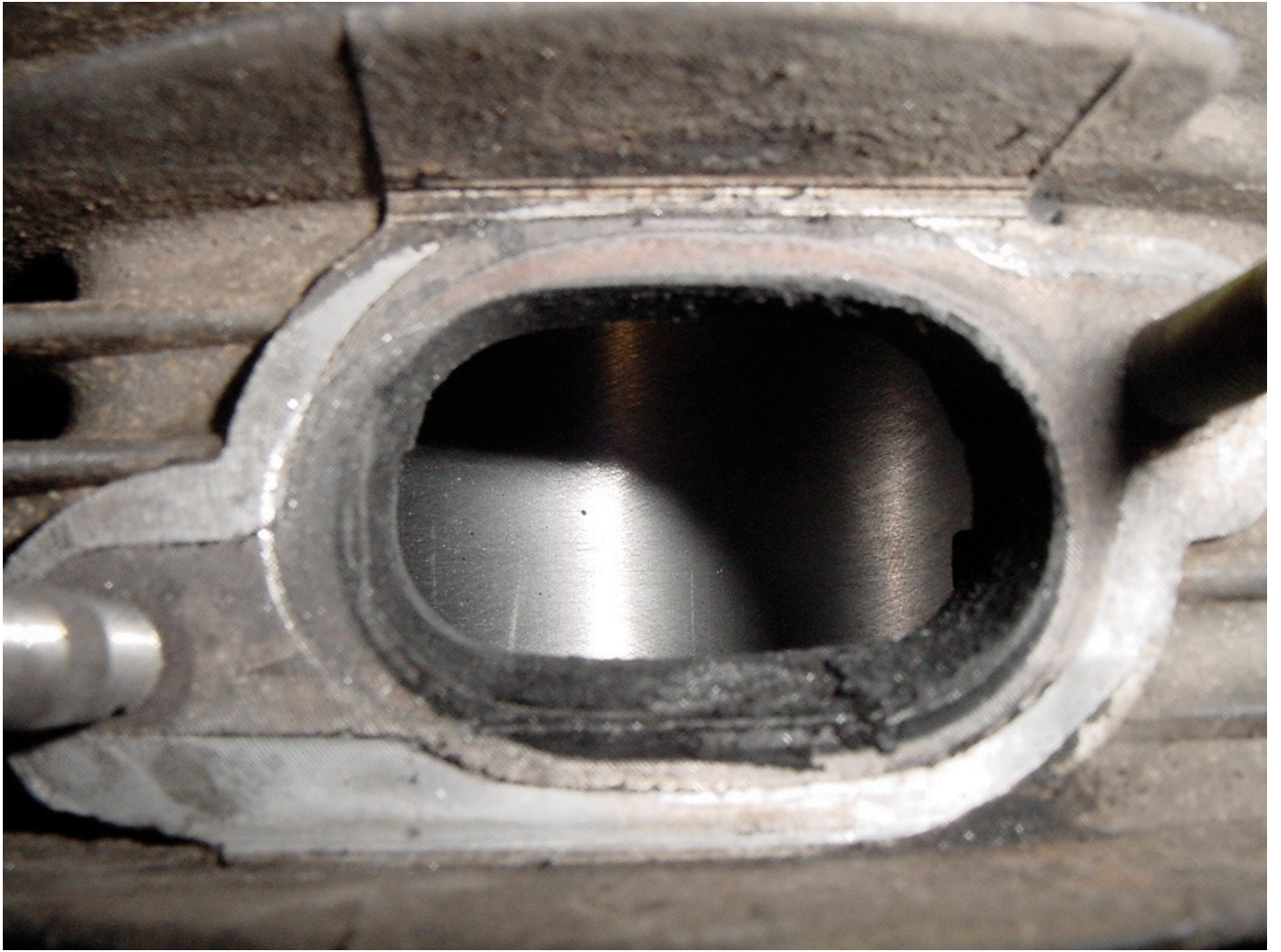
Further improvements can be made by fitting a reed block. MB offer our own Reed block, it's not a straight fit, it requires some work to be done. Some fins need removing above the inlet port, then the inlet manifold needs matching and flowing into the inlet port, the port needs to be increased and reshaped and most importantly a boost port or 2 (we can do 3 with more work) needs cutting into the cylinder and the piston either needs modifying to 360 degrees or fit a new MB reed piston. The reed will improve the Rapido cylinders, it will stop spit back, improve low down drive-ability and works with a standard Race type exhaust port timings.



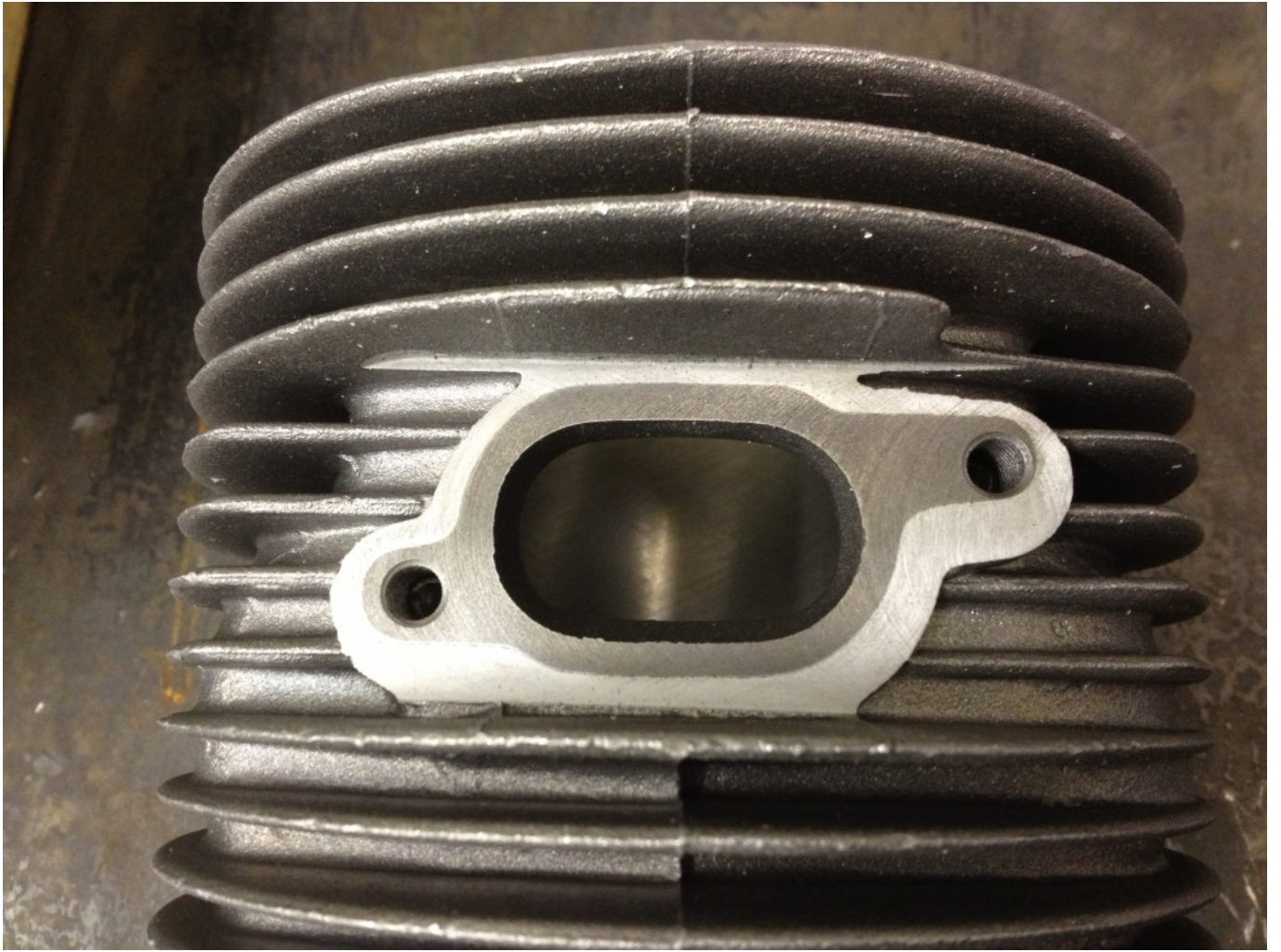
Shows the difference in inlet shirt lengths



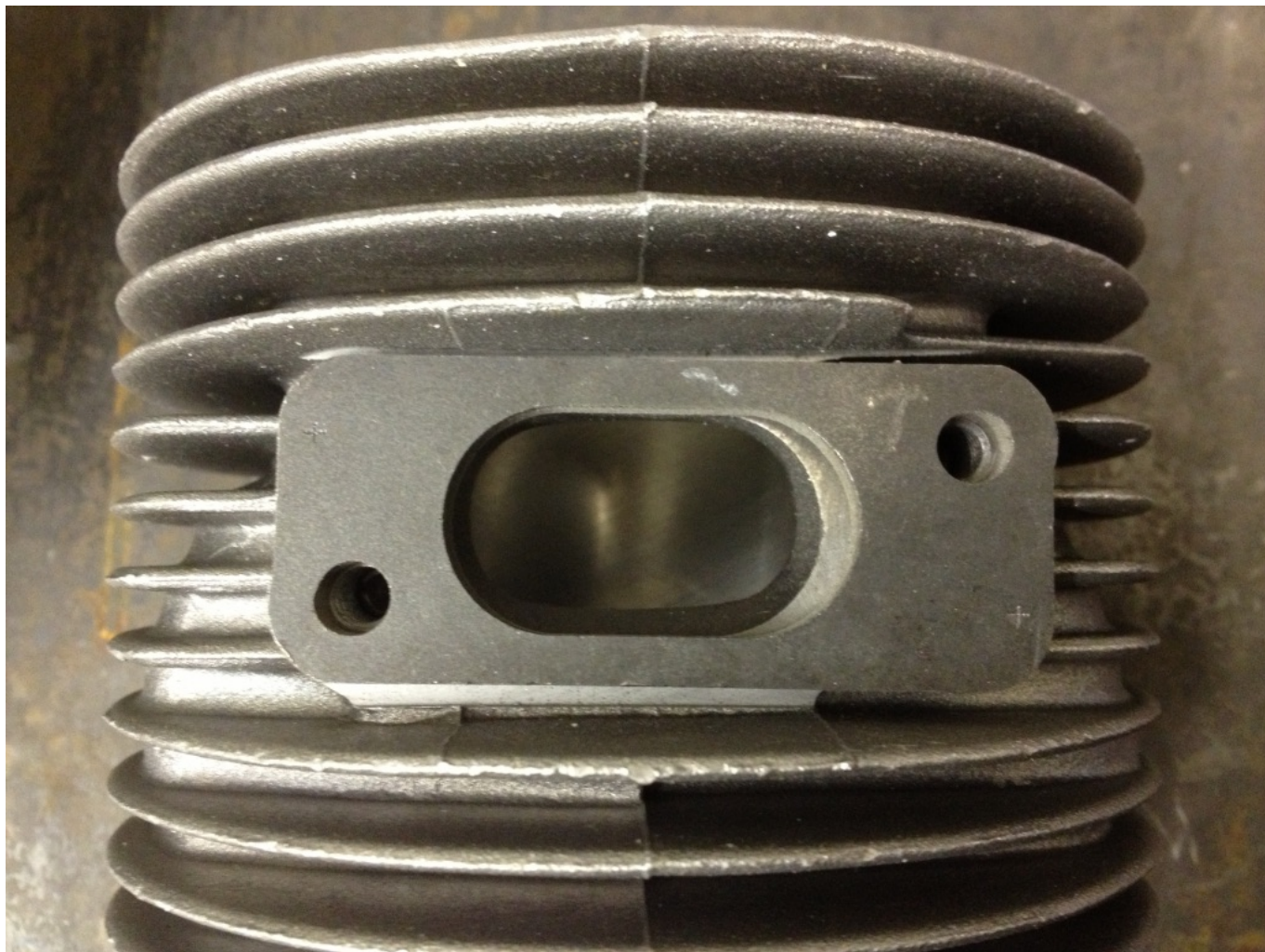
Shows the distortion that can happen to a Rapido cylinder, this was machined down in a lathe as it didn't fit into the casing



Showing the alloy/iron manufacturing method



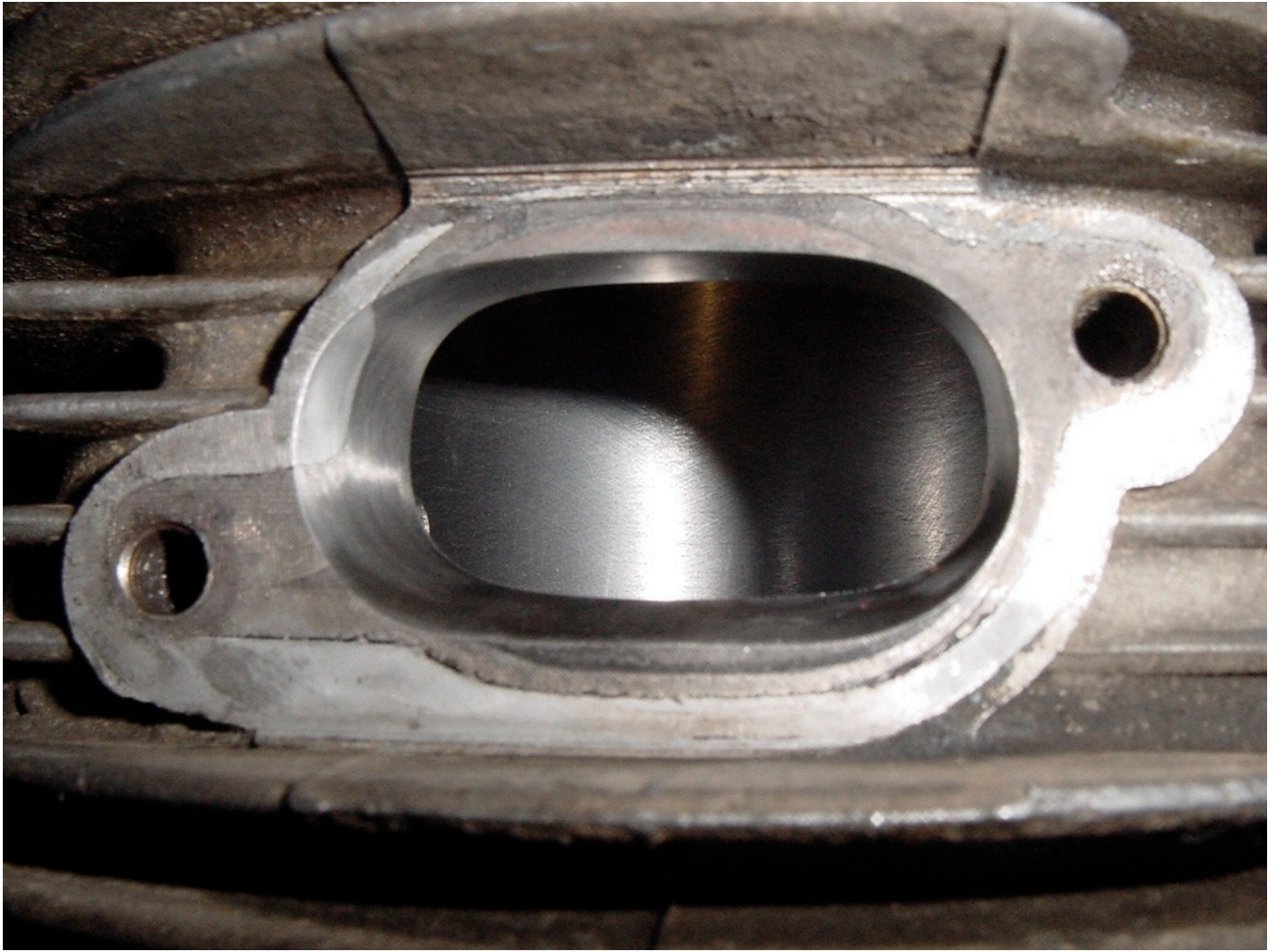
Race Rapido exhaust port



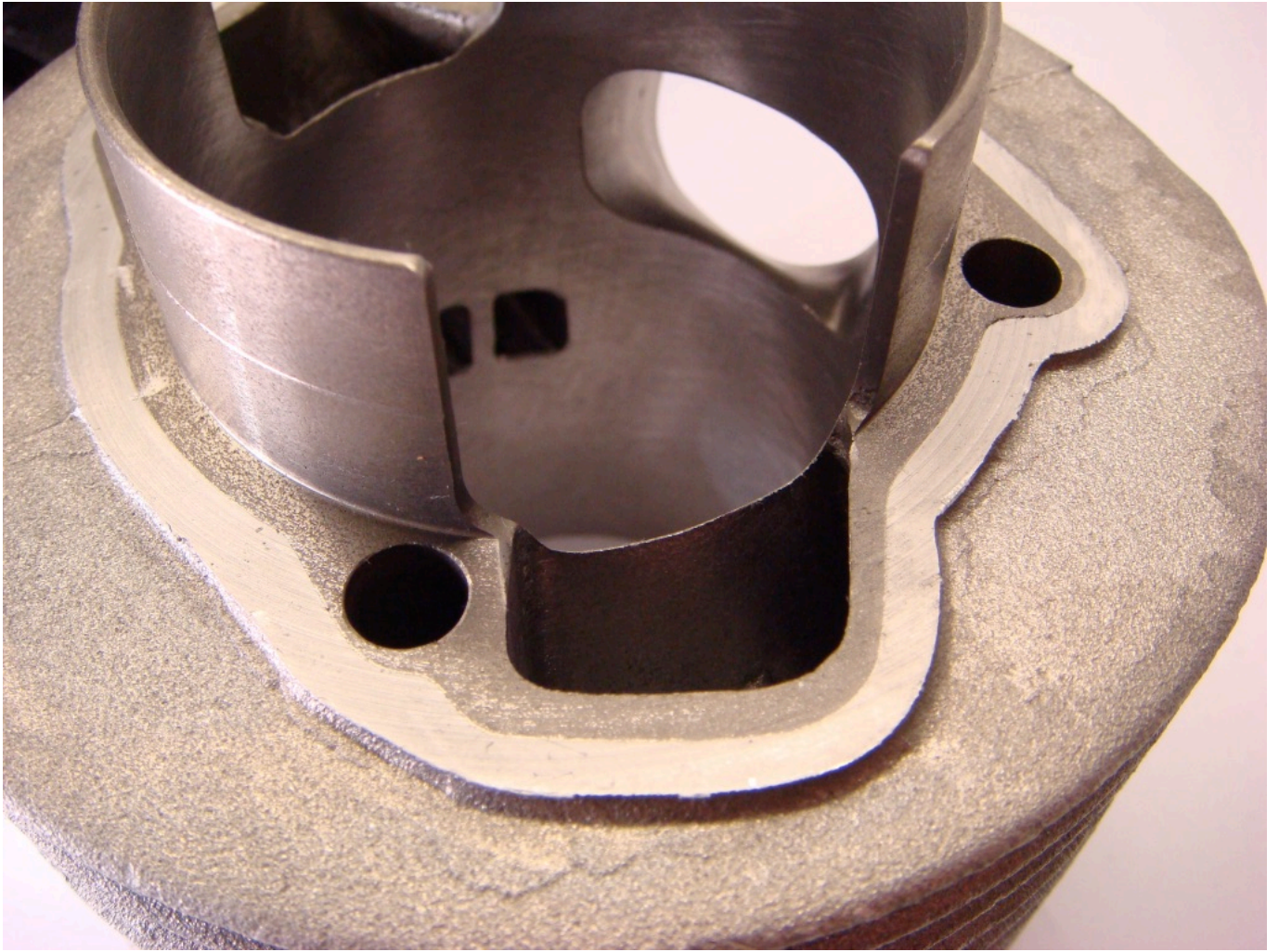
Race Rapido exhaust port mismatched and one stud thread is out to a correct exhaust flange



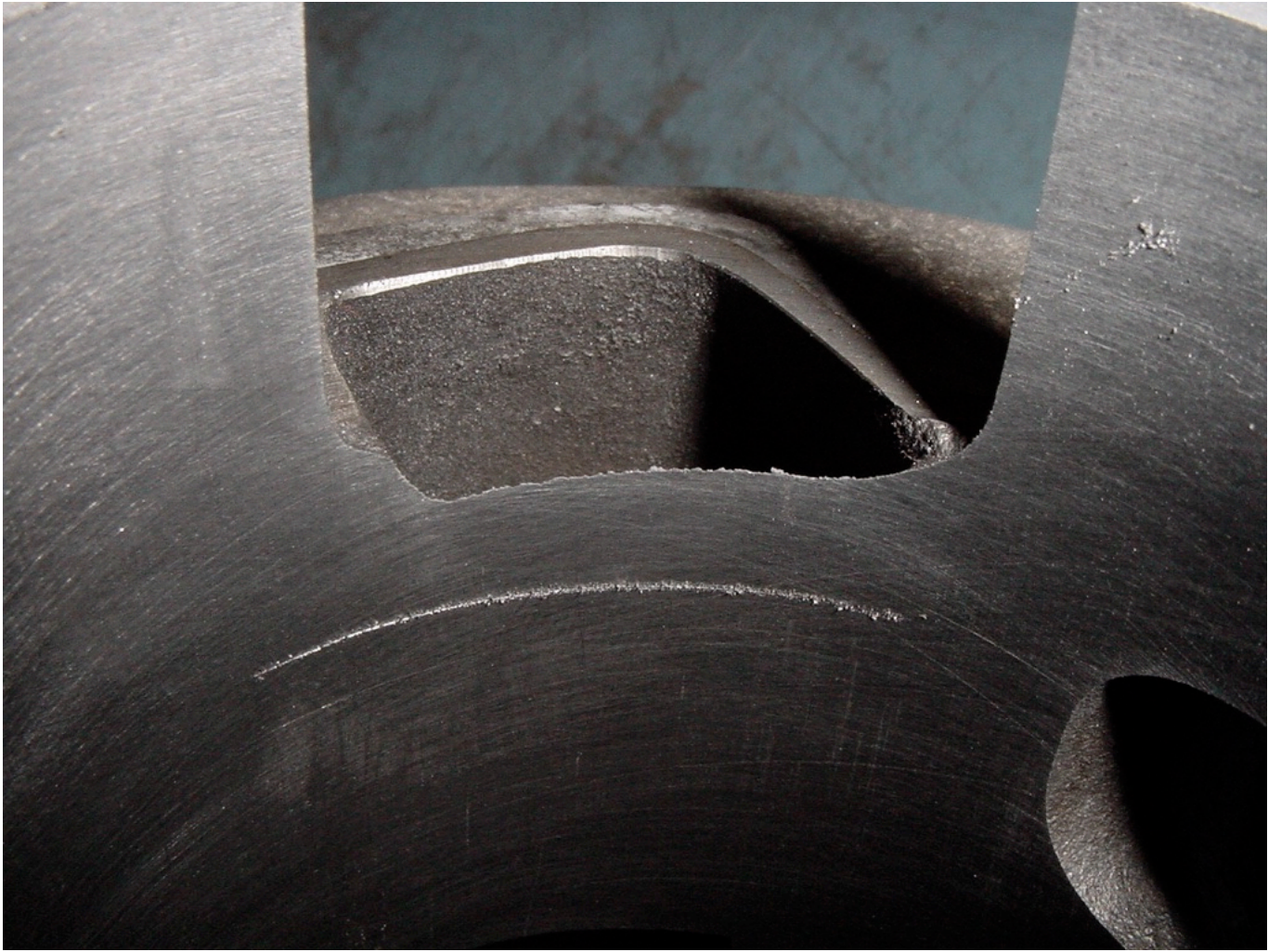
Another version mismatched to a correct exhaust flange



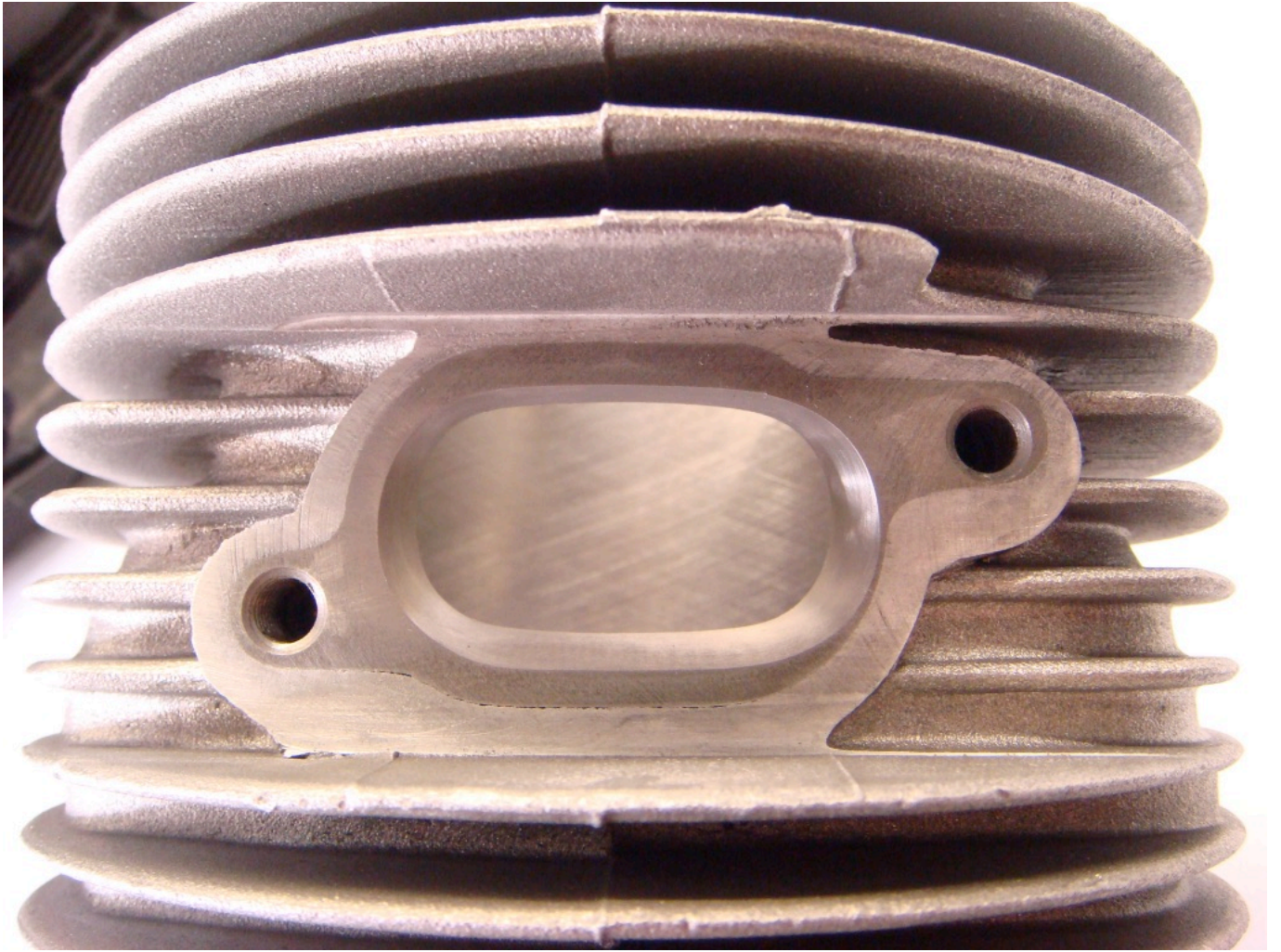
Tuned exhaust port



Showing the very thin side wall of the transfer feeds



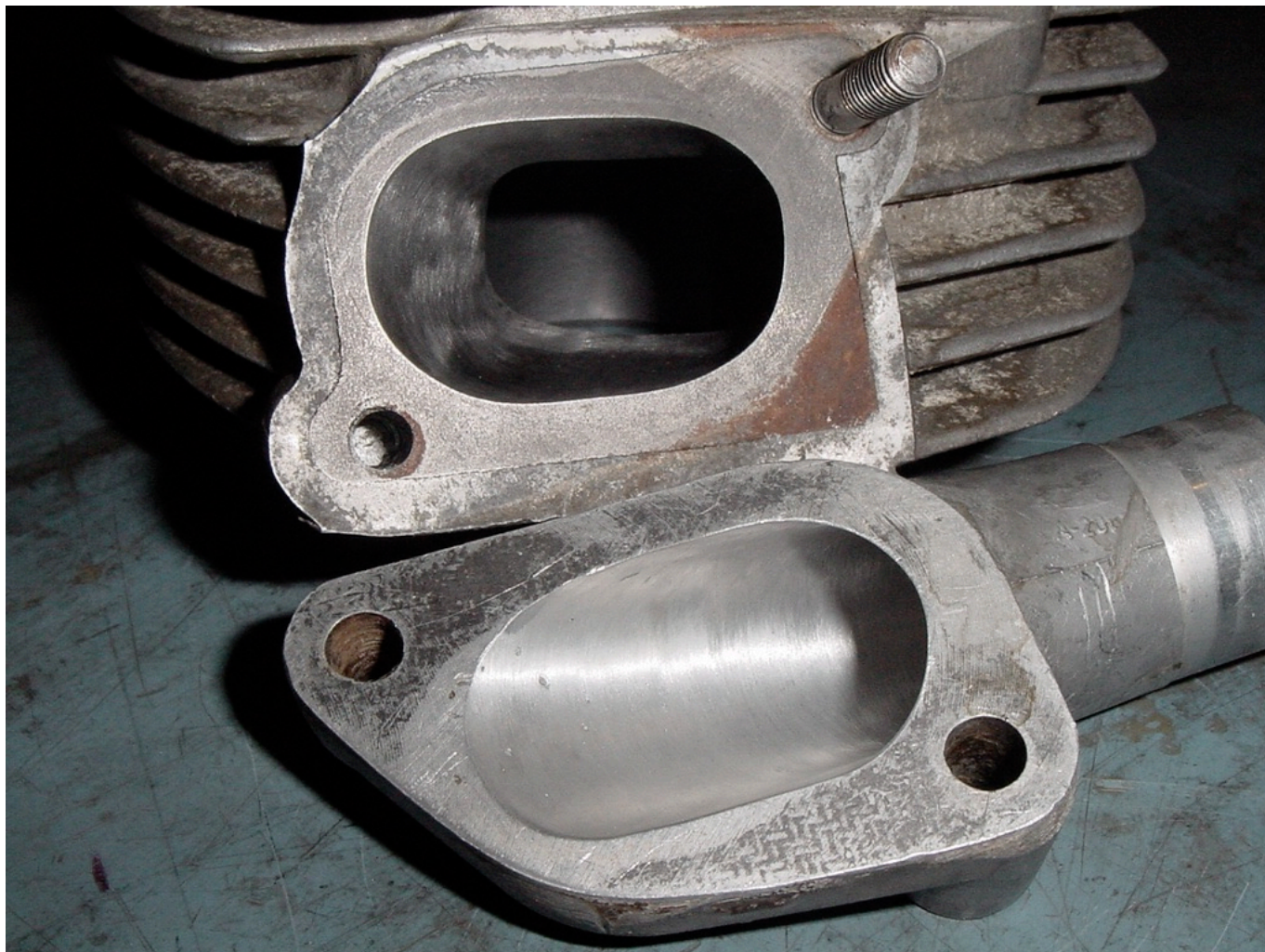
Scribe line where the wall has to be ground down to make safer



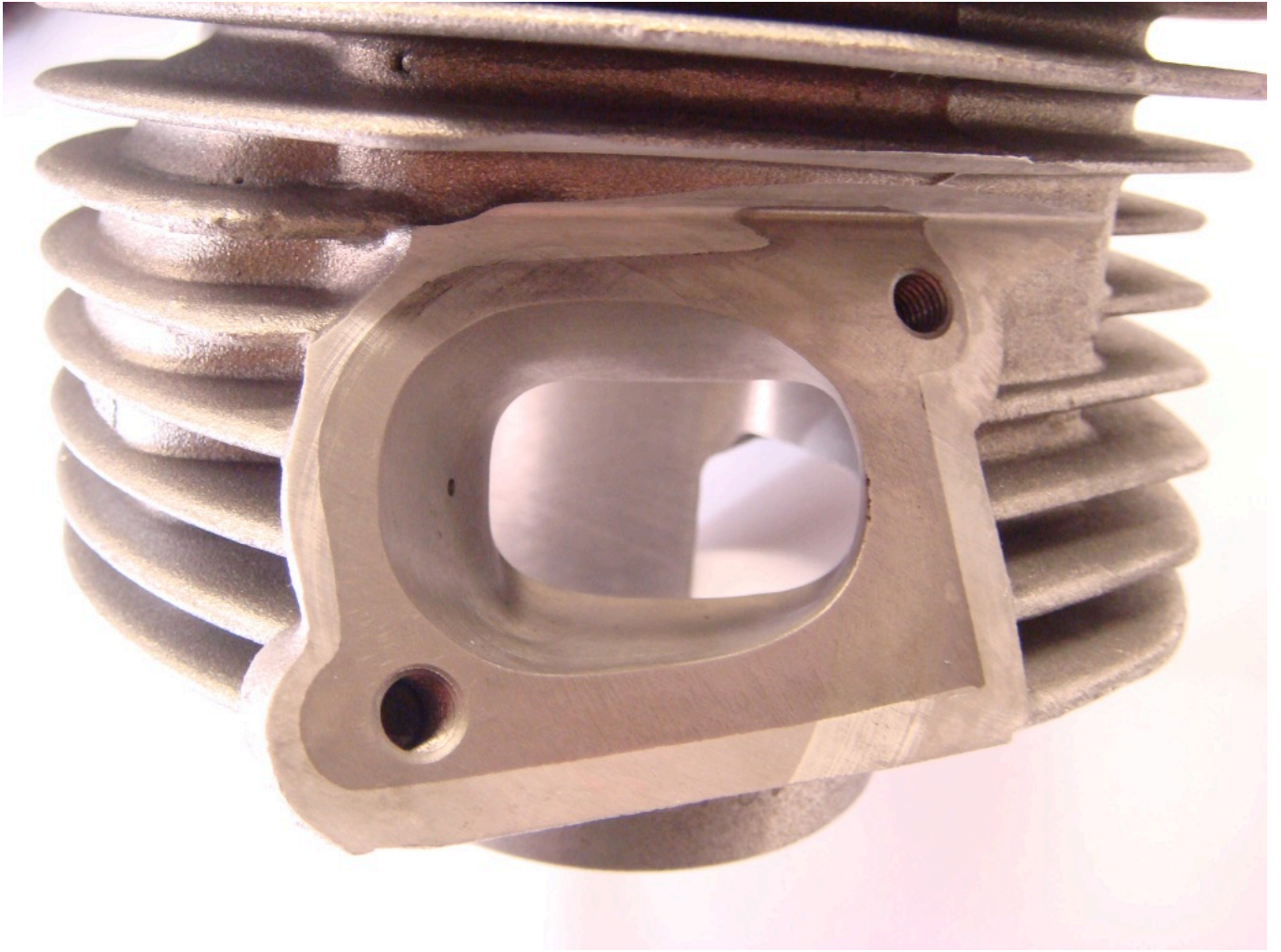
Tuned Race type exhaust port



Tuned exhaust port from inside the bore



Matched 22mm inlet port to the cylinder



Tuned standard piston port type



Reed tuned Rapido inlet port



MB Shorty inlet



Reed Rapido engine in the dyno



Nice power spread from a Road Reed tuned Rapido, 30mm, MBgm Clubman, perfect torque graph

There is so much work which can be done to the Rapido it's best to email mark@mbscooters.co.uk