# MB Services - Introduction.....

## MB ENGINEERING SERVICES

If you know of MB or you don't. We like to think we are at the top of our profession in the Lambretta engineering game.

Mark Broadhurst comes from a real engineering back ground and has rebuilt, tuned, repaired, raced and ridden many Scooters over the years. Setting standards that others have followed. Indeed many dealers say in their own words we are the guys! Others have said Mark is wasted in the Scooter game. Over the years many F1, Indy car and race teams have sort advice from MB. University and Collage lecturers have also taken advice and said what we do is the best and our written work is easy to understand and is very clear and our points of view are interesting and easy to follow.

To get to this standard we have probably tuned more Lambretta engines and developed more parts than anyone else. Every single part manufactured is designed and tested by Mark often spending many hundreds of hours developing to get where MB is today.

Here you will find some of the jobs that we do daily. Jobs we do with our eyes closed. To us they can be simple or difficult or be an utter and complete bastard!

We do lots of work for other dealers and engineers where they know they can trust the work Mark does to help them out. Mark was used as the technical adviser for the spanners Manuals and has been involved with many technical articles in Scootering and other magazines and his findings and developments are often quoted by people on forums.

Heres a quick list of some of the work we do — in other sections we show detailed Technical Articles on what repairing engineering tooling/services we offer to repair a Lambretta.

# CRANKSHAFT OVERHAULS

The history and technical side of Lambretta crankshafts can be read here. MB have been rebuilding and modernising Lambretta crankshafts from the early 1980's much of the now newer cranks and conversions have come about though work and developments that MB have done over that time. At least two special pieces of equipment is required to rebuild a crankshaft, it doesn't matter if it's a bog standard con rod overhaul or a crankshaft upgraded conversion. One piece of equipment can be found in any garage or engineering shop, the hydraulic press. These are required to press the crank pin out, as the pin can require 12 tons to press out or in. But it's not so simple, do it wrong and you have scrap in your hands.

The main piece of equipment required is the crank aligning jig. Cranks can not really be rebuilt correctly without this tool. You can fabricate tools for this job but you need to know what you are doing to get the tool right in the first place. Crank rebuilds really are a specialist engineering job. You can not just go to your local engineer and say just strip and rebuild this crank. The chances these people can not do it. It's like a Blacksmiths job...... a dying trade, today it can be cheaper to buy a new crank than it is the re assemble one so the skill is disappearing!

It's not just skill but but experience which makes a good crank rebuilder. When we overhaul a crank, we check for damage on tapers, threads and crank webs before we attempt a rebuild. Once stripped we inspect the internal holes where the pins are. If all is ok, depending on con rods used, everything is measured and checked before assembly which is done in a set sequence to assemble tightly and in line.

Not all crankshafts can be assembled and end up perfect as described in our crank section. It's swings and roundabouts, sometimes we can only do our best. The main factor in crank rebuilding is the accuracy of assembly tolerances and knowing when a crankshaft is assembled tight because if a crank is loose in some engines or depending on how a bike is ridden that rebuilt crankshafts can spin out of line and in some cases this can damage flywheels and stators.

Usually cranks take and hour or so to assemble. The easy ones are not necessarily the tight ones. I would love to rebuild a crank quickly with oil or grease which makes re aligning easy to do, but these are not tight it does pay to use an experienced crank rebuilder because if it goes wrong you have to strip it all out of the engine and start again.

## CYLINDER HEAD MACHINING

Cylinder heads are a misunderstood part of a Scooter engine, they are described in depth here. MB have re machined thousands of cylinder heads to suit every cylinder and piston ever used in a Scooter engine. As with crankshafts it takes years of experience to get them machined correctly, not just to run true to the bore but to get the correct squish clearance, squish design and compression ratio required to suit that engine. We have made many one off heads to suit special one off engines whether it's an air or water cooled head for the road or race track. We have cast many heads to suit these conversions.

Today with modern fuels it is very important to get the compression ratios correct, this is done correctly by removing the combustion bowl area. Not everyone understands this importance and don't even touch the combustion chamber bowl which results in higher compressions which causes seizing, melted and holed pistons. For these reasons the head is one of the most important part of an engine but is the most neglected part where dealers, manufacturers and suppliers supply what can be utter rubbish.

I some cases cylinder kits don't even come with heads, you have to supply your own so make sure it's right. In some cases the heads supplied in kits are either too high or even too low compressions. It's rare anyone ever supplies these heads for kits correctly. So if your having problems with too high compression to turn over an engine, or your bike seizes, and continually melts pistons or your bike has a massive lack of power then get your head looked at.

We can tell just by looking at a photograph if the head is right. Modern cylinders like our Race-Tour cylinders now use heads designed to drop into the bore to centralise heads correctly, others use our old top hat method to centralise the bore. All these designs we invented and require extra work on the lathe or miller to get heads to fit and a work right.

We offer these head modifications;

- Reprofile head with Race compression ratios
- Reprofile heads with Road compression ratios
- Spark plug hole Timesert insert to repair threads
- Head recessing, dropped into bore or top hat spigotted extra
- Modifying heads with extra bolt holes extra work

#### REBORES

Every general Automotive or Motorcycle engineering company should be able do a rebore on a single cylinder Lambretta! But how it's done can vary from one person to another and on what machinery is used. It's the accuracy of piston to bore clearance and what that clearance should be, depending on the piston and cylinder used which is the important part with a Lambretta rebore.

Lambrettas use different clearances compared to bikes and cars, get it wrong and it will either seize or rattle. Get it right and the rebore will work for many trouble free miles. We have the history and experience and this is why Scooter Dealers get us to rebore cylinders for them where we also chamfer port edges and spigot entry, clean gasket surfaces and if it's an old MB tune we re polished and decoke the exhaust port?

These boring bar machines are not cheap and are hard to come by as some are so small anyone can do them on a bench in a shed or garage and people keep them just in case. I looked at buying a new boring bar in the the 1980's when rebore's were as common as muck and we would be doing at least one a day. To buy the machine would have taken 15 years to have paid for it's self, so it wasn't until I came across a second hand one that I took the plunge, when another turned up at a similar price and I bought that as a spare and 10 years later I have never turned it on, it takes no room and is there for a rainy day when I need it. Today a Motorbike boring bar costs around £6000! You need to do lots of bores to get your money back.

Things have moved on in the Lambretta world where we now have many cylinder kits which are made from Alloy and do not require reboring every few thousand miles because they are hard plated and normally do not require reboring but re plating and normally there are no pistons available as oversizes, if some thing goes wrong and damage occurs. So as Cast Iron cylinders are getting rarer another comes along to take over, as the plated alloy cylinders have become more popular it's opens up big bore conversions that MB have specialised in with Jap piston conversions and MB RT pistons. Today some importers have copied our MB RT piston and also offer oversizes, but please note these really are inferior pistons made with poor rings and quality.

Rebores take time, it's the nature of the machine, once measured and set up, depending on if it's a plain rebore or a conversion rebore it could take up to an hour to do. The machine needs to get from the top of the cylinder to the bottom and cut at a speed were the cut leaves a fine true bore. The machine can only cut small amounts at a time. This fine bore needs honing with special tools to smooth out the machine marks and leave cross hatch honing which marks roughly 30 - 45 degrees to hold oil.

We offer these rebores;

- Plain rebore and hone
- Rebore up to 2mm oversize
- Conversion rebore up to 4mm
- Conversion rebore up to 9mm
- Conversion rebore up to 9mm
- We also offer plain honing services to increase piston to bore clearances and piston cleaning from seizing

## REPAIRING CYLINDER BORES

Both Cast Iron and Alloy cylinders do go wrong when not set up correctly or if there is an accident damaging the bore. Repairing a Cast Iron cylinder is easy providing the damage is not too much and there are pistons to clean up the damage. Today with our MB Race-Tour pistons and lots of oversizes that previously was not available any cylinder should be able to be rebored and made good. It may need a new head making or yours remachining to suit the larger piston.

Some alloy cylinders use an iron liner either cast or shrunk into the cylinder, in the Lambretta world it's only the SR or the Indian 200 – 225 cylinders that use this method so think of them as a Cast Iron cylinder where they can be rebored.

## ALLOY PLATED CYLINDERS

Alloy cylinders are a different matter, there is a miss conception that a plated alloy cylinder can be rebored! In normal circumstances they can not be rebored the same as an Iron cylinder. Most alloy cylinders are Nicasil plated which is a hard chrome like finish on the bore. This finish is to reduce friction, it's harder and does not wear very often.

If worn, then it's a case of measuring the bore and using a slightly over sized piston to tighten up the bore and it should run fine again. But these are Lambrettas and you can damage the bore, plating can wear or lift and a cylinder may need re lining.

There are only two places in the UK doing this plating service. One does re Nicasiling and one a hard plating service call Ceramic plating. MB DO NOT use the Nicasil plating in the UK as it is sometimes much softer than Cast Iron and can wear out in less than a 1000 miles. We prefer to Ceramic plate our cylinders to repair them or when we do our big bore conversions which we have used many years with no problems. This service is not cheap and done right needs extra work from MB before and after the plating.

People always love to have bigger pistons. The TS1 200 did not sell as well as the 225 version nor did the Monza 200 vs the 225 or the RT200 vs the RT225. Before the Alloy cylinders came along the 200 – 205 Cast Iron was preferred over the 225 version because in the old days with poor pistons they just seized. MB offer oversized big bore conversions for all Alloy cylinders, this is why we developed our RT pistons. It's not just a case of reboring an Alloy cylinder to a bigger piston. The plating surface is too hard to run the boring tool down without blunting the tip so a long winded process needs to take place with these conversions.

We have to send away the cylinder for deplating, at this point we can repair any damage to the bore with alloy welding. Do the tuning or machining if required and set up for a rebore for an over sized piston. The cylinder then needs preparing for the plating by chamfering all port edges.

MB offer this work to Alloy cylinders;

- Rebore Alloy cylinders and prepare for plating
- Prepare cylinders for ceramic plating
- Replate Ceramic cylinder bores
- Tuning varies from Cylinder to Cylinder

## IRON LINED CYLINDERS

There is another old trusted method to repair a damaged Alloy cylinder. Very good if a spigot has cracked off or a gudgeon pin clip has come out. This is the Iron lining method, where the plating is bored out to a size and a Iron liner is made to suit. By doing this method it's easy to repair a damaged cylinder. Some argue Iron Liners are no good, these people talk rubbish, we have linered around 400 cylinders.

The beauty is, you can add or fill in ports or extend the liner at the top to suit longer stroked cranks to good effect. The down side in the old days was there was no over sized pistons for the TS1, this is why we developed our big bore Jap conversions using 70 - 71mm pistons and went further with our standardised RT pistons to make a big bore kit much easier. Today other manufacturers are making Lambretta oversized pistons.

I have made special liners myself but choose to sub this job out to a friend who has done them for me for many years and has done them for famous people like Barry Sheen and John Surtees. You could say he is good and I have always used him, there are others who do similar jobs and if you believe people on forums these are just as good, but to be honest they get no where near and just ruin your pride and joy of a very expensive cylinder.

MB offer these services;

- Iron liner
- Extra to spigot a liner at the top

## GENERAL MACHINING

MB have a wide variety of machine tools to help us in all aspects of engineering, fabrication and restoration. With the jobs we do we would be lost without our machine shop. Heads and cylinders are the main jobs, but end up on the milling machine for all the castings we make.

Really the list of equipment and jobs we do is endless.

- Lathe work
- Milling work
- Polishing work
- Surface grinding
- Linishing
- Press work
- Reboring
- Honing
- Metal cutting
- Metal bending
- Tube bending
- Steel welding
- Alloy welding
- Frame jigging
- Fork jigging
- Bead blasting
- Aqua blasting
- Ultra sonic cleaning
- Rumble polishing
- Dyno testing

## HUB OVERHAULS

Anyone who rides a Lambretta has to sit on it with a front hub and brake. I've been on so many bikes which are death traps! I never thought building a front hub be that hard work, but people throw them together with no respect to life! I've been on bikes so called professionally built and these are also death traps — sent packing with it will bed in.......... not!

All it takes to build a hub correctly is time, patience some tools and common sense! But then I've had some very clever people bring hubs in and say 'your doing it I haven't got a clue'! Then I realise not everyone has a mechanical ability, so there is a market for someone who knows what he's doing.

Building a hub can take time, it certainly needs experience as with an engine you need to know all the the tricks. As with everything Lambretta nothing is straight forward and things never build as easy as the books say, especially if it's chrome plated or epoxy or painted. You do need special taps to clean threads and proper drifts, not sockets and you need die grinders to clean important parts of the hubs and you need cleaning equipment and of course you need the spares to rebuild hubs. We spend ages slowly assembling a hub to make sure it turns without locking up and pay attention to speedo drives to make sure a speedo works and lubrication is added in the right places. We have special holding tools for hubs, not just to assemble them but to machine them if needed and all the correct tooling to assembly them.

FORK OVERHAUL

As with overhauling front hubs it pays to rebuild a set of forks correctly. Again there are plenty of dangerous sheds on the road and I've ridden them that pull to one side, hit the brakes and they pull or wobble to the other side. No wonder Scooters have a bad rap for handling from bikers and Scooterists, then when they seen me flicking my own bikes all over the place they question how can you do that?

I've been told by race winning riders that my bikes go road corners like they are on rails! It's a case of spending time, checking heights and distances, fitting correct parts and making sure you have the experience and the right tools to put a set of forks together.

Again I take time! It's pointless rushing to build forks, do them right and 20 + years later they won't need stripping. I've overhauled forks in front of people who have come back years later and said 'I always remember watching you build my forks, the time you spend on getting it right' There's no excuse to have dangerous forks, even forks welded wrong in the factory can work well, it's knowing the tricks.

We have a dedicated rebuilding bench with all the correct tools and even more remade special rebuild tools.

And building forks wouldn't be right without a real fork assembly re alignment fixture. This we have and regularly cut and reweld forks to run true!

HEADSET OVERHAUL

You would think it was easy to assembly a headset? As with forks, we've seen so really poorly assembled headsets that just don't work or select gear even.

We have our specialist assembly area, were we rebuild headsets so the gear change and throttle side spins free with the lightest of grip. Headsets built like this make a better bike to ride. Along with all the improved parts that we make headsets become a work of art.

### TUNING

Tuning is covered all over our tech site. MB tune any 2-stroke and have probably tuned more Lambretta cylinders than anyone else. We have more tuning and engineering equipment than most and believe we are true professionals at what we do and send tuning all over the world.

## WELDING

Our well equipped workshop is full of bits and bobs and specialist tooling to work with. We have gas welding and cutting equipment with MIG and TIG welders which means we can basically weld anything! Scooters always break, crack and wear out, our workshop can repair the hardest of jobs, it's really rare I say sorry I can't do it.

Dealers send welding and conversion jobs in regularly. The list is endless to what we can do in our workshop, once welded and repaired we have the machine shop and grinding areas to finish the job off so you can not tell it was broken in the first place. In the past we have repaired exotic cars, bikes, buses, lorries and some very obscure parts you wouldn't believe. Like making a 6" key for a Church and mending a 1909 Rolls Royce!

If you are restoring your Scooter and a part is broken don't just think I'll buy a new one to replace it, you may find the new one which doesn't fit so need fettling which we do or more more commonly you can not find that new part so we repair it. The list is endless to what we can and have repaired, here's a list.

- Cracks.... Handlebars, front/rear hubs, engine casing, mag housing, side covers, horn casts, mudguards, panels, runners etc
- Snapped.... handle bars etc
- Bent.... forks, frames etc
- Modifications..... to cylinders, engine casings etc

## FRAME REPAIRS

Frames vary from all the factories, some ride in a straight line others don't and you dare not take your hands off the bars!

Frames crack and get twisted. With our specially made frame jig we can straightened, strengthen or do a simple repairs and get the frame inline.

#### ENGINE REBUILDING

We have build many hundreds of engines both standard and tuned. Our engines have won endless racers on the track and won UK and European championships. We've even set world records at Bonneville salt flats!

But it's not all about racing with us. It's about creating engines that are rideable and driveable and reliable. Preferring the Wolf in Sheeps clothing type of approach – making an engine that works for the customer.

To do this correctly we a full workshop full of equipment including our development dyno.

Over the years we've been picked for some of the top custom Scooters to do the engines.

## THREAD REPAIRS

It's a fact Lambretta's pull threads out all the time and studs, and screws snap it's the nature of the game I'm afraid! I'm constantly repairing Lambretta engine castings. I'm always drilling and tapping them out to put threads back to standard! Or welding broken casings and repairing them and fitting inserts and stepped studs. Too many people have a go themselves! And ruin really rare parts! I've restored nearly every type of Lambretta including model A's — including making one off parts which haven't been available. We make our own over sized studs and special inserts. We do what ever needs doing to repair a Lambretta to original.

Ask mark@mbscooters.co.uk