

*About MAX BMW Motorcycles Machine Shop Articles: 2017 brings MAX BMW's Machine Shop to full operational status and a series of articles on our individual machines and operational practices. In this series, we highlight some of the specific equipment, tools and jigs we have developed to come to the exacting standards of ultimate quality, attention to detail, accurate measurements and swift turnaround of customer jobs.*

# MAX BMW

## Motorcycles

ARTICLE 5  
May 5, 2017

### Tools and Equipment

This article looks at a few of the tools and machines in the MAX BMW Machine Shop. Our equipment has been acquired or produced by us to keep turn-around time quick and our results of maximum quality, consistency and precision. We continually expand and refine the services we offer.

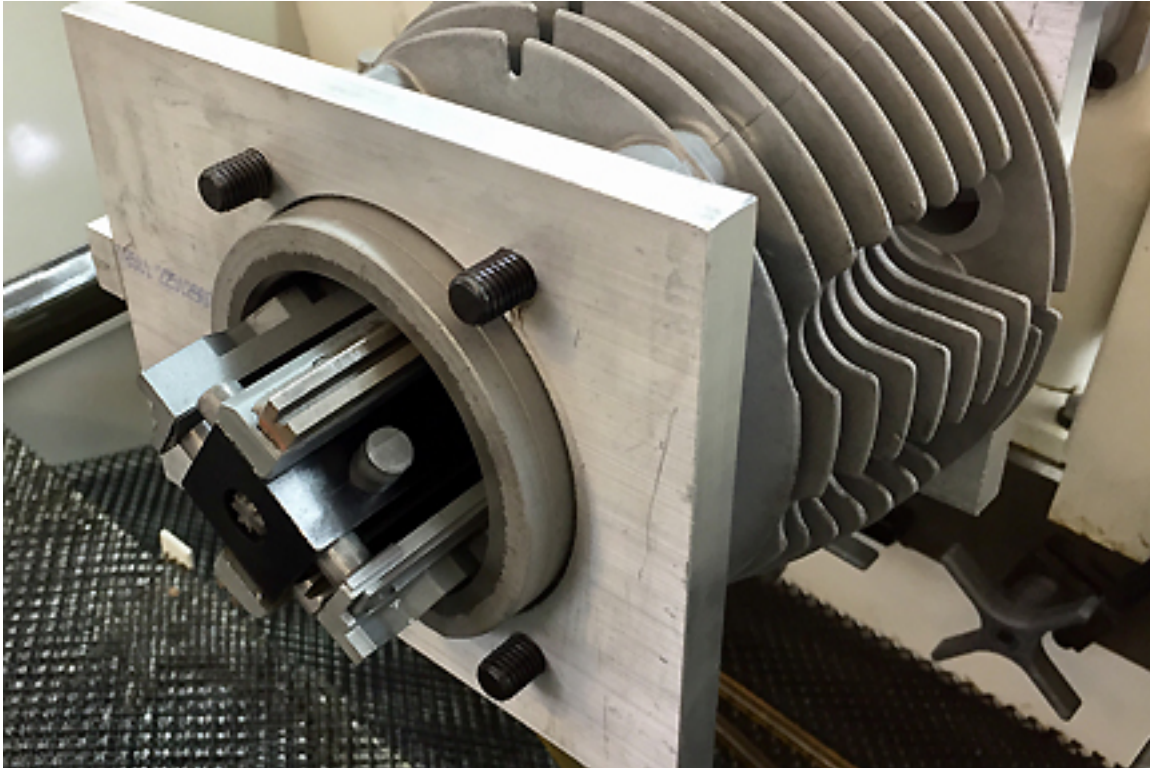
#### **Sunnen MBB 1660 Hone with PF-150 Auxiliary Filtration System:**

Utilizing diamond abrasives, we are able to resize cylinders to extremely close tolerances while keeping the geometry of the cylinders round and straight every time. This machine also allows us to hone the big and small end of connecting rods as well as the inside diameter of bushings for many different applications. The PF-150 auxiliary filtration keeps the honing oil very clean even after many jobs and helps to keep the parts cool during machining by having a large volume of oil at hand. This process is light years ahead of commonly used ball hones in terms of accuracy, the ability to remove bore taper and oval conditions which ball hones cannot do.



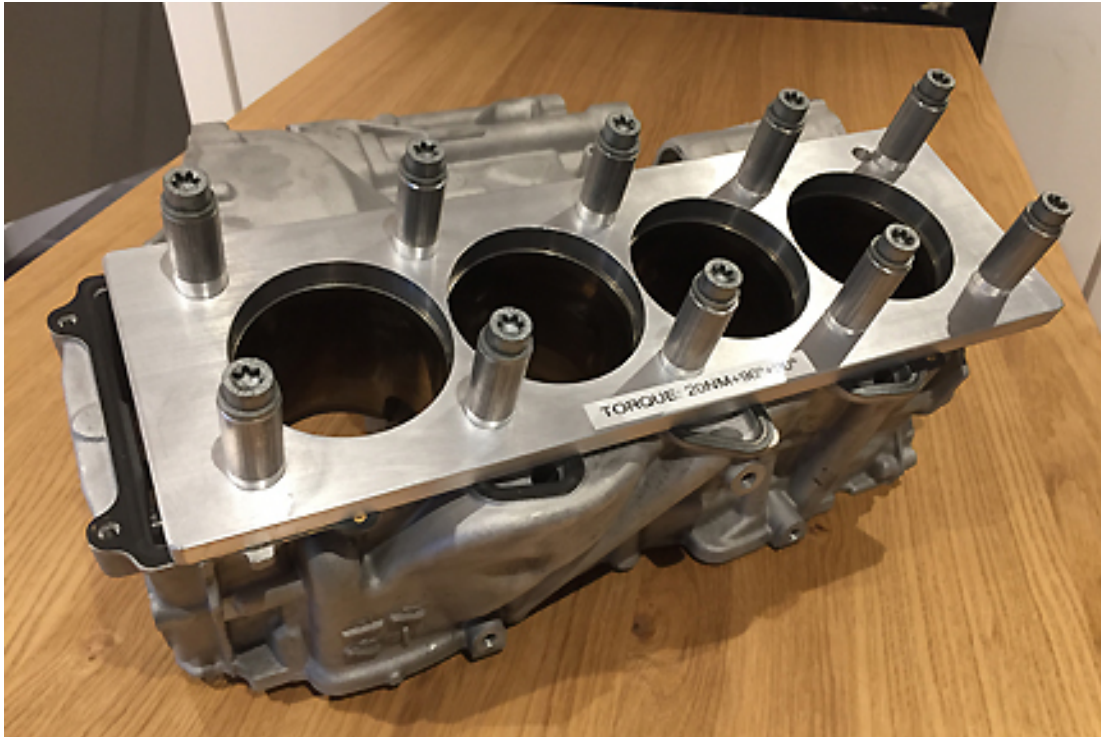
**MAX BMW Torque Plates:**

We design and make our own custom torque plates for every BMW engine we work on and we are always adding new ones to our extensive inventory of models they fit. These complement the accuracy of our Sunnen hone. All cylinders we machine are resized and diamond honed using our torque plates to stress the cylinder exactly as it is when installed on the engine. This allows us to produce results with extremely close tolerances as well as providing quicker ring seating. These benefits help to give your BMW engine a longer life with less smoke, longer lasting ring, cylinder and piston wear and easier tuning.



**Kwik-Way FWS-II Boring Bar:**

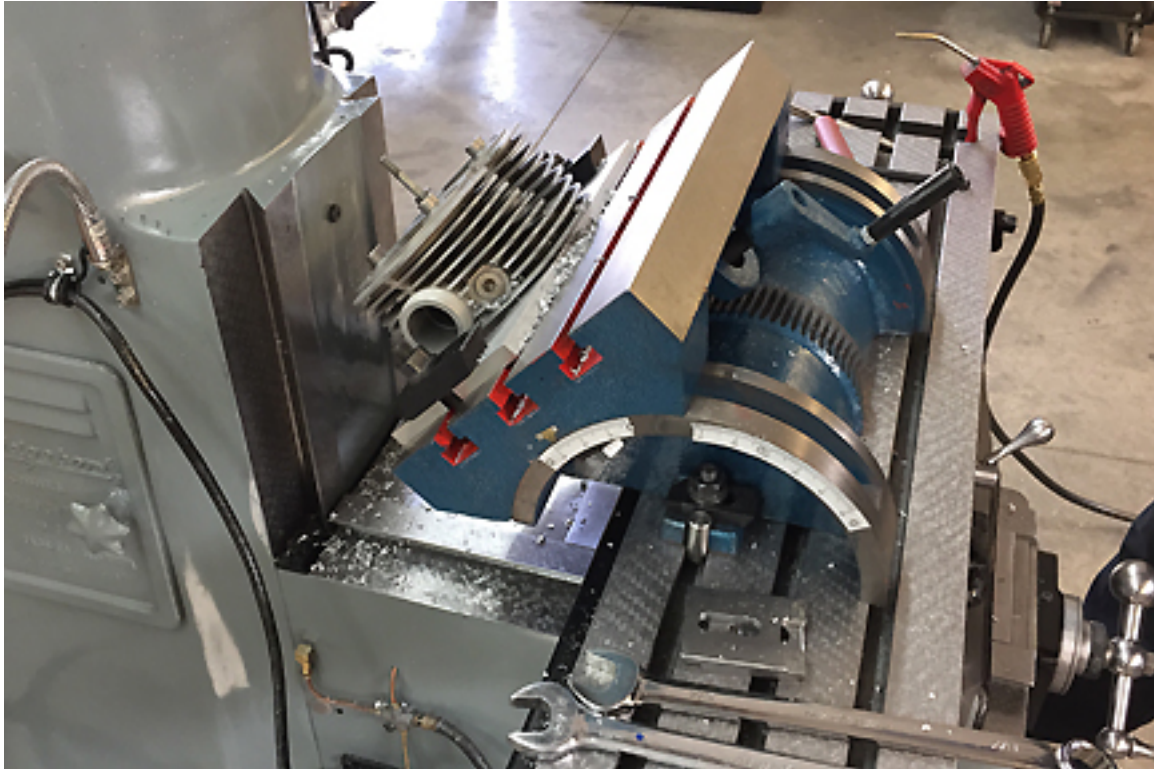
The Kwik-Way boring bar is a great way to quickly remove material when going to an oversize piston, or big-bore upgrade where there is 1mm or more material to be removed. It's design locates off the top deck surface of the cylinder and ensures that the "new" bore is perfectly perpendicular to the deck. This process is always followed up by diamond honing on the Sunnen hone for ultimate accuracy.



**Bridgeport Knee Mill with 3-Axis Heidenhain DRO:**

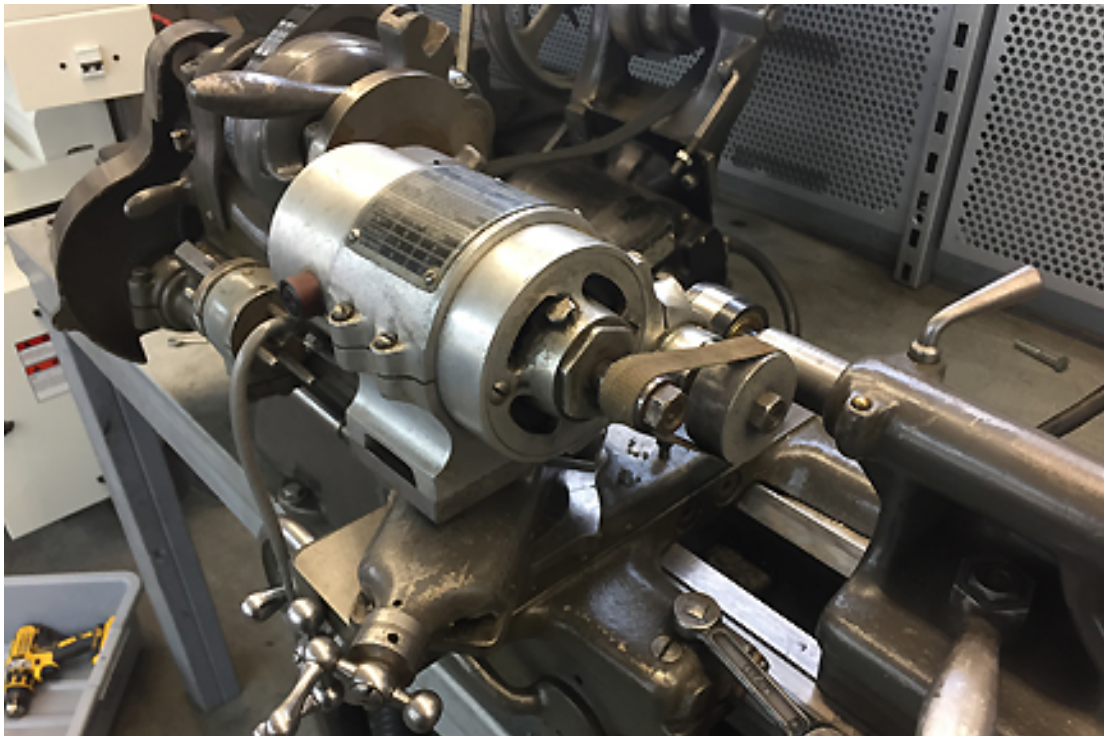
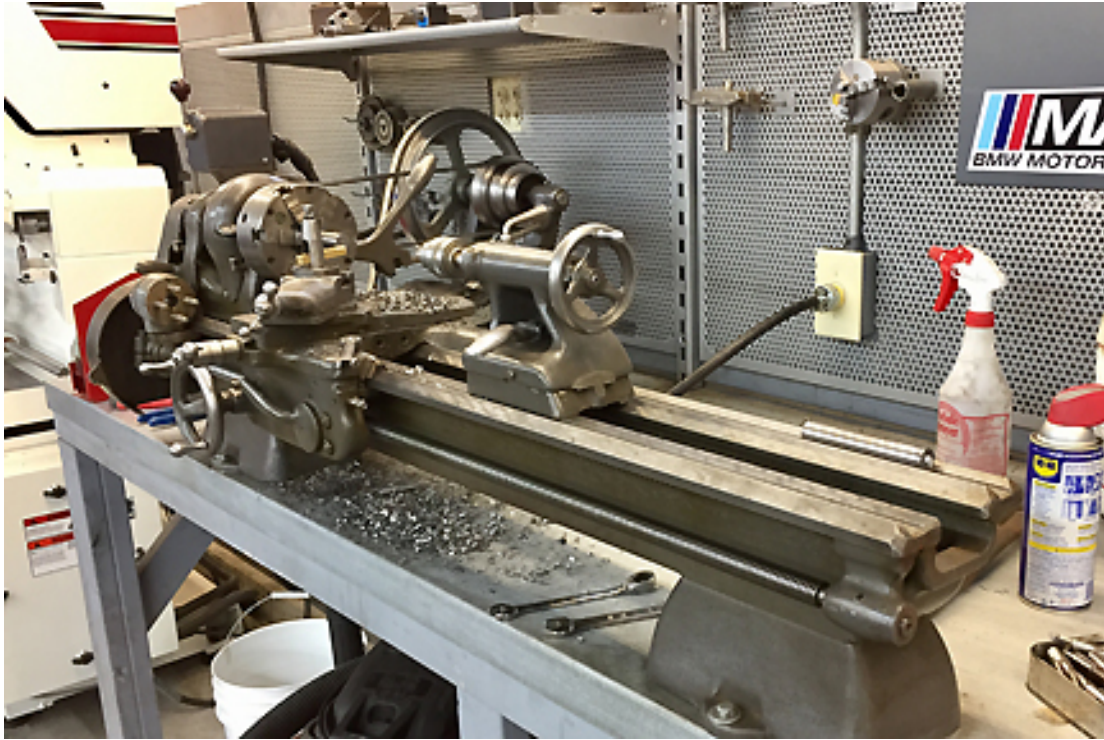
The Bridgeport mill sees the highest use of any machine in the shop. Everything from exhaust spigot removal and torque plate fabrication to cylinder head surfacing, and tool making. It's the most versatile machine in the shop! We just gave it a complete reconditioning. All it's surfaces have been re-ground and every moving part inspected for wear, adjusted or replaced giving this machine the same or better accuracy than it had from day one. Adding to this, we have installed a Heidenhain DRO or "Digital Read Out". Repeatability is extremely important and we can also program patterns so that making special tools is even easier and quicker.

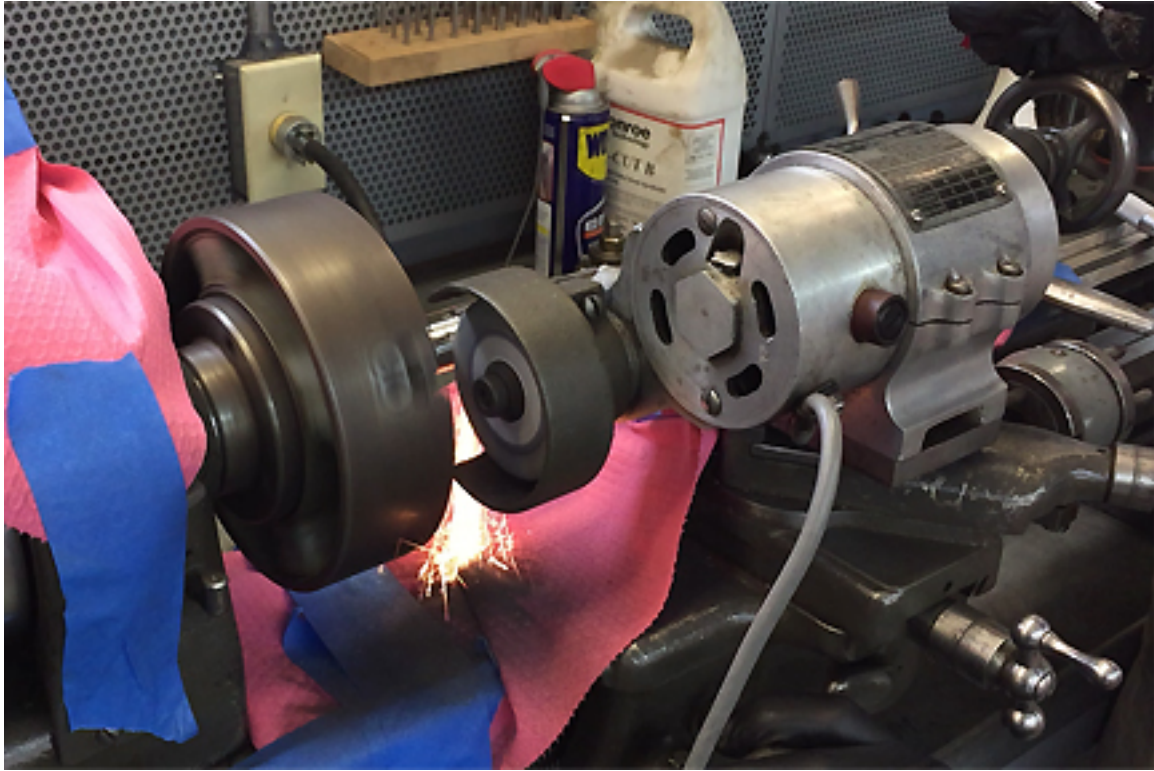




**South Bend 9" Lathe:**

The lathe is another work horse in our machine shop. Having the ability to custom make valve seat rings, valve guides, valve guide drivers and other custom tools is evident by the amount of use this lathe gets every day. Other attachments also allow us to grind hardened shafts with our tool post grinder, turn shafts on or off center with our 4 jaw adjustable chuck and even mill pieces using the milling attachment.



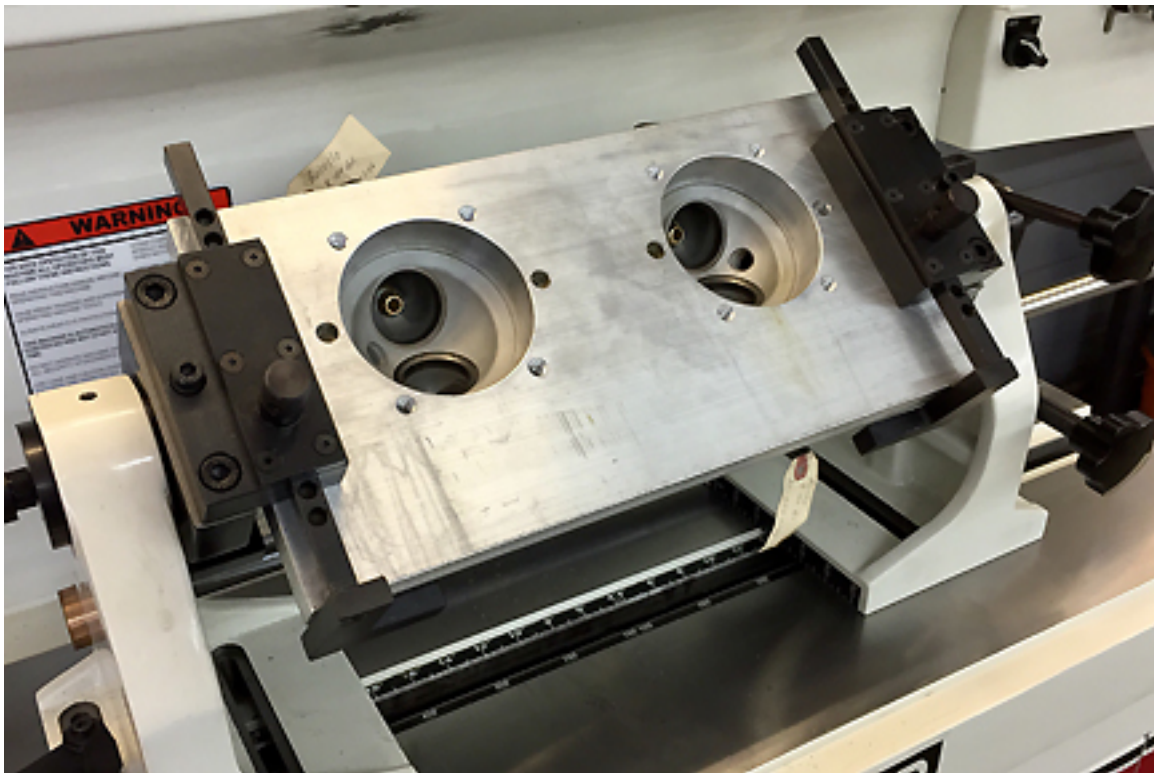
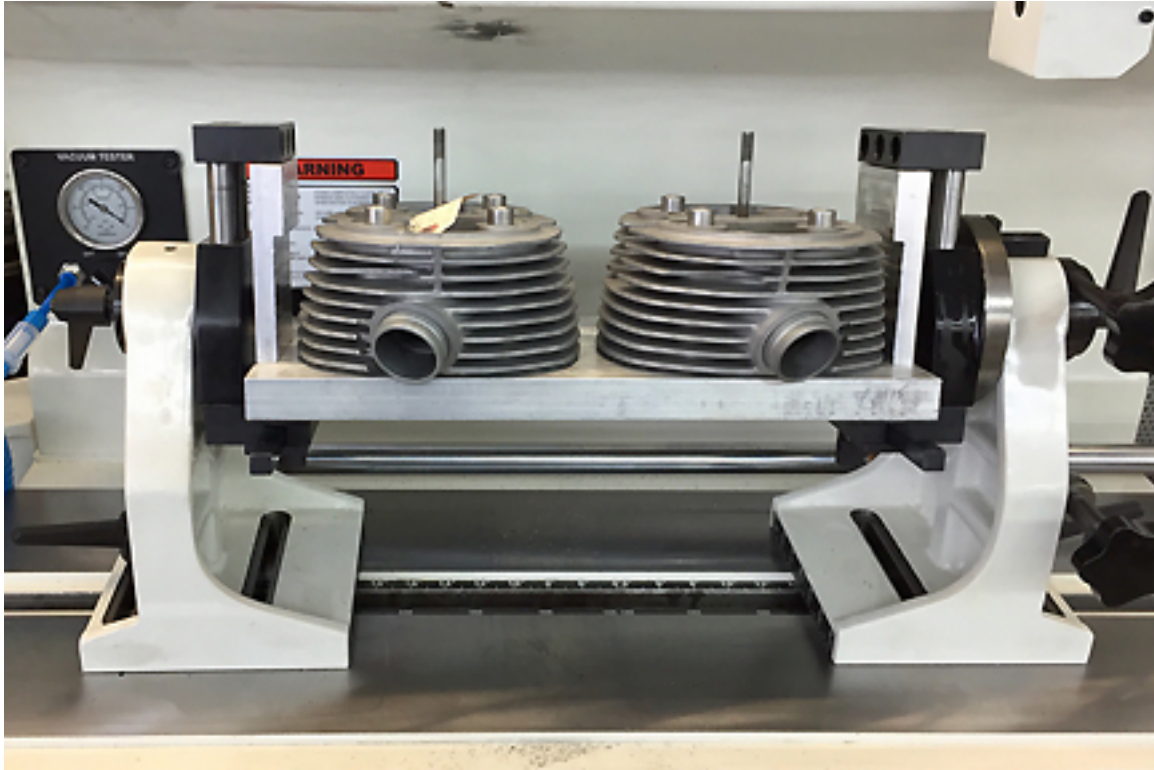


**Rottler SG7 MTS Seat and Guide Machine:**

This state of the art machine makes cutting valve seats quick and keeps tolerances as tight, accurate and repeatable as possible! Able to hold concentricity of .0005" (.0127mm) this machine is one of the most accurate on the market. The Carbide forms that cut the seat material have all the angle and angle widths ground right on to them which makes the valve job consistent from seat to seat and from head to head. We have also made a fixture so that two heads can be held in the machine at the same time helping to reduce the time the job is being handled and worked on. This machine has a built-in, "through the port" vacuum system for checking valve seat to valve seal quality. Big benefits include keeping our pricing low and our results high.

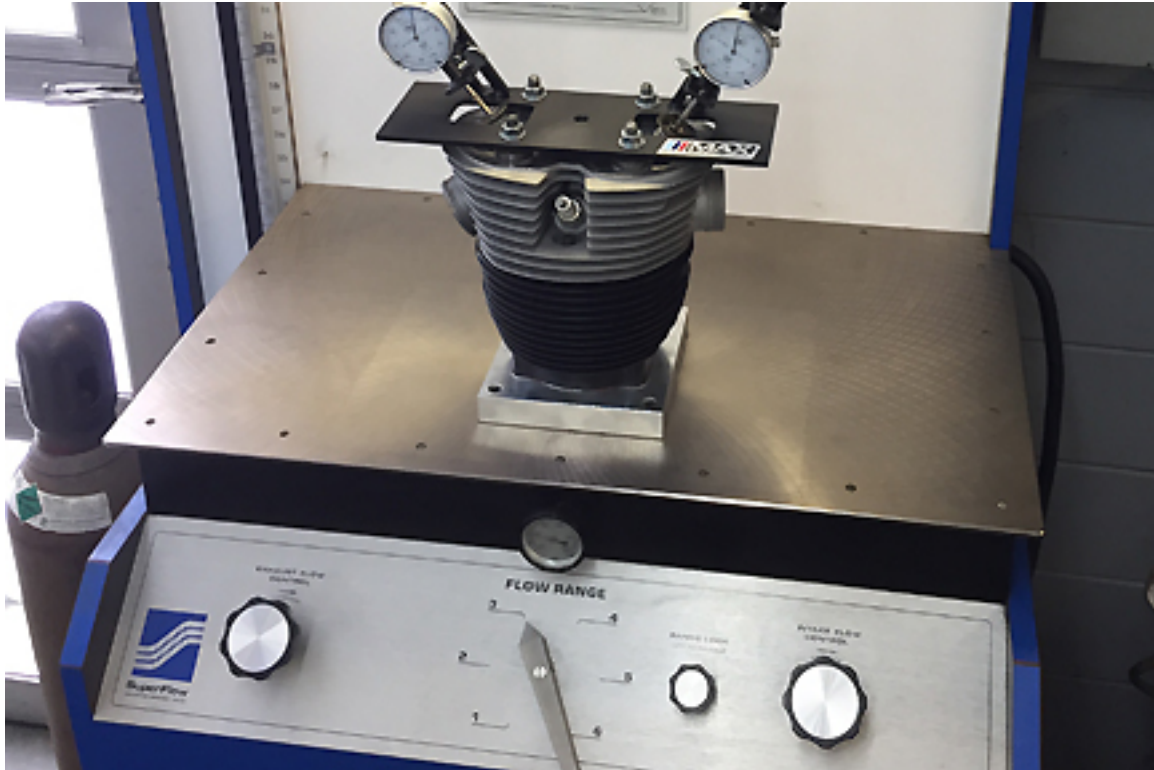


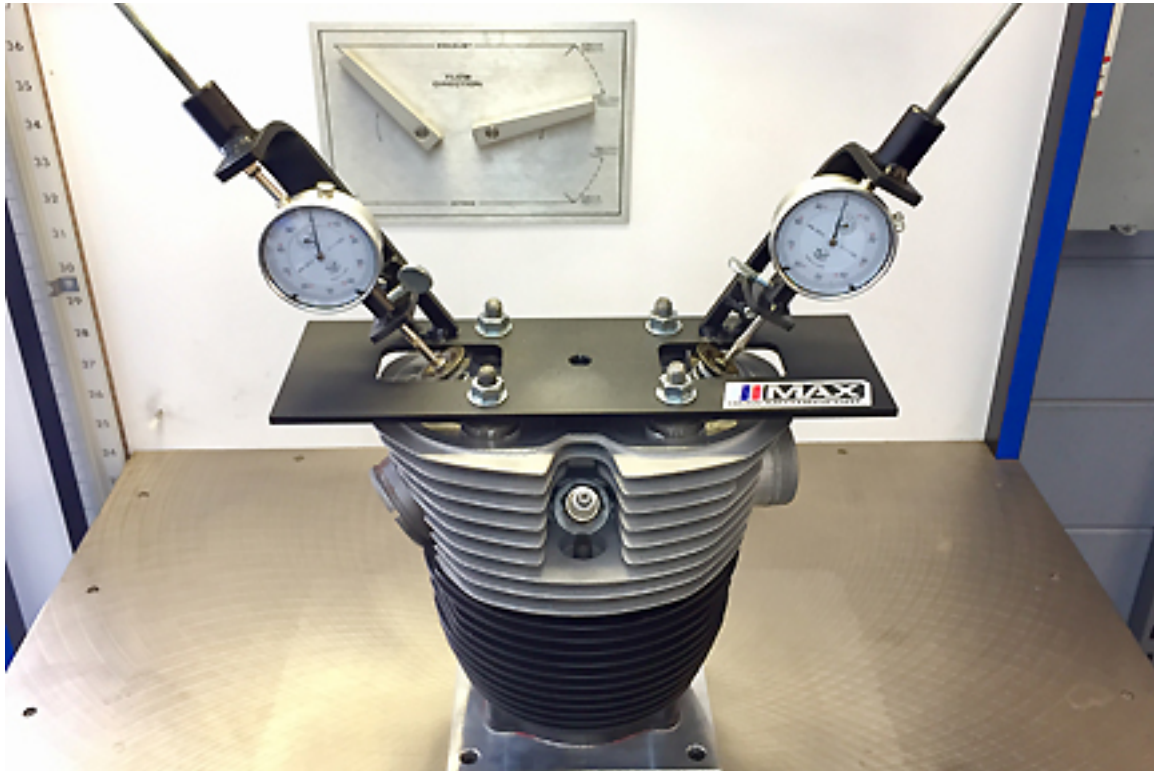




**Super Flow SF600 Flow Bench:**

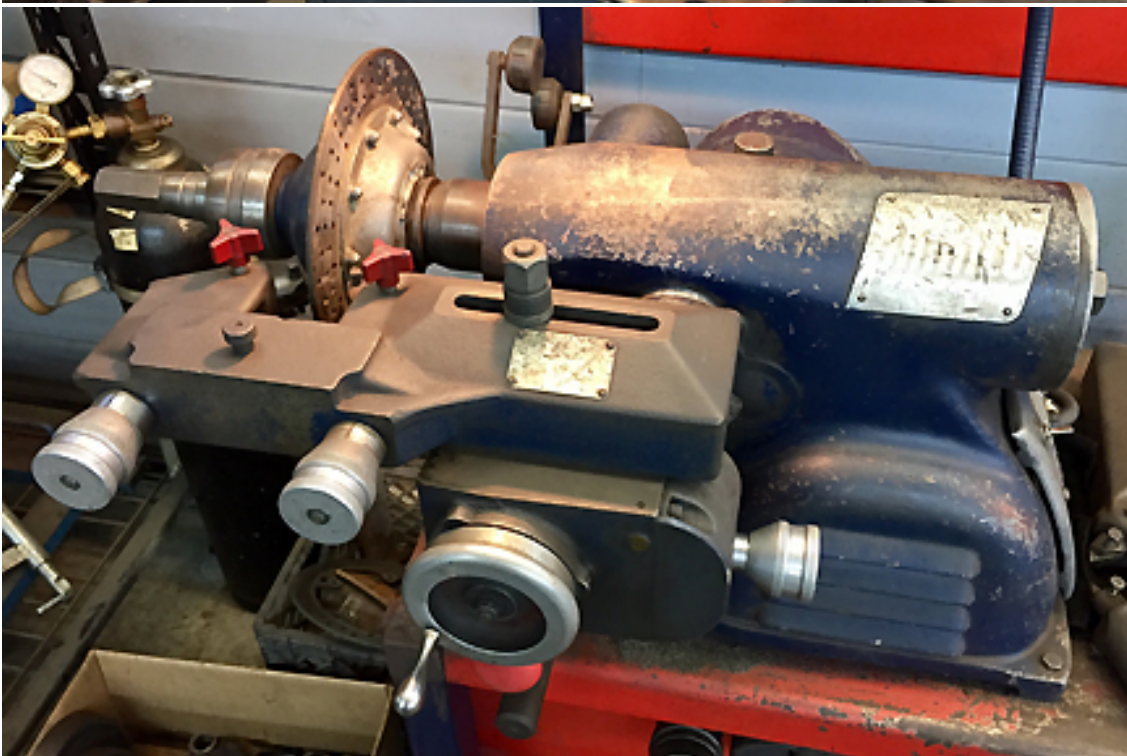
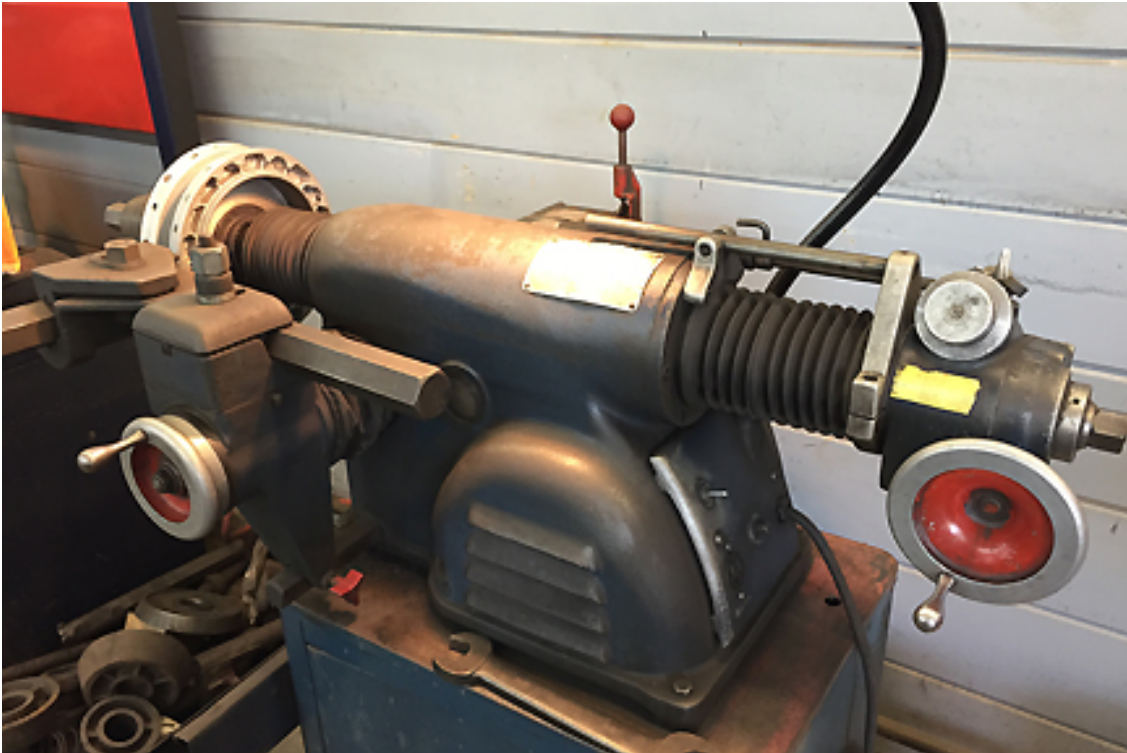
Being able to document and back up any stated improvements is always very important. You can't just say that something performs better without proof! Whether it's a street bike or a track bike, we know that our customers think so too. Our Super Flow SF600 has been the industry standard for years when it comes to flow testing cylinder heads. We have been making our own fixtures, adapters and measuring jigs for several of the different BMW engine families including the /5/6/7, R100 and the S1000 models. Proving out results for new ideas and techniques when it comes to modifications and increased performance levels of an engine is always high on our list. Documentation we include with your parts are before and after graphs that show flow improvements at specific incremental valve lift points.





**Aamco Brake Lathes:**

We utilize twin brake lathes set up to machine brake rotors and drum style hubs. These are ideal for customers who are going for the ultimate level of originality by reconditioning their stock parts. If you have a drum brake model with brake pulsation, we can often cure it on the lathe. Disc brakes that are scored or glazed can likewise be significantly improved as long as there is enough material to work with above the minimum allowable thickness.



**Welding:**

It seems as if there is always a need to weld something at the shop. We utilize welding equipment that gives us a broad range of welding capacity. The Miller Syncrowave 210 Tig, Millermatic 135 Mig and acetylene gas units are workhorse welders for us. From general shop use to specialty services such as cylinder head repair, fin repair and rear drive spline repair these tools are part of the action!



**Measuring Equipment:**

All of our measuring equipment has been carefully chosen to do the best job and provide results of the highest accuracy. Cylinders are measured down to .00007" or .002mm while valve guides and other small holes are measured using the same level of precision. We take our measurement processes very seriously because results inevitably falter whenever attention to detail is skimmed on. If your tools are not precise, the quality of your measurements will be compromised no matter how hard you try. Precision dimensions allow us to give our customers top-level machining tolerances providing engines that are easier to tune, maintain their tune longer, run more efficiently and produce more power... Who doesn't love more power!

**Sunnen GRM2061 Dial bore gauge:**

Sunnen GRM3000 Dial bore gauge:



Brown and Sharpe outside micrometers, Starrett Micrometers:





**In the works:**

As we constantly improve and build on the services we offer, here is a little behind the scenes peak at what the machine shop has in the works. We'll talk some more about these in the near future!

Fuel Tank Tumbler to clean the inside of those old rusty tanks or to clean out that old liner that has been peeling away and clogging your fuel lines. Tanks are re-lined with a product that stands up to modern ethanol based fuels. (shown here in prototype form being turned by hand... the completed machine is powered by a reversible, variable speed electric motor)



Rear Spline replacement for your 1970-1984 twin shock bike. As the miles go up the splines on the original rear drive go down. We now offer a stronger solution that will outlast your bike!



We've developed our own rotary welding fixture so that the new splines can be welded in place with clean, smooth welds.



Our investment in tools, machines, equipment and personnel is significant so that you can be confident when investing in your BMW motorcycle!

*Our machinist, Nathan, cut his teeth in the machining industry starting with a degree in Automotive Restoration and in High Performance Engine Machining. He worked in Tennessee and North Carolina building 900+ hp dirt race engines as well as working a stint in the world of NASCAR. Coming to MAX BMW has allowed him to further focus his skills by taking advantage of specialized BMW training. Pursuing his love of these bikes inspires Nate in developing custom adapters and fixtures, unique to MAX BMW, aiding in broad restoration abilities and enhancing the high-performance side of BMW Motorcycles.*

See our Machine Shop page at: <https://www.maxbmwmotorcycles.com/max-bmw-machine-services.html>