
ROTTLER
THE CUTTING EDGE
ENGINES THAT MOVE THE WORLD ARE MACHINED WITH ROTTLER
Since 1923

1923
Clarence T. Rottler and Rottler Manufacturing introduce portable boring bars in Seattle.

1950
Rottler innovation allows engine blocks to be fixed to a machine's base and the work head to be floated above the surface.

1956
Don Rottler assumes ownership of the company.

1970
Rottler introduces diesel engine block machining equipment.

1985
Electromechanical systems make their debut, signalling Rottler's transition from strictly mechanical controls.

Rottler Innovation Since 1923

Think Nothing Has Changed in This Industry? Think Again

Some might say the transportation industry hasn't changed all that much since it began. Sure, the rage is about autonomous vehicles, but when you get right down to it, trains, trucks and automobiles – or at least the engines that power them – aren't all that different from the ones James Watt, Jean Lenoir, Gottlieb Daimler, Karl Benz, the Duryea Brothers and Rudolf Diesel developed.

After Seattle machinist Clarence Rottler developed his portable boring machine during his off hours, he hand-carried it on a street car to an "automobile row" auto repair shop to demonstrate its effectiveness and make sales.

His timing was impeccable – back then, when the "improved" roads were gravel at best, even cars making the 350-mile round trip from Seattle to Portland, OR, probably needed engine work.

Since 1923, the Rottler name has been synonymous with leading edge technology. In those early days, "high-tech" meant unpowered portable boring bars, but unsurpassed research and attention to the needs of the American engine rebuilding market has allowed the Rottler family to refine – and redefine – the standard in rebuilding equipment.

During the 1950s, Rottler offered the first component capable of fixing the engine block solidly to a machine's base and floating the work head over the surface. This combination led to unmatched speed and accuracy, raising the bar among equipment manufacturers.

Rottler's machining technology utilized the "dry cutting" method as much as possible. Not only did this reduce the clean-up time required for engine components, it allowed easier and faster fixture changeover. **This attention to detail – so often overlooked – is one of the qualities our customers have not only come to expect but to rely on for decades.**

For many years the typical cylinder bore surfacing technique was straightforward: bore the cylinder to size and then rub the inside of the bore with emery paper or similar abrasive material. But more than 20 years ago, when oil consumption and engine performance became an issue during the oil crises of

With 95 years of building machines that repair engines that move the world, it's hard not to be impressed with Rottler's legacy.

Luckily, the ability to service, machine and rebuild these engines has improved – **and Rottler Manufacturing has been at the forefront of some of the industry's most impressive developments.**

"High-tech" has meant different things over the years, and today, of course computer technology is as good as it gets. Taking a step back in time, however, reveals how Rottler has

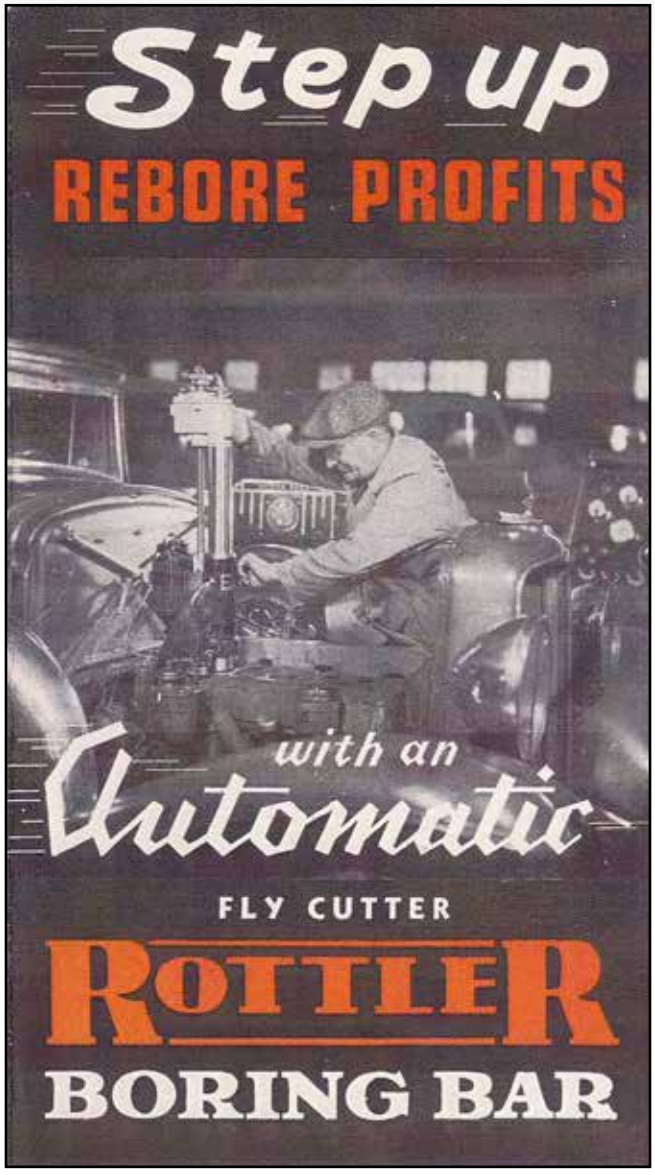
the 1970s, cylinder honing took on a new importance.

Rottler's technological advancements in honing set the standard by which today's equipment is judged. Our recognition of the importance of cylinder bore finish was paralleled by the awareness that the gasket sealing sufaces on the engine block needed attention as well, and cutting edge surfacing equipment was developed.

Also during the 1970s, Rottler made the move to diesel engine block equipment and today offers many different machines to meet the needs of the largest engine rebuilders.

As engine designs have changed, Rottler's equipment has met new machining standards – because Rottler SET new machining standards. **Rottler consistently addresses the needs of today's machine shop by looking at what tomorrow's demanding standards bring.** Our dedicated team of engineers is devoted to developing systems that increase the accuracy, speed and flexibility of today's engine builders.

Connection to customers in an integral part of Rottler's corporate legacy.



"High Tech" has certainly changed over the past 95 years. Since Clarence Rottler first hand-carried his portable boring bar from shop to shop to demonstrate its effectiveness in the 1920s, profitability has been Goal No. 1. During the 1950s, Rottler developed a method of fixing the engine block solidly to a machine's base and floating the work head over the surface, providing unmatched speed and accuracy. Today? Computer technology allows operators time and resources to concentrate on maximizing productivity and profits.

When Rottler engineers go to work on new designs and development, customer satisfaction is a critical component. **"We need to make a machine that's going to work well for that customer without modifications and without a lot of training," explains Andy Rottler, third generation company president. "Our machines are designed for any type of engine building – and they've**

Rottler Executive Bio

Andy Rottler

As the third generation of the company that bears his name, you might say Andy Rottler has machining in his genetic makeup. Following in the footsteps of his grandfather (Clarence Rottler) and his father (Don Rottler), Andy has led the Kent, WA-based manufacturer of engine machining equipment through impressive growth in the automotive and diesel engine manufacturing industry.

Since taking leadership in 1985, Andy has led a dedicated team that has created innovative machines for the performance gas, heavy-duty diesel, production remanufacturing, industrial and custom engine building professional. Indeed, thanks to unmatched dedication, diversity and innovative product development, Rottler's advanced designs continue to meet – and exceed – the most demanding engineering needs of engine builders around the world.

"As engine designs have changed, Rottler's equipment has met new machining standards," explains Andy, "because Rottler SET new machining standards. Our dedicated team of engineers is devoted to developing systems that increase the accuracy, speed and flexibility of today's engine builders. Rottler consistently addresses the needs of today's machine shop by looking at what tomorrow's demanding standards will bring."

Today, "high tech" means computer-aided design and immediate wireless connectivity with customers and technical support across the entire world. But the name Rottler still stands for the most innovative and most dedicated line of equipment for the automotive engine aftermarket.

1997
Andy Rottler
takes over operations as the third-generation president.

1999
The F67A multi-purpose CNC machining center introduced to the performance racing industry.

2000
Touchscreen Controls
make CNC machines simple to operate and extremely accurate.

2003
Rottler introduces its first cylinder head seat and guide machine, the SG.

2005
F90 Series introduced, giving the ability to machine massive V20 engine blocks.

Trade shows are a little different today than they were back in the ´50s and ´60s. Today, Rottler Manufacturing displays multiple operating machines with dozens of trained sales engineers. Yet we're still pursuing the same goal - letting customers interact with the machine, learning how intuitive accurate machining can be.

got to be user friendly. We want our customers – even if they're new to the business – to be able to run the machine and do engine work on it. You can't make money if you're struggling to learn the machine."

By spending time with customers in their shops, traveling to customers' locations, observing their operations and asking questions about the issues they're facing on a day-to-day – or even hour-to-hour – basis, Rottler engineers are able to translate those needs into new machines that eliminate those issues, speed up their processes and hold better tolerances for them in operation. Leading production remanufacturers, champion race engine builders, innovative custom engine builders and OEMs rely on Rottler's commitment to innovation. "It's a two-way street," Rottler says. "Our customers' feedback is extremely valuable – without them, we can't produce a machine that's going to be significantly better than our competition."

Customer feedback ranges from machine ergonomics (how does it FEEL) to the computer interface (how does it WORK) and everything in between. And if one customer feels it's worth changing, the engineers at Rottler know that many

others may feel the same way. Future designs may incorporate those requests.

For Rottler's engineering team, understanding what the customer is asking – in whatever language and whatever neighborhood that question is posed – is critical to building the next generation of machine for this market.

And those "self-driving" cars getting all the attention today? Rottler pioneered programming and automation for engine builders over 30 years ago when electronics were still in infancy. Since then, Rottler has perfected the "walk away" technology that allows machinists to maximize their productivity and performance.

"High-end programmable automated machine tools often are extremely expensive and may be a challenge for small engine builders to justify or to find financing to purchase them," Rottler explains. "Rottler's approach is different – we've focused our R&D on simplified automation for lower cost machines. It's our commitment to our customers – we understand and believe that automation reduces your machining steps, allowing jobs to be completed in less time, increasing productivity and resulting in increased profits."

Working For You – Even When You're Not Working

The global market means some people are working while others are sleeping. That used to mean that business interruptions were dependent upon the clock. No longer.

Rottler's technological edge allows customer service to be real-time. And thanks to the worldwide web, local customer service may mean attention to a machine halfway around the world. "That's how universal the equipment is," Rottler says. "Russia, China, Europe, South America – we're all over the world."

Today's technology allows Rottler to talk to people across the world instantly. When they buy a machine, every customer gets a webcam that allows them to communicate instantly with skilled engineers and customer service experts about what's going on, what they're doing and what's happening with the machine. "We're able to instantly work with them on fixing their problem. If we need to, we can even log onto the computer in their machine and work directly with the software," Rottler says. "You know how you sometimes hesitate to update the operating system on your personal computer because of the time and the hassle? Rottler will do that for our customers at a time that won't be inconvenient to their business."

Thanks to unmatched dedication, diversity and innovative product development, Rottler's advanced designs and equipment continue to meet the most demanding engineering needs of engine builders around the world.

History is more than just a collection of stories and photographs - it's attention to yesterday's legacy, meeting the needs of today's engine builder and anticipating tomorrow's innovations.

Rottler Executive Bio

Anthony Usher

Anthony Usher developed his passion for machining expertise one engine at a time at his performance engineering shop in Johannesburg, South Africa. A self-described "speed demon," Anthony looked for every advantage for his customers and himself.

Seeking to exploit the design limitations and opportunities in the first 4-valve-per-cylinder engines in the early 1970s, Usher traveled the world looking for machines and equipment capable of meeting his demands. When even his competitors started turning to him for advice and supplies, he refocused his efforts.

He realized that many of the machines most in demand simply didn't exist or weren't affordable for small shops or race teams. He presented a proposal to Don and Andy Rottler to join the company as a partner, and help develop and market new technology machines and products missing in the marketplace.

Moving his family across the world to Kent, WA, Usher was instrumental in bringing the F65 – the first CNC machining center – to the performance industry at the PRI East and West shows in 1999. Then in 2002, he introduced Rottler's first seat and guide machines to the engine building industry.

Since then, extensive travel for sales, installation and training has kept Usher busy improving his relationship with engine builders all over the world, all the while looking for the next industry innovation.

2008
P69 5-axis Cylinder Head Digitizing and Porting Machine introduced.

2009
The F69ATC and F109 Machining Centers are introduced. Big block machining and Automatic Tool Changers are now accessible to engine builders

2011
Rottler expands factory, doubling size and manufacturing capacity**.**

2012
F103/104/105 Heavy Duty Machining Center introduced.

2013
Rottler celebrates its 90th Anniversary and **introduces the H70 Series** with automatic hole-to-hole diamond honing.

EM69
Next Generation CNC Machining Centers

Rottler's new EM69 CNC Machining Centers have been specifically designed to be the most technically advanced industry-specific systems ever. More than just a single machine, these new "Engine Machining" CNC Vertical Machining Centers are designed to give customers even more flexibility for engine parts machining, digitizing and porting, and custom parts manufacturing.

Rottler's totally new, next generation CNC control found in the EM Series machines continues to give users unmatched speed of learning and ease of use when probing/digitizing without the need of additional cumbersome and expensive software. This advanced 4C software lets users know they are machining with the most state-of-the-science equipment available.

One of the main features is the EM series' expanded size 32˝ touch screen – by maximizing screen size, Rottler's CAM software allows unprecedented amounts of information to be displayed for the operator's use. The user can choose the information to be displayed for incremental and interactive functionality.

The EM69P 5-axis CNC Machining Center offers the precision and speed needed to reproduce cylinder heads and intake manifolds with exceptional accuracy and speed, with no handwork required.

What is 4C Software? Rottler's newest EM Series equipment offers Computer Numeric Control (CNC), Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) in the industry's most advanced Computer Measuring Machine (CMM).

The advanced software design allows professional engine builders and head developers to maximize production and minimize preparation time. The next generation CNC control gives even greater capability beyond porting by letting users probe parts for duplication and modification all within the machine control – no external or third-party software or equipment required.

EM69ATC

The EM69ATC features a new 24-tool ATC Automatic Tool Changer – the system provides greater flexibility for general parts machining and less downtime waiting for an operator to manually change tools between operations.

The EM69ATC 3 & 4-axis CNC Machining Center is versatile and great for machining engine blocks and making custom parts and also features a 24-tool ATC.

Just as Rottler revolutionized CNC head porting with our unique "all at the machine approach," we are now focused on revolutionizing general CNC/CAD/CAM/CMM by bringing the same "all at the machine approach" to the general machine tool industry.

What is 4C Software?

Rottler's newest EM Series equipment offers Computer Numeric Control (CNC), Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) in the industry's most advanced Computer Measuring Machine (CMM). The 4C technology allows users to digitize, edit designs and begin cutting in less time but also requires less machining/ programming expertise compared to many other systems. This brand new, revolutionary CNC machine CAD/CAM software allows 3D CAD Solid Models to be imported or created at the machine – the built-in CAM functions can be used to semi-automatically and interactively create complex 3D tool paths direct from the CAD geometry.

EM Series Features

- 24-position ATC Automatic Tool Changer for increased versatility and productivity
- Increased Spindle Power & Torque for Billet and Casting machining
- Maximum Functionality – operators can machine blocks and cylinder heads as well as create custom parts all in one machine
- All EM series machines feature linear roller bearing slideways with direct drive ball screws for smooth and movements and precise accuracy and repeatability.

Outthinking to Win

Warren Johnson Enterprises,
Sugar Hill, Georgia, USA

To become the winningest driver in the history of Pro Stock, Warren Johnson has mastered the ability to maximize speed, accuracy and efficiency – at the starting line and in the engine shop.

"Outthinking the competition is what appeals to me," explains the man ranked 7th on NHRA's 50 Greatest Drivers list. "I originally started CNCing heads back in 1992, and I've used a couple of different software programs since then. **But the beauty of Rottler's equipment is its digitizing software.** Thanks to its speed and efficiency, I can port cylinder heads four- to five-times faster with this equipment than any of the systems I used in the past."

"It writes its own program," Johnson says. "You don't have to do it in G-code. **This is the most user-friendly software I have ever used.** You can be productive right away if you have basic machining skills and you know which way to turn the handle."

Rottler's digitizing software, found in its newest 4- and 5-axis CNC machines, allows engine builders like Warren Johnson to not only replicate winning cylinder head configurations, but manipulate them to meet the sport's ever-changing demands.

"I started really checking into the software and having conversations with people that actually wrote the software. I could see the advantages over the systems I was using in the past," the Professor explains. "It's got a lot of flexibility built into it and I'm sure that the people who wrote the software actually had experience hand-porting cast iron heads and figured there has to be a better way!"

With the ability to both make billet heads and machine standard production castings, Johnson says the versatility and flexibility is unparalleled.

"You can take a set of heads and carve them one way – if they don't run as well as you thought, you just rework the program," he says. **"We've taken heads off the engine, recut them and had them back on the engine in two hours."**

The bottom line, Johnson says, is the quest for more power without expending more effort. "Rottler's distinct advantage over any other system I've used is being able to manipulate ports and change things without having to go back and redigitize everything. If you can move a mouse you can move a port."

2014
SG10X, industry's first guide-to-guide valve seat cutting machine introduced.

2015
New H85 and H87 CNC honing machines are launched.

2017
The SG100XY heavy duty guide-to-guide valve seat cutting is developed.

2017
S80 Series CNC surfacing machines introduced.

2017
EM69 3, 4 & 5-axis CNC Machining centers introduced.

So Advanced, It's Simple

Xcelerate – An Automated Commitment to Performance and Profitability

With today's engines, the terms "close enough" and "almost" are unacceptable. Yesterday's equipment has neither the speed nor accuracy required to keep cars, trucks and industrial equipment moving. Outdated equipment is slow to set up and needs more operator attention. Valuable man-hours could be better spent on other tasks instead of wasted doing things the old-fashioned way.

Thanks to our pioneering use of electronic controls and state-of-the-art cutting tools and fixturing, Rottler has overcome many of the traditional bottlenecks that slow work flow in a shop.

Operation and programming of Rottler Xcelerate logo machines is done using an ergonomic touch screen positioned on the front of the machine. The display tells the operator exactly where the spindle is positioned at all times.

Manual machines require an operator to literally stand permanently at the machine doing the same thing eight times over for each block! Not only is this an expensive waste of manpower costs, but fatiguing for operators, especially at production facilities. Machinists become bored and unproductive and do not enjoy their job, producing poor quality and low productivity results.

The SG10X, H85X and F10X machines have been branded with the XCELERATE logo – this describes Rottler's automation and focus on customer needs. More than just a catchy name, it's a commitment – we understand and believe that automation reduces your machining steps, allowing jobs to be completed in less time, increasing productivity and resulting in increased profits.

SG10X Cylinder Head Seat and Guide Machine

Thanks to the Quick X Axis Alignment System (Patent Pending), productive guide-to-guide automatic machining is a reality. The SG10X cuts a line of valve seats or reams valve guides – automatically! A quick tool change and the other line of valve seats or valve guides can be done automatically.

H85X Automatic Vertical Honing Machine with Hole-to-Hole Automation

The H85X hones a complete line of cylinders – automatically! Hone a complete V block automatically unattended with optional auto-rotate V fixture. Automatic lower crash protection means no broken stones or holders; automatic load control gives perfectly round and straight cylinders; and automatic CNC Control finishes every cylinder to the same size. Uses diamond and CBN abrasives for the perfect surface finish no matter the block construction.

F10X CNC Automatic Programmable Hole-to-Hole Cylinder Boring Machine

The same automatic functionality built into Rottler's advanced valve seat and guide and cylinder honing machines is also available in the F10X. You can bore and sleeve a complete line of cylinders – automatically! Perfect for performance race engine builders, remanufacturing operations, small engine builders and tractor pullers.

Many programmable automated machines can actually pay for themselves through labor saving costs. Ask your Rottler representative for a time study that can show how the labor cost to pay an operator is often more than the monthly payment on a lease for an automated machine.

While Silicon Valley tends to get the bulk of the attention for technology advancements, don't overlook the contributions of Seattle, also known as the Emerald City.

Seattle, Washington, USA, home to tech gurus like Bill Gates of Microsoft and delivery and sales authority Jeff Bezos of Amazon fame, is no stranger to innovation.

Rottler, which has been leading the innovation charge since the early 1920s, pioneered programming and automation for engine builders over 30 years ago when electronics were still in infancy. In fact, Microsoft was just getting going! Rottler has always pushed the boundaries with electronics to provide programming (memory) and automation.

High-end programmable automated machine tools often are extremely expensive and may be a challenge for small engine builders to justify or to find financing to purchase them. Rottler's approach is different – we've focused our R&D on simplified automation for lower cost machines. New machines have been developed to repeat simple processes like cutting valve seats in a cylinder head, boring and resleeving cylinders in blocks, as well as automated cylinder honing.

Xcelerate

Many Happy Returns

Rudd Racing Engines, Ardmore, Oklahoma, USA

RRE Rudd Racing Engines

Return on Investment is a simple, cold calculation. How much did you make from an investment relative to its cost?

For Michael Rudd, the ROI calculation is clear: the investment he made in Rottler machining equipment has almost immediately paid off in unexpected ways.

"Growing up, my dad taught me a lot of everything he used to do in the machine shop. I was always interested in the mechanical side of things and even though I went to the Oklahoma oil fields to run the drilling rigs, my plan was always open up an engine shop," says Rudd.

"I started off in 2013 as a brand-new, one-man shop with dreams of growth – in just a few years I've now got three other guys working for me and a significant shop expansion going on right now.

"When I got serious about my own shop, I spent about 8 months looking into equipment. Working with Rottler's representatives, I picked out a series of Rottler machines. Because I started as a one-man show, the expert help was very important."

Rudd says the ROI can be seen in his operation's growth. The machines are so easy to operate and do the jobs so fast, he says, he had to hire people to keep up.

"The proof of what the equipment has really done for us is this: I found I got so much work from being able to do the jobs so fast – I thought with the machines I could keep up with the work myself but I can't really keep the machines busy enough. In a year we were able to hire three employees and pay them all out. I need one guy for each machine to just keep feeding the machines. **It's just unreal – when you can take a job that used to require 16 hours of man time and turn around and port a set of heads in two hours plus the complete valve job, you know you can't beat that. It's impossible.**

Rudd points to Rottler's ease of use and speed of operation as his main purchase incentive. "Everything else seemed like you either had to know G-code or basically be a Harvard engineer to run it. Though all of our rigs in the field were all CNC operated and I was at least familiar with how they operate, I don't have any G-code training. The great thing is, I didn't need it. Really, if you can run an iPad today, you can do it. I've got three guys who are experienced with other systems and they all say it's so much simpler than G-code."

The investment keeps returning, Rudd says, thanks to the machines.

VR Series

Rottler valve refacing machines grind valves to minimum CONCEN (our exclusive promise of accuracy) for improved sealing and performance. The VR10 and VR12 machines come standard with vitrified wheels, grinding oils and two diamond dressers. Special wheels for grinding difficult metals such as titanium and Inconel are available.

VR10

The VR10 Valve Refacing Machine with Turcite Slideways sets new standards in speed and accuracy for performance racing and remanufacturing cylinder head work. The air-operated 2 x 3 Ball Precision Chuck System eliminates collets. Valve face is machined concentric to the valve stem for improved sealing, better heat transfer and reduces mechanical stresses on valves.

VR12

Using Rottler's Centerless Grinding System, VR12 operators are able to easily grind a set of valves to the exact same length without adjusting settings. The Centerless System rotates the valve stem on its own centerline. Precision drive rollers rotate the valve stem and a pneumatic low friction steady rest support the valve stem similar to a precision balancing machine, resulting in extremely accurate valve stem to valve seat run out less than .0002″ (.005mm) TIR.

Building the Best, Using the Best

DFC Diesel, Alberta, British Columbia, Canada

When DFC Diesel first started rebuilding engines in 2010, president Matt Adams says the team quickly realized it wanted to build the best, using the best. "Thanks to brand new cutting-edge Rottler equipment we were able to bring an unrivaled level of precision machining to the Canadian diesel industry."

Today, DFC uses a variety of Rottler equipment, including Rottler's SG10XY for all of its 5.9L Cummins cylinder heads – "It can work on all 24 guides or seats while one of our machinists is able to operate other equipment during its cycle time," says Adams.

"The rigidity of the spindle head and live pilot design gives mirror like seat finishes that are repeatedly cut to the same depth. This allows us to maintain strict quality control and have identical results on every cylinder head we remanufacture. Its automatic functions allow more production to be done and being CNC controlled gives repeatable results each time it is used."

DFC received the first automated hone from Rottler in existence and Adams says his workers are proud to showcase its abilities with every engine they remanufacture. "With a CNC controlled operating system it allows every engine to have the exact same crosshatch angle in every cylinder and with a load sensing honing head gets every bore within 0.0002″ (two tenths of a thousandth inch) for taper and out of round with ease. Finishing off with a pre-programmed plateau mode gives our engines the same level of quality found when built in the OE manufacturing plants. These finishes are QC checked using a profilometer ensuring the proper RA surface finish for proper ring seating and longevity.

"A welcome addition to our lineup of precision Rottler equipment, our P69 (now the EM69) is the first and only one purchased in Canada. This machine allows fast and precise digitizing and cutting of head ports and allows reverse engineering of existing port designs through the use of a Reninshaw probe. The ability to design intakes and produce custom parts as well as cut O-rings in cylinder heads makes this machine extremely versatile. With patented technology the P69 raises the bar for precision engine machining equipment and further demonstrates our desire of bringing the most advanced machining equipment to the business.

"Finishing off our lineup of the most advanced automotive machining equipment in Canada is the SG9MTS seat and guide machine. The SG9MTS has all the same design features of the SG10X but in a manual version. The live UNIPILOT design keeps concentricity of seat cutting to above industry standard and the production fixture combined with programmable cutter heights and speeds allows for precision machining with production speeds. Perfect sealing of valves is possible each time, every time."

SG Series

Production Level Efficiencies for Low Volume Users

Despite their outward appearance, today's cylinder heads are vastly different than the ones engine builders worked on only a few years ago. Airflow technology has become such a science that guessing is no longer an option – and inaccurate valve seat finishing or head porting can be detrimental – even destructive – to today's precision engines.

For rebuilders of gas and diesel cylinder heads, Rottler's SG technology can pay dividends.

Rottler's SG XY concept has taken years to develop and become practical for small volume head manufacturers and rebuilders. Rottler's newest Xcelerate machines replace extremely complicated and expensive machines similar to those used to manufacture huge, mass production runs of the same heads. Rottler has worked in conjunction with leading small-volume head manufacturers like Edelbrock, TrickFlow and Dart to develop automated machines that are easy to change between different castings and affordable for low-volume manufacturing.

The biggest technical challenge with automated head machining is getting

Unipilot ROTTLER TOOLING

the centralizing pilot into the valve guide AUTOMATICALLY. These days, valve guides are getting smaller and smaller and 6mm or .250″ are common. The head casting must be precisely located every time so the pilot can enter the valve guide without missing, which could result in serious "crash" with tooling failure.

When only one or two heads or small batches are being machined, fixturing and set up should be fast and easy – and accurate. Rottler developed an innovative fixture system for clamping heads that allows the complete fixture to float on air. Special alignment arms line up valve guides so that the pilot can enter each valve guide automatically without crashing. Even small shops doing just one set of V heads can be productive with this fixture and alignment system.

Rottler's exclusive ACTIV Spindle Technology and Quick X Axis Alignment System – advancements made possible after years of R&D and testing – makes such productive guide-to-guide automatic machining a reality. The system is critical for success and is available in the smaller SG10XY and larger heavy duty SG100XY model with many machines currently in service in busy reman and manufacturing companies such as DFC Diesel and Edelbrock.

The latest design ACTIV Spindle has a sphere built inside the spindle to compensate for any misalignment and allows the UNIPILOT tooling system to automatically center with reference to the valve guide centerline while the workhead is floating on air cushions. Once the floating stops and the workhead clamps, the UNIPILOT and valve guide centerline are maintained while the valve seat is cut giving excellent CONCEN. When doing machining operations other than valve seat cutting such as valve seat housing counterboring and valve guide reaming, the spindle is required to be locked vertically. The ACTIV spindle has a pneumatic locking system that locks the spindle sphere rigidly vertically for other types of machining requirements.

Lightweight Workhead Floats on Base Plate

The new design SG series utilizes a very light workhead that floats independently on a base plate allowing precise centering of the pilot in the valve guide. The base plate moves the workhead from guide-to-guide by a precision ball screw and servo motor. The complete assembly clamps with air pressure for rigid machining.

Quick X-Axis Alignment System

This patent-pending feature is the secret to productive guide-to-guide automatic machining! After the cylinder head is clamped in the fixture, two pilots are installed in the outer valve guides and two of the alignment arms are moved on linear slideways inline with the two pilots. At this stage, the complete fixture assembly floats on air and the two pilots contact the two alignment arms to align the valve guides with the X-axis movement of the workhead. The fixture then clamps on the machine table, the two pilots are removed and the cylinder head is ready for automatic guide-to-guide machining.

SG100XY
Rottler's Newest Focus on Diesel Castings

There are two common designs for diesel cylinder heads: large (huge) castings for six-cylinder inline engines with 24 valves, and single-cylinder heads, each with 4 valves (such as found on the CAT 3500).

The single-cylinder heads are the biggest challenge! Most seat and guide machines can only handle one single head at a time, requiring the operator to load, clamp, machine intake seats, change tooling, machine exhaust seats and then unload the completed head before loading the next head. A tremendous amount of time is wasted! Operator fatigue becomes a real concern as the operator has to spend so much time just loading and unloading and not getting the critical machine work done of cutting valve seats and reaming valve guides!

The SG100XY large capacity cylinder head seat and guide machine incorporates Rottler's exclusive ACTIV spindle and guide-to-guide automation for ease, accuracy and precision on even the largest heads.

Rottler has developed fixtures that allow easy loading of four single heads and then, with one button operation, all heads are clamped at once. The fixture is designed to accommodate different height heads – a key benefit, because heads being remanufactured have often been worked on before and are not equal thickness. After the heads are clamped, the SG100XY is able to machine 12 intake seats unattended and after a quick tool change, the software automatically knows to start cutting the 12 exhaust seats unattended.

For the large, 24-valve castings, Rottler has developed a servo-controlled 360-degree rollover fixture with power clamping. Easy and fast to set up, these huge castings can be rotated 360 degrees and leveled for many operations such as valve guide and spring seat repairs, injector tube repairs and even drilling out broken studs on the exhaust manifold surface on the side of the heads.

Rottler has developed special spindle motor control technology to vary the spindle speed while finish cutting the valve seat. SSV varies the spindle speed to specified RPMs and controls the acceleration and deceleration in microseconds, giving improved surface finish for perfect CONCEN and vacuum seal.

SG80A

The Rottler SG80A was created specifically for machine shops that rebuild large cylinder heads found in the heavy-duty industrial, stationary and marine engine industries. Large cylinder heads come in many shapes and sizes and require a machine that is able to easily load, clamp and do all the operations required to remanufacture these heads.

Over the decades, Rottler's spindle design has proved that our engine block machines are able to "plunge cut" wide counterbores found in large engine blocks with exceptional results and we believed that many large cylinder heads could be "plunge cut" as well. Plunge cutting requires a very rigid machine, and by utilizing many of our already established design features such as Rottler's exclusive spindle design and fixed tooling, operators could save time and money.

Our concept has since been proven, in over 100 machines, that the SG80A is capable of plunge cutting large valve seats very quickly and with excellent CONCEN and surface finish.

Universal optional fixturing allows a wide variety of heads to be set up, leveled and clamped for rigid machining. Special fixturing can be designed and manufactured to suit a wide variety of applications when required.

SG80MTS

The Rottler SG80MTS was specifically designed for heavy-duty machine shops that rebuild small to large cylinder heads. From 24-valve single-casting cylinder heads to huge, single-cylinder heads used in natural gas, mining and marine workboat engines, the SG80MTS is designed to handle it.

Rottler's spindle design has proven over decades that our engine block machines are able to "plunge cut" wide counterbores found in large engine blocks with excellent results. The SG80MTS is capable of plunge cutting large valve seats very quickly and with excellent CONCEN and surface finish results.

Rottler's MANUALMATIC Technology System automates repetitive manual operations into one MANUALMATIC process. UNIPILOT Tooling, powered by MANUALMATIC, produces the best CONCEN in the industry.

Operators move the workhead effortlessly on a cushion of air to the next operation allowing the patented UNIPILOT tooling to easily center into the next guide ready for MANUALMATIC to accurately repeat the process.

Understanding MTS

Automatic Ease and Accuracy

Rottler's MANUALMATIC process automates repetitive manual operations into one simplified process, combining standard seat and guide machining steps for efficiency and improved accuracy.

So Advanced, It's Simple.

With MANUALMATIC, productivity increases of 30% to 50% can be achieved almost immediately. MANUALMATIC is designed for operators who are accustomed to standard manual equipment. Rottler has created a Touch Screen that is easy to operate on day one. Buttons and switches have been eliminated, saving operator time. Manual controls are simply placed on the Touch Screen and operators push screen buttons that mirror manual operation.

Rottler's exclusive MANUALMATIC Technology System (MTS) and UniPilot tooling allow even the least computer-savvy employee to achieve levels of productivity and accuracy you may never expect.

After entering your seat or guide requirements on the user friendly Touch Screen, a quick touch off and zeroing initiates MANUALMATIC operation. With zero set, MANUALMATIC manages spindle speed transitioning to finish RPM automatically. Feed the spindle and Rottler intuitive control easily manages functions such as workhead float/clamp, valve guide pilot centering and spindle power. When seat depth is reached, MANUALMATIC changes the spindle RPM automatically for equal seat depth and finish.

Workhead lights illuminate heads and flash intuitively when the Digital Depth Gauge senses the entered spindle height. Buzzers are replaced by bright LED lights, improving operator efficiency. MANUALMATIC eliminates foot pedals and combines final lowering, roughing, finishing, raising and Workhead Float into one automated MANUALMATIC process! Operator hands stay on the wheel, driving maximum performance.

SG7MTS

- Operations such as valve guide reaming, drilling and tapping are included
- Lightweight Air Float Work Head for precise centering
- Holder Kit for heads that Roll Over Fixture is not able to clamp – two-piece frame adjustable for different length heads
- Maximum Cylinder Head Length in 360-Degree Roll Over Fixture – 28″ (700mm) adjustable to 32″ (800mm)
- Rottler R1 Taper 2.25″ (58mm) Hardened and Ground Spindle with 8″ (200mm) of hand wheel travel
- Spindle Rotation Speed Infinitely Variable from 40-400RPM with AC Motor and Vector Drive
- Quick change of Spindle RPM from High to Low for fine finishing of the valve seat
- Quick Change Tool Retention System for fast location over pilot and accurate centering (Patented)
- Steering Wheel for Rapid and Fine Spindle Feed for Precise Valve Seat Depth and Finish
- Work head tilts 15-degrees in both directions for Canted Valve Guides
- 2 LED Work lights – either side of the spindle giving shadowless view of valve seat area
- Digital Electronic Level for quick, precise alignment of Fixed Carbide Pilots
- Digital Display for repeatable Depth Control of Spindle Travel
- Built in Vacuum Tester complete, Kit includes hose and quick change pads; Heads can be quality checked while still fixtured in the machine
- Space requirement with Tool Cabinet mounted: 52 X 34 X 78″ H (1321 X 864 X 1981mm)

SG8MTS

- Rottler R1 Taper 3.150″ (80mm) Hardened and Ground Spindle with 8″ (200mm) of hand wheel travel
- Rottler Automatic Tightening and Quick Release Spindle Lock Nut System automatically and securely clamps tooling nearly instantly
- Quick Change Tool Retention System accurately centers over the pilot (Patent Pending)
- Infinitely Variable Spindle Rotation Speed from 25 to 400 RPM. RPM is constantly monitored in clear view on the Rottler Color Touch Screen Digital Display
- Quick Change RPM from Low to High with a single button push conveniently located on the bottom of the control panel
- AC High Torque Spindle Motor with Vector Invertor
- A swivel mount three drawer Tool Storage Cabinet is included
- Digital Electronic Level for Quick and precise alignment of Fixed Carbide Pilots
- Digital Depth Gauge provides repeatable Spindle depth control
- A Holder Kit is included to handle jobs that are outside of the Roll Over Fixture profile.The adjustable Holder Kit features a two piece frame to accommodate heads of differing lengths.
- 360° Roll Over Cylinder Head Length Capacity is 44″ (1120mm). Optional Fixture expands length capacity to 52″ (1270mm)
- Space requirement with Tool Cabinet mounted: length 74″, depth 34″, height 80″ (1880 x 864 x 2032mm)

SG9MTS with ACTIV Spindle

- Automatic Alignment System built into the Spindle for fast location of the pilot into the Valve Guide and Accurate Centering (Patent Pending)
- Touch Screen Control for increased production and memory for settings
- Air Float Work Head with Foot Pedal Control
- Heavy Duty Spindle – Diameter 3.150″ (80mm)
- Spindle Rotation Speed Infinitely Variable from 50-900RPM with Digital DisplayQuick change of RPM for Low and High by a single push of the bottom on the control panel
- Digital Electronic Level for quick alignment of Valve Guides
- Digital Gage for Depth Control of Spindle Travel.
- Two-piece frame – adjustable for different length heads
- Flexible, compact LED work light mounted on Work Head
- Tool Storage Cabinet with four drawers, mounts on the machine and swivels for ease of use
- Cylinder Head Length Capacity in Optional 360-Degree Roll Over Fixture 44″ (1120mm) and 52″(1270mm) with optional fixtures
- Space requirement with Tool Cabinet mounted: length 74″, depth 34″, height 80″ (1880 x 864 x 2032mm)

CNC Automatic Surfacing Machines

Today, surface finish is more critical than ever, thanks to such industry advancements as MLS gaskets and bimetal engine construction. A surfacer must allow the right combination of cutting speed and feed rate to achieve exceptionally low Ra finish numbers.

High cutting speeds, in turn, require superabrasives that can handle the heat. Rottler machines were the first surfacing machines to use CBN (cubic boron nitride) inserts to resurface cast iron blocks and heads, and PCD (polycrystalline diamond) to resurface aluminum blocks and heads.

Linear ROLLER BEARING SLIDEWAY

The S80 series of machines combine cutting edge control technology with proven traveling column, machine tool, dry surfacing technology to create the world's most advanced surfacing machines available today.

Over four decades ago, Rottler pioneered automation and programming by utilizing electronics and computers. **Today, the S80 Series Surfacing Machines incorporate the latest ClearPath Integrated Servo Touch Screen Control Technology into a Dry Surfacing Machine capable of surfacing a wide variety of materials and with features such as multi pass automatic machining.** Rottler touch screen control technology makes the machine easy and fast to learn and operate.

Traveling column design, proven for decades in Rottler engine block machining centers, reduces floor space requirements and improves accuracy of surface finish.

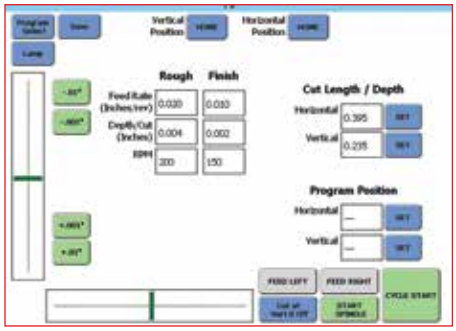
The programmable downfeed with multiple passes is ideal when large amounts of material need to be removed in one set up. Angle milling and weld removal are also easily done in one cycle.

- Direct Drive Ball Screws and Linear Roller Bearing Slideways on vertical and horizontal movements combine to give precise motion control resulting in precision surface finish.
- Full-Steel enclosure surrounds the machine and keeps the work area clean and free of chips and protects operators from moving machine parts. The stainless steel doors fold down for access to the work area
- An electrical enclosure mounted on the side of the machine allows the back of the unit to be installed against a wall, reducing floor space requirements.
- Increased Vertical Travel – the workhead is mounted on linear roller bearing slideways and has extended travel 19" (483mm) eliminating the need for parallels while being able to surface a wide variety of jobs from small, single-cylinder heads to tall diesel blocks.
- Super Fine Surface Finish – Direct Drive precision ball screws and linear slideways combined with infinitely variable speeds and feeds allows surface finish as low as 2Ra to 6Ra.
- Dry Cutting – the spindle and cutterhead system is specially designed and developed for dry cutting with CBN and PCD cutting tools eliminating the need for coolant.
- Universal T Slot Base – Large, One-Piece Meehanite Cast Iron Base with T-Slots allows mounting of any fixture and any job – jacks and clamps can be placed anywhere!
- Fast Floor-to-Floor Time – Heads can be surfaced in a few minutes and a pair of angled V8 heads in less than eight minutes.
- Infinitely Variable Spindle Speeds from 350 - 1,800 RPM for machining different metals
- Infinitely Variable Travel Feeds .001″ - .080″ (.025-2mm) per Cutterhead Revolution for Desired Surface Finish Roughness
- Work Head Vertical Travel via Ball Screw and Linear Roller Slideway for Precise Movement
- Cutterhead Guard and Slanted Casting includes Roll Out Chip Bin for Efficient Chip Collection
- Depth Dial Indicator Assembly for Rapid Touch Off on Surface to be Machined

Touch Screen Technology

Over four decades ago, Rottler pioneered automation and programming by utilizing electronics and computers. Today, the S80 Series Surfacing Machines incorporate the latest **ClearPath Integrated Servo Touch Screen Control Technology** into a Dry Surfacing Machine capable of surfacing a wide variety of materials and with features such as multi pass automatic machining. **Rottler touch screen control technology makes the machine easy and fast to learn and operate.**

- Program Length of Part – Input length of surface to be machined and the machine travels the exact distance then returns to home – not necessary for time consuming setting of end stops.
- New Technology ClearPath® Integrated Servo System with Touch Screen Control.
- Conversational Touch Screen Control allows simple programming for any workpiece such as depth of cut, multiple passes, total material removed, speeds and feeds.
- No Handwheel required – machine is moved by sliding finger on touch screen slide bars.
- Programmable Rapid Touch Off Set Point for reduced Cycle Times. Upon completion of Automatic Cycle, cutterhead returns to Home Start Position at Vertical Zero Height.



S85A

The S85A model is designed for surfacing automotive and small diesel heads and blocks. The S85A is ideal for the requirements of the performance racing engine builder and production engine remanufacturer.

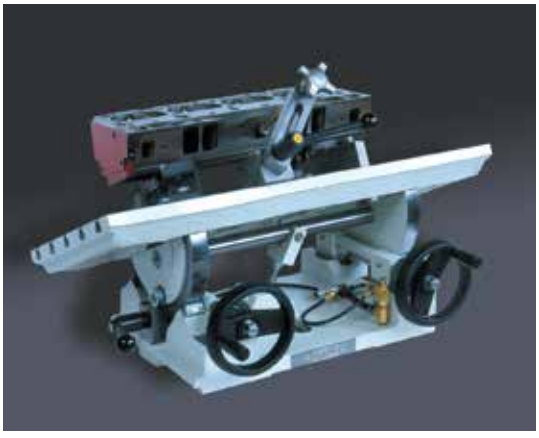
- Table size: 40″ x 20″
- Cutter Diameter: 14″
- Horizontal Cutter Travel: 41″
- Machine Dimensions: 76.2″ D x 68.3″ W x 74″ H
- Overall Floor Space Requirements: 76.2″ D x 68.3″ W
- Machine Weight: 3500 lbs.

S86A

The S86A is designed for surfacing everything from the smallest to large heavy-duty diesel heads and blocks. It is ideal for a job shop that does a wide variety of engines, including diesel.

- Table size: 50 x 20″
- Cutter Diameter: 16″
- Horizontal Cutter Travel: 51″
- Machine Dimensions: 86.2″ D x 68.3″ W x 78″ H
- Overall Floor Space Requirements: 86.2″ D x 68.3″ W
- Machine Weight: 3900 lbs.

Dual-Axis Leveling Table



Rottler's universal Dual-Axis Leveling Table and head clamping tooling allows any component to be fixed then leveled in both directions in a matter of seconds. The Air Float and the Dual-Axis Leveling Assembly ensures simple, accurate positioning of any workpiece, without the need for confusing gages or shims.

Just as there's little margin for error when it comes to valve, seat and guide work, today's computer-controlled, low-emission engines are very sensitive to surfacing work as well. Accuracy is critical for today's engine builders, because engine blocks and cylinder heads require only the minimum metal removal when surfacing the head gasket faces.

Designed for Rottler's S80 Series machines, the Dual-Axis Leveling Table can be used on all Rottler machines that have surfacing capabilities such as EM70 and EM100 machining centers. The table's versatility and construction design allows it to be used for surfacing requirements on industrial machines as well.

CNC Vertical Stroke Honing Machines

Honing engine blocks has traditionally been a very tedious "manual" operation, in which a machine operator must be present at the honing machine throughout the entire process – he isn't able to leave and attend to other work while honing a block. Rottler pioneered the concept of "walk away" honing and the latest H85 CNC automatic vertical honing machines take that efficiency to the next level, allowing operators to be more productive, accurate and profitable.

Many engine blocks have interference or variances in the lower area of the bores that can damage honing stones and holders. Every time the H85 starts honing a cylinder, the machine will check bores for interference, avoiding potential damage to honing stones and holders. Rottler H85 control senses lower bore interference prior to rotation and stroking motion starts, eliminating any stone or holder damage.

Rottler's CNC Servo Controlled High Pitch Ball Screw and Hardened Steel Linear Slideway Systems allow precision vertical stroking and fully automated operation, creating a true constant cross hatch pattern throughout the entire length of the bore, increasing oil retention while reducing oil consumption, extending engine life and reliability.

Rottler has introduced three different models in the H85 series, catering to different types of shops and applications from small, one-man, grassroots race shops to large production facilities requiring extremely fast cycle times and metal removal rates.

The most important function when finish honing cylinder bores is the roundness and straightness of the bores. The CNC control found in all H85 Vertical Honing Machines is able to expand and contract the honing stones automatically and at the same time control the exact load or pressure that the stones 'push' against the cylinder wall. As the H85 finish hones the bores the load is reduced, eliminating any distortion in the cylinder walls resulting in very accurate round and straight bores.

The H85 is programmed with both roughing and finishing loads, automatically controlling the stone pressure while honing cylinder bores producing the desired geometry and surface finish in every cylinder. This Monitored Variable Load Control means honing time is substantially reduced for maximum productivity and repeatability.

Rottler's innovation in honing technology have forced industry professionals to reconsider the accuracy of the rocking head-design honing machines. With the H85 series, Rottler offers a true vertical stroking machine without any rocking motion.

What does this mean to you? Simply put, these advanced design technologies allow very fast direction change and minimize any variation in crosshatch angle at the top and bottom of the stroke. Consistency, accuracy and repeatability are the result.

Rottler offers a range of different grit size CBN metal bonded finishing stones. The CBN stones cut better than standard abrasives and are superior to diamond stones for cutting cast-iron, presenting a clean finish with no torn, folded or fragmented metal left behind.

Upgradeable, Not Obsolete

The Rottler H85A is the only ground level hone that can be upgraded for increased speed and productivity. Start with the Rottler H85A model and as your customer demand increases simply call Rottler to automate your hone. No need to replace the machine with a higher production model.

In addition to being fully upgradeable, Rottler hones are proven to last decades in the field. Their rugged base, linear slideways and ball screw with auto lubrication work together to increase life expectancy.

In addition, the H85AX can be upgraded to the H85AXY in the field with a retrofit upgrade package. This upgrade feature allows a customer to purchase a H85AX at a lower price and, as budget allows, upgrade to get the full automation for maximum productivity.

H85A

The affordable, entry level H85A CNC Vertical Stoking Machine is designed for the small shop where budget constraints are most important. The H85A includes all the honing features of the H80 range but requires the hone head to be moved from cylinder to cylinder manually. Once the hone head is positioned above and lowered into the cylinder then the CNC control takes over and hones the cylinder automatically. Once the machine has completed the automatic honing cycle, the operator moves the hone head up to the clearance position. At this stage, the operator then moves the hone head over and into the next cylinder and starts the automatic honing cycle again.

H85AX

The H85AX model includes more automated features to further increase productivity but still maintains a competitive price to be affordable for machine shops where budget is limited. The H85AX includes all of the features of the H85A with the addition of automated X-axis travel. The hole-to-hole software will allow the H85AX to hone a line of cylinders automatically unattended. Once the line is complete, the operator can roll a V block and the machine will be ready to hone another line of cylinders automatically. The H85AX has the ability to be upgraded to the H85AXY.

H85AXY

This model includes all of the features of the H85A and H85AX with the addition of automated Y-axis travel. This feature allows parts such as engine V blocks that have offset cylinders to be completely honed unattended. After the V block is rolled over in the optional automatic rotate fixture, the machine will move the workhead in and out to centralize the hone head in line with the bore centerlines. *See Page 31 for details on the Heavy Duty H87AXY.*

Demanding Surface and Finish Accuracy

Total Seal Piston Rings, Phoenix, AZ

The perfect cylinder bore surface finish is the Holy Grail of the performance engine building profession. Everyone is looking for it, many claim they have found it, and yet the precision needed to seal piston rings and cylinder bores seems just as elusive now as it ever has been.

"We have spent countless hours using the Rottler CNC Vertical Honing Machine in the search for the proper surface finishes required to achieve perfect ring seal," says Keith Jones, technical director with Total Seal Piston Rings. "Until recently, we have been limited to using vitrified or diamond abrasives."

"Vitrified stones gave us nice, clean cuts and make it easy to hit the target surface finish numbers, but consumable costs are much higher compared to diamond stones. Diamond stones create better bore geometry and give extremely long life, but the surface finish is nowhere near as clean a cut," Jones says. "We see lots of debris and burnishing of the cylinder surface."

After testing various abrasives with Rottler's experienced sales team, Jones says CBN abrasives offer the best of both worlds to Total Seal and its customers.

"We have an abrasive with extremely long life and a surface finish that is as good as or better than vitrified stones delivered. Little to no debris, no burnishing and almost thread-like consistency in the valleys.

"We've examined the different abrasives and the surface textures they leave under high-powered microscopes and the results are consistently the same. CBN honing stones are a real game changer."

TOTAL SEAL PISTON RINGS
Total Seal, Inc.
Phoenix, Arizona

F Series
CNC Boring and Sleeving Machines

The F Series Boring Machines are truly unique in the automotive and diesel engine building industry. These machines represent the next generation of boring equipment, evolving from the Rottler boring bar, which has been the industry standard since 1923. With improvements in electronic motors and cutting tool technology, Rottler boring machines are two to three times more productive than challengers on the market.

They offer unmatched flexibility, accuracy, strength and service capabilities, with models designed for small, medium and large gas and diesel engine blocks.

The high speed Rottler F Series machine can bore a block in half the time other models of boring machines require. New insert technology is producing long lasting, inexpensive inserts, which are capable of handling these high speeds and feed rates, with the same cost per insert as previous styles. Inserts do not require sharpening and the low cost of these tools makes them the ultimate choice for boring cylinders.

The world famous Rottler F Series boring and sleeving machines have been upgraded to the proven Rottler Windows Touch Screen Control with the latest technology CNC BISS encoder servo motors, giving faster cutting speed and feed rates. One pass sleeve cuts and automatic equal depth counterboring are all possible with these powerful automatic machines.

Operation and programming of Rottler's F Series Boring Machines is done with ergonomical touch screen positioned on the front of the machine. Rottler pioneered the development of this simple method of operation and the display tells the operator exactly where the spindle is positioned at all times. Programmed information such as depth of cut, speed and feed is clearly displayed so the operator knows the machine movements at all times. Unlimited block programs can be stored in the machine's memory for future use.

F9A
1.5-5˝ (38-127mm) Bore Capacity

The F9A machine is the industry standard worldwide for small- to medium-size engine blocks or cylinders. **Designed for all automotive blocks up to big block V8s and small diesel blocks,** the F9A will produce accurate bores for a lifetime. The F9A is ideal for the production shop where the odd sleeve must be fitted. The F9A is the fastest, most powerful boring machine available to the jobber shop. The simple set up and Windows touch screen control make this a very economical machine to operate.

F10A

1.5-9″ (38-228mm) Bore Capacity

This heavy-duty machine was designed for small- to large-capacity machine work. The spindle diameter is 3.25″ (82.5mm) for extra heavy-duty machining up to 9″ (230mm) bore size. Large sleeve cuts can be taken at high spindle RPMs, and in many blocks, one pass sleeve cuts are possible to increase productivity. Programmable counterboring operations eliminate guesswork and provides added timesaving. The massive one piece Meehanite, stress-relieved, precision machined base casting allows the fixturing of large diesel blocks such as Cummins 855, Detroit 12V71, Mercedes 444V12 and odd jobs such as gear cases and connecting rods. The FA machines can also handle small jobs down to 1.5″ (38mm) bore diameter with optional cutterheads.

F10X

1.5-9″ (38-228mm) Bore Capacity

Having the same feed and capacity of its brother, the F10A, the F10X uses Rottler's exclusive Xcelerate technology to make operation faster, easier and more precise. **This special version CNC machine offers automatic hole-to-hole unattended boring.** Windows-based control and simple, intuitive software through a 15″ touch screen makes programming and automatic control for cycles such as boring, sleeving, counterboring and blind-hole machining simple and repeatable. Turcite-coated slideways give low friction and extended life.

EM70 Series
Designed To Meet Diverse Needs

The EM70 Series machines are designed for both the small- to medium-size diesel engine rebuilder as well as the performance racing engine builder. The large capacity of the EM79 allows dual work stations so two jobs can be set up at once. A block can be bored and surfaced on one side of the machine while another block can be set up on the other side of the machine for main line boring and thrust facing.

Special fixturing allows fast block loading and unloading as well as easy change over to different design blocks. Operators can change from V block to inline block in just a few minutes, and the CNC control stores all settings in memory for instant recall.

Main and Camshaft Line Boring with Rottler Unique Right Angle Drive

Rottler has over 30 years of experience in line boring with right angle drives. Anything from very small overhead camshaft cylinder heads to large diesel and industrial engines and frames can be easily set up and line bored with Rottler machines, software and tooling. The EM79 is well developed for this type of work and can machine up to large overhead camshaft heads such as Detroit 50/60 and CAT 3406E and C Series. Main bearing conversions and stroker clearancing can be done at the same set up as line boring and thrust facing, allowing maximum versatility of this multi-purpose mid-size machining center.

EM79
Multi-Purpose CNC Machining Center

Common, everyday jobs such as boring, surfacing and line boring can be easily automated with the EM70 machines. Operator attendance is only required for set up. Often when surfacing a block, more than one pass is required. The EM79 can be programmed for multiple passes, moving down the exact amount each pass and completing with a finish cut for the required surface finish during the final pass. Bore centers are either measured from the block or from a blueprint, then saved in the memory. The EM70 machine moves automatically to the exact positions, useful when multiple boring operations are required for jobs such as resleeving. For special applications, Optional Renishaw Wireless Probing can automatically find bore centers and measure diameters.

Features

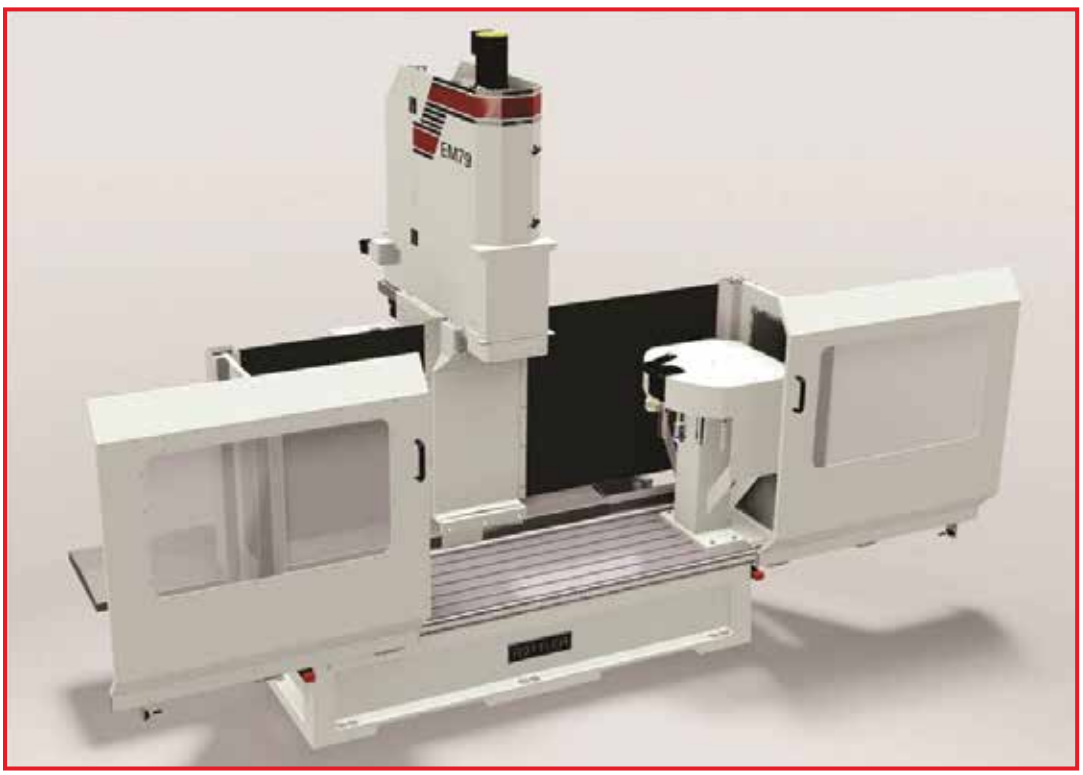
- Windows Touch Screen Control – Easy to learn and fast to operate.
- Extra height capacity for medium-size diesel blocks for increased versatility.
- Sliding quill spindle design for deep hole machining required for block work.
- World standard CAT40 Spindle for fast tool changing and worldwide versatility.
- 4-Axis Automatic 360-Degree Roll Over Fixture for increased productivity.
- Single phase 220V for power efficiency – save electrical running costs.
- Automated workhead tilting system for surfacing gives superior surface finish.
- Horizontal Movement (X Axis) – Left/Right – 72″ (1829 mm)
- Horizontal Movement (Y Axis) – Front/Back – 14″ (355 mm)
- Vertical Movement (Z Axis) – Up and Down – 18″ (457 mm)
- Automated workhead tilting system for surfacing gives superior surface finish.

Diesel Engine Remanufacturers

The small- to medium-size diesel engine remanufacturer requires an automatic machine that is easy to learn and fast to operate so any block can be machined quickly and accurately. In order for engine rebuilders to move out of the manual machine age and into the CNC era, they need computer technology. Features such as Rottler's Windows Touch Screen Control Panel combined with Conversational Programming allow virtually anyone to easily operate these machines.

Performance Engine Builders

The performance racing engine builder requires a versatile, multi-purpose machining center that can handle a wide variety of engine machine work. From simple jobs like boring a block and surfacing a head to complex machine work like line boring and general CNC machine work and making parts, Rottler's EM70 Series delivers.



EM79ATC

Multi-Purpose CNC Machining Center with Automatic Tool Changer and Full Enclosure

Rottler has developed the EM79ATC machine's ATC system to maximize productivity. This unit includes automatic tool changer and full chip enclosure for production applications in both diesel and high performance environments.

Complete cycles including probing, boring and surfacing can be completed unattended with the doors securely locked closed.

Global Domination
Big Blocks, Big Machines, Big Needs

There's an old saying that, "If a salesman sold it, a truck brought it," and according to industry statistics that's never been more true. The American Trucking Association reports that more than 70% of the freight moved in America is carried on trucks, and that number is expected to increase by about 3.4 percent annually through 2023.

But what constitutes the heavy-duty market? According to the U.S. Department of Transportation's Vehicle Inventory and Use Survey (VIUS), Class 6 trucks (which may include small construction vehicles such as dump trucks or box trucks) may be classified as "light-heavy." Traditionally, however, Class 7 vehicles (with gross vehicle weight ratings ranging from 26,001-33,000 lbs.) and Class 8 vehicles (with GVWR over 33,000 lbs.) are considered the "wheelhouse" of the heavy-duty market. Increasingly, this market needs to be expanded, say players in the industry.

While traditionally encompassing diesel engines, the size of the engines, the scope of the market and even the fuels they are powered by mean heavy-duty means different things to different businesses in different parts of the world.

Heavy-duty is more important than ever around the world, and Rottler's commitment to serving these diverse industries is unwavering. Though they operate in some of the most severe conditions imaginable, today's diesel engines are very efficient – but, when they are out of service, they are extremely costly.

Though they can be very profitable, bigger engines have bigger requirements. Some in-frame rebuilds on fleet vehicles can take approximately 40 hours and cost in excess of $12,000 – this may seem a very costly rebuild, but remember: this should last from 800,000 to 1 million miles.

But is it a gold mine for shops? Profits come with an expense, of course. Heavy-duty trucks require a variety of special tools that usually have heavier price tags. And two other factors must be taken into consideration: manpower and machines.

These "Big Cats" aren't endangered around the world, but in many cases the skilled employees to properly remachine and remanufacture the engines may be.

"Training is a key issue," says one engine builder, "because in today's world there just aren't many younger people wanting to do this kind of work. When you do find someone, you can tie up weeks and months training them on certain machines or procedures your shop has."

And the machinery needs can't be overlooked, because the sheer size of diesel engines requires more robust equipment than those found in automotive facilities. Fortunately, machines from Rottler are capable of maximizing productivity with

Line boring, connecting rod reconditioning, cylinder head porting, block sleeving – all of the standard machining operations need to be performed on heavy duty engines. The challenge? The sheer scope of the jobs mean dedicated engine builders need dedicated equipment. Rottler supplies the equipment to machine the engines that move the world.

experienced users and ease the transition with rookie employees. Rottler's EM100 Series Machining Centers, H87AXY Honing and SG80MTS Seat and Guide Machines provide the automatic and manual options engine builders require.

Of course, heavy-duty does not only mean over the road trucks. Industrial applications continue to offer substantial opportunities, say experts. Industry leaders service mining, marine, stationary power, oil and gas pumping operations. Each of these markets represent similar margins primarily due to the high level of demand – and they are quality-driven markets where engine reliability takes precedence over price.

And while downturns in some segments of the industrial market have been offset by increases in others, experts say it's critical to find your niche and maximize your efforts at profitability.

Massive engine blocks up to V20 locomotive configurations and large cylinder heads in many shapes and sizes – from 24-valve single-casting cylinder heads to huge, single-cylinder heads used in natural gas, mining and marine workboat engines – mean today's "diesel" engine builder may serve a niche common in name only.

There are huge changes taking place in the heavy-duty engine business – with the right personnel, the right training and the right equipment, you can keep freight moving around your community and across the country.

Rottler's heavy-duty machines employ an array of fixtures and features to help maximize the productivity capabilities of the machine. "Walk-away" technology means an operator can set the machine to automatically complete its job while he is free to do other work.

First-World Service

Metric Automotive Engineering, Johannesburg, South Africa

Ask the typical engine builder in the United States what his biggest business challenge is and you might hear complaints such as internet parts sales, competition from OEMs and an inability to find enthusiastic employees. Ask Andrew Yorke about his headaches and things sound a bit different

"Things that all my fellow engineers take for granted in the States - such as dependable electricity or a guaranteed water supply, aren't really guaranteed," says the leader of Metric Automotive Engineering in Johannesburg, South Africa. "You just accept when you open your shop on Monday morning those are things that may or may not be present – it can be tough to provide what we'd like to think is a first-world service in a third-world environment."

For more than 45 years, Metric has navigated these challenges, in sub-Saharan Africa. Customers – who hail from the entire continent – are predominately heavy-duty diesel in nature.

Yorke says it's not unusual to have Cummins, Caterpillar, MTU, Komatsu, Volvo and Iveco as well as any other brand of diesel engine in the shop at the same time. "The OEMs don't have the volume to justify supporting a proper machine shop, so they send us their business."

To meet the demands of its diesel OEM customers, Metric Automotive Engineering uses seven heavy-duty Rottler block machines, as well as multiple other new and "veteran" machines.

"No matter where it is around the world or what they're working on, in the good shops you'll always find the same equipment. And the Rottler brand will be there," Yorke says. "If you want to do the job right you need to have the right tools."

The decision making process on repairing these big expensive engines is often a very slow and tedious one, Yorke says. So although Metric has the technical skill to turn something around very quickly, decisions made by the end user as to whether they'll actually repair the engine or how they'll pay for it is where the delay is.

"Rottler really is the global leader in the machines for our industry," believes Yorke. "We know we can count on them. Plus, they have the capability to log into our machines remotely and do software upgrades and change parameters if they need to. With a nine-hour time difference, updates can happen overnight. They can just leave a Skype message to tell us what they've done. Without that we'd be in deep trouble."

EM100H Series
Multi-Purpose CNC Machining Centers

In both size of the engines and scope of the market, “heavy-duty” has taken on a new and much more important role on the world’s stage. Rottler’s commitment to this arena has earned a reputation among OEM remanufacturers and large engine rebuilders worldwide. Our rugged equipment and unmatched versatility make Rottler the number one choice for this kind of engine work.

Rottler’s Programmable Automatic Control makes these machines fast and accurate. The machines work like advanced CNC machining centers but Rottler’s conversational programming technology makes them very easy to operate. No programming knowledge is required and operators are trained by factory technicians in just a few days to run these machines at full speed.

Many unique jobs such as large connecting rods, gear housings and other often overlooked jobs can be performed with this versatile equipment.

All EM100H Series Machines come with

- CNC (Computer Numerical Control) using Windows Operating System and Industrial PC with Intel Processor.
- 15″ (400mm) Computerized Touch Screen.
- Spindle Rotation by AC Servo Motor – Infinitely Variable 0-5000RPM – 10HP (7.5kW)
- 3-Axis movement by Precision Ball Screws & AC Servo Motors – Infinitely Variable
- Precision Position Display in .0001″ (.002mm) Resolution.
- Electronic Handwheel for manual movement – per click: Coarse Mode .01″(.25mm) Medium Mode .001″ (.01mm) Fine Mode .0001″(.002mm)
- Infinitely Variable Feed rates adjustable by handwheel during automatic cycles
- High Performance Spindle Rotation AC Brushless Servo Motor and Drive System
- Hard-Chromed Precision Spindle with High Speed Angular Contact Bearings
- Automatic Workhead Tilt System for Back Clearance during Surfacing
- Air-Assisted Quick Change Cutterhead Draw Bar System
- One-Piece Heat Treated Meehanite Cast Iron Machine Castings
- Air-Pressurized Column for Less Friction and Accurate Positioning
- Turcite-Coated Slideways for Low Friction and Extended Life
- Dual LED work lights offer shadowless illumination of work area and cutting tool
- Automatic Central Lubrication System monitored by controller
- Chip Guard with Adjustable Pivot Arm
- Optional full chip enclosure available for increased safety and to keep work area clean

EM103H

Automatic CNC Travel (X, Y, Z axis):
80˝ x 16˝ x 29˝
(2032 mm x 406 mm x 736 mm)

The EM103H is designed for machining smaller engine blocks used in “On Highway” applications such as trucks and buses. At the same time, it is a large machine capable of machining mid-range size blocks up to the size of a CAT 3508 and 3412, Komatsu 170 V12, MTU 2000 V16, Cummins K38, Detroit 60, Mercedes 400 V12, etc.

EM104H

Automatic CNC Travel (X, Y, Z axis):
108˝ x 16˝ x 29˝
(2743 mm x 406 mm x 736 mm)

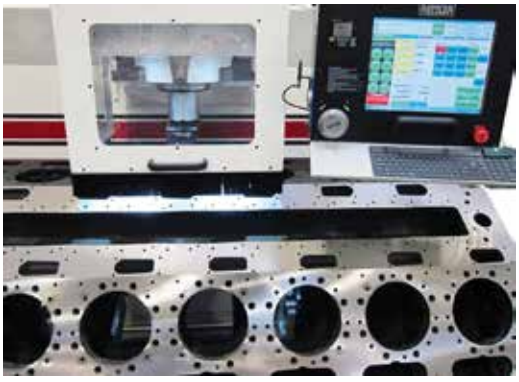
The EM104H is designed for machining large engines used in the earthmoving, mining, oil and gas, power generation and marine work boat industries up to the size of the CAT 3516 and 399, Cummins QSK 78, MTU 4000 V16, Waukesha 7042, etc.

EM105H

Automatic CNC Travel (X, Y, Z axis):
132˝ x 16˝ x 29˝
(3353 mm x 406 mm x 736 mm)

The massive EM105H is designed for machining large engines used in the earthmoving, mining, oil and gas, power generation and marine work boat industries up to the size of V20 engines blocks such as the CAT3520 and C175 V20, MTU 4000 V20, Cummins QSK78, Waukesha 9390, etc.

Touch Screen Programming



Rottler’s EM100H Series machining centers use Windows OS and Touch Screen Technology through a 19˝ touch panel. This technology is familiar and intuitive to users with nearly any level of experience and the conversational programming system makes them very easy to operate.

The Touch Screen Controls are located on a flexible adjustable pendant arm for ease of operation from front or rear of the machine, centralizing the machine controls. Only the buttons and interactive menus required for a particular machine operation are displayed. Machine operations can easily be done manually or automatically, with the ability to store programs in memory. Digital readout allows the operator to accurately monitor position at all times. Control operates in metric and inch systems.

Skype and a webcam are preinstalled for video conferencing and interactive internet-based support. This feature allows instant, direct communication with Rottler technicians who can see exactly what you are seeing and can even take control of your machine in order to iprovide training or install software updates.

Software options make it easy to generate Programmable & Automated Cycles such as Boring, Surfacing, Lower Sleeve Offset Boring, Water Hole Repairs, Main & Cam Line Boring and General CNC Machine Work on even the largest diesel blocks.

EM107H and EM109H
Multi-Purpose CNC Machining Centers

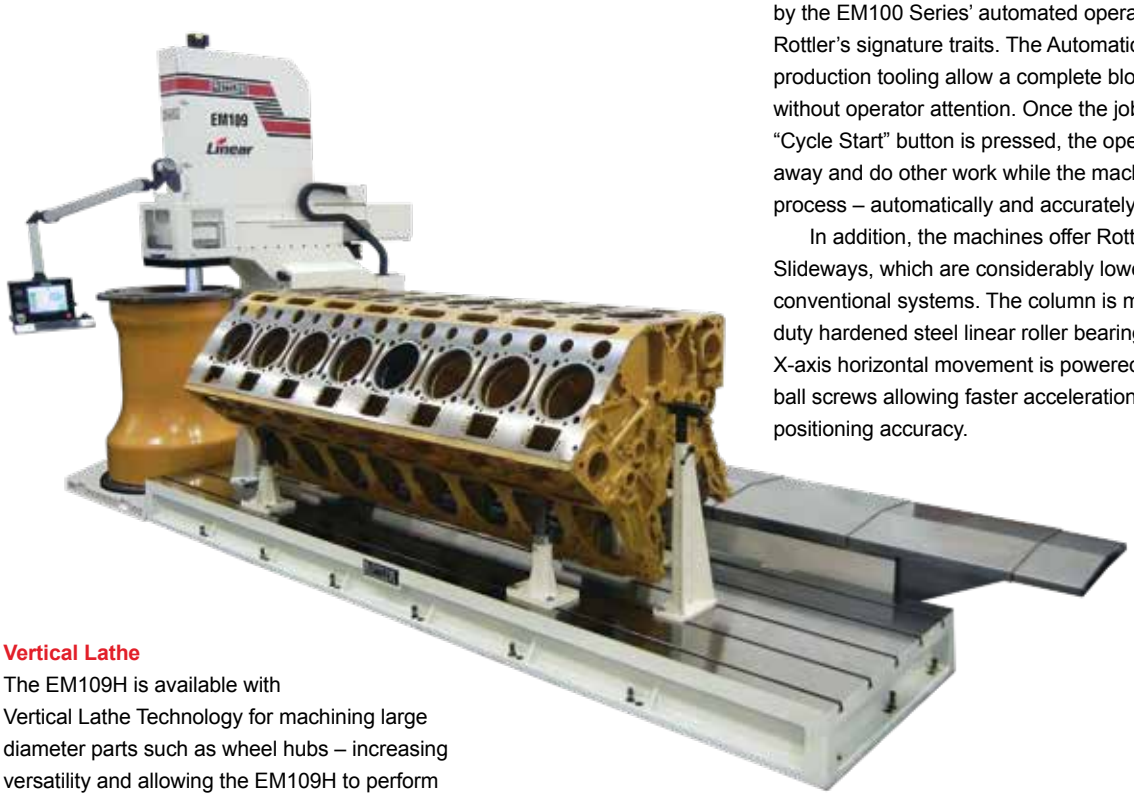
Extra large engine blocks weigh in excess of 20,000 lbs. (10,000 kg), so Rottler had to invent a completely new concept in machine tool design. The EM100 Series machines are all capable of performing jobs on diesel engines, but the EM107H and EM109H machines are manufactured specifically to handle the world's biggest and heaviest engine blocks. Rottler's flagship machines, these massive engineering marvels are designed to quickly, easily, accurately and affordably eliminate the costly downtime that is the result of big engine failures.

Functioning as advanced CNC machining centers, Rottler's Conversational Programming Technology makes these gigantic machines as easy to operate as a smartphone. No programming knowledge is required and operators can be trained by factory technicians in just a few days to maximize machine capability at full speed.

The "H" represents the machines' new spindle design – German-engineered, the HSK spindle is seen more often in modern machine tools and represents a dramatic improvement over conventional spindle tapers. Conventional spindle tapers found in most machine tools for the last few decades have used a simple taper to hold the tool, typically a CAT40 or CAT50. This design holds the tool ONLY on a taper inside the spindle but HSK design contacts the tool and the spindle by flat and taper, increasing the rigidity and performance of the metal-cutting ability of the machine. The EM107H and EM109H both use a HSK80 size taper. In addition, the HSK spindle maximizes the effectiveness and performance of Rottler's Automatic Tool Changer (ATC) system, increasing productivity and allowing the operator to perform other functions including running additional machines at the same time.

Rottler's technological expertise is further showcased by the EM100 Series' automated operating system, one of Rottler's signature traits. The Automatic Cycle software and production tooling allow a complete block to be machined without operator attention. Once the job is set up and the "Cycle Start" button is pressed, the operator is free to walk away and do other work while the machine completes its process – automatically and accurately.

In addition, the machines offer Rottler's Linear Slideways, which are considerably lower in friction than conventional systems. The column is mounted on heavy-duty hardened steel linear roller bearing slideways and the X-axis horizontal movement is powered by Direct Drive ball screws allowing faster acceleration and improved positioning accuracy.



Vertical Lathe

The EM109H is available with Vertical Lathe Technology for machining large diameter parts such as wheel hubs – increasing versatility and allowing the EM109H to perform as a complete multi-purpose machining center.

Linear
ROLLER BEARING SLIDEWAY

EM107H

True Multi-Purpose Capability

The EM107H has been designed with specific applications in mind. Many large blocks such as CAT 3500 and C175, Cummins QSK60 & 78 and MTU 4000 that are remanufactured these days are a V block design. Rottler has designed the EM107H and special fixtures to be able to roll these blocks automatically!

Once the block has been set up in the fixture, the EM107H is able to index and roll the blocks to programmed angles so that many parts of the block can be machined without operators having to reset the blocks. Combined with an automatic tool changer, the EM107H is able to also complete many different machining operations such as water corrosion repairs in one automatic programmed cycle.

The size of the fixed worktable and traveling column design allows massive blocks/frames to be set up as well as multi work stations for set up of a variety of different parts or fixtures at one time. The extra long travel of the column allows a vertical lathe to be installed at one end of the machine so that large-diameter parts such as wheel hubs and spindles can be turned increasing the versatility and redefining the phrase MULTI-PURPOSE.

The Rottler EM107H has been designed and developed to incorporate special fixtures such as 4th axis to allow large blocks such as CAT C175-20 to be rolled and indexed during machining. Combined with Rottler's automatic tool changer, many operations can be completed automatically – unattended – giving savings of 50-75% time and cost.

EM109H

Developed to machine the industry's largest blocks

The EM109H is a massive machine manufactured to handle the very large and heavy engine blocks found in locomotives, marine workboats, power generation and natural gas pumping engines such as the CAT 3600, MTU 1163 and 8000, EMD and GE Locomotive. These engines have been in service for decades and require updating and modifications for improved emissions and the EM109H is fully capable of doing this kind of machine work.

The size of the fixed worktable and traveling column design allows massive blocks and frames to be set up for a variety of different parts or fixtures at one time. The extra long travel of the column allows a vertical lathe to be installed at one end of the machine so that large diameter cylindrical parts such as wheel hubs can be turned, increasing the versatility of the machine and the engine rebuilding operation.

Connecting Rod Machining
Commitment to Automated Simplicity

To remain in service under even the most demanding of conditions, heavy-duty connecting rods require precision machining. Because the combustion process in a diesel engine is controlled by compression, incorrect or unequal length rods will drastically affect the performance of the engine. With conventional rod reconditioning equipment, the two ends are normally done in two steps on different machines. This increases the risk of non-parallel bores and incorrect center-to-center distances.

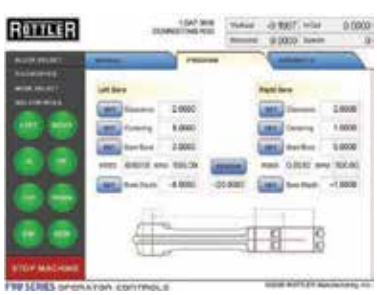
Rottler's patented connecting rod fixture allows these large conrods to be surfaced and bored on the Rottler EM100 series machines. The Rottler boring fixtures allow both big end and small end to be bored in one setup resulting in perfect parallelism between big end and small end. All the rods in a set can be accurately bored for equal center-to-center distance, a must for today's high-compression diesel engines.

- Automatic alignment system allows quick setup with reference to the center of both ends. After clamping, the centering devices move out of the way for boring work.
- Both the big and small ends can be bored floor-to-floor in under 5 minutes.
- Center-to-center distance can be easily controlled for the exact same distance for each rod in a set. When used with the EM100 series machines, these distances can be programmed into the machines' control memory.
- Heavy-duty fixtures for facing and boring large connecting rods found in natural gas compressors and marine workboat engines.

Hone Conrod Big Ends with the Rottler H80 series CNC diamond honing machines.

Fractured/snapped connecting rods have added a new challenge to rebuilders. Many of these conrods can be rebuilt by honing the big end and boring a new semi finished small end bronze bushing. Rottler offers special tooling and fixturing to be able to hone conrod big ends.

Connecting rods that have serrations at their joining surfaces require special cutters and software to remachine the serrations to ensure that they are perfectly straight and equally spaced. Rottler has been manufacturing right angle drive equipment for line boring for over 20 years and has used this technology to design a right angle drive to cut serrations. Rottler has developed a special fixture that aligns and locates each rod and cap for machining. After clamping, the locating device is removed and the software program machines the serrations automatically.



Special heavy duty fixtures available for boring very large, heavy connecting rods found in natural gas compressors and workboat marine engines are available.

Cylinder Sleeves and Liners
Overlooked Opportunity

Honing engine blocks is typically thought of as a tedious “manual” operation, whether it’s a high performance gas engine, medium- or heavy-duty diesel or natural gas engine. With Rottler’s “walk away” honing and the latest H87AXY CNC automatic vertical stroke honing machines, automatic efficiency allows operators to be more productive, accurate and profitable.

In many modern engines the surface finish of the cylinder liner or sleeve is critical for reliable compression sealing and oil consumption control. Large engines have wet liners, which are normally replaced with new liners when engines are rebuilt – but with Rottler’s technology many liners can be remanufactured to be as good as new, saving cost and the environment.

Surprisingly, a visit to any large engine rebuilder may reveal lots of liners in the dumpster – many of them still look pretty good! Rottler has developed the new H80 Series of CNC Vertical Honing Machines to be able to hone very large liners and sleeves to as good as new condition. Special fixtures securely hold these liners and large diameter honing heads, stone holders and diamond and CBN super abrasive honing stones allow these liners to be honed – easily and fast. Some large engine rebuilders are reporting recycling up to 70% of liners that they previously replaced with new liners.

H87AXY

The H85AXY is a large capacity vertical stroke machine capable of honing large liners found in stationary and marine engines such as CAT3600 and Wartsila 32/34 engines.

- Special Heavy-Duty Version High-Production Machine that can move automatically in both X and Y axis for automatic honing offset cylinder blocks.
- Automatic Lower Crash Protection System – every time cycle start is activated, the machine will check that the stones will not interfere with lower bore before starting rotation and stroking preventing stone and stone holder damage.
- Spindle Taper with Quick Change System – change hone heads in seconds without any wrenches.
- Automatic Honing Stone retract at End of Cycle – the machine will automatically retract the stones during last stroke so that the stones do not leave any scratches or marks in the bore.
- Automatic Cross Hatch Angle System – the machine will automatically adjust parameters to programmed cross hatch angle and finish the bore to programmed angle.
- Automatic Roughing and Finishing Load Sensing System – machine controls load/pressure that the honing stones exert against the cylinder wall and reduces load during finishing cycle.
- Automatic Short Stroke and Dwell – machine detects tight area and short stroke or dwells.
- Automatic Stone Feed-Out System – once hone head is positioned in the bore, the machine automatically expands stones and rotates slowly before starting hone cycle.
- Automatic Plateau Finish Program – the machine automatically expands plateau stones/brushes to programmed load and counts down number of plateau strokes, then withdraws the stones/brushes and retracts the hone head to the clearance position.

Since 1923, Rottler Manufacturing has had a solitary mission – to develop the highest quality engine machining equipment for the performance race engine builder, medium duty diesel jobber shop, production gas engine remanufacturer or heavy duty diesel engine repair facility. An unwavering commitment to excellence continues to result in advanced designs and equipment designed to meet the most demanding engineering needs of the most successful engine builders.

Rottler's "Cutting Edge" can be seen in a complete range of machines specifically designed to meet the unique challenges of today's engine builders. Engines that move the world are machined with Rottler.

SG7MTS Small Cylinder Head Valve Seat & Guide Machine

SG8MTS Cylinder Head Valve Seat & Guide Machine

SG9MTS High Performance Cylinder Head Seat & Guide Machine utilizing UNIPILOT Tooling

SG10XY Guide-to-Guide Cylinder Head Seat & Guide Machine

SG100XY Heavy Duty CNC Guide-to-Guide Cylinder Head Seat & Guide Machine

EM69P
5 Axis CNC Multi Purpose Machining center with Automatic Tool Changer

HP85A
CNC Honing Machine

H87AXY
Heavy Duty CNC Honing Machine

H85AXY
CNC Hole-to-Hole Honing Machine

EM109H
Multi Purpose CNC Machining Center for Medium to Very Large Blocks

EM69ATC
3 & 4 Axis CNC Multi Purpose Machining Center with Automatic Tool Changer

VR12 Centerless Valve Refacing Machine

VR10 Valve Refacing Machine

F10X Programmable CNC Cylinder Boring and Resleeving Machine

S85A Small CNC Cylinder Head, Block and Manifold Surfacing Machine

EM79
Multi Purpose CNC Machining Center for Small to Medium Blocks & Heads & Conrods

EM105H Multi Purpose CNC Machining Center for Medium to Large Blocks

F69A Multi Purpose CNC Machining Center for Small to Medium Engine Blocks and Conrods

S86A Large CNC Cylinder Head, Block and Manifold Surfacing Machine

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