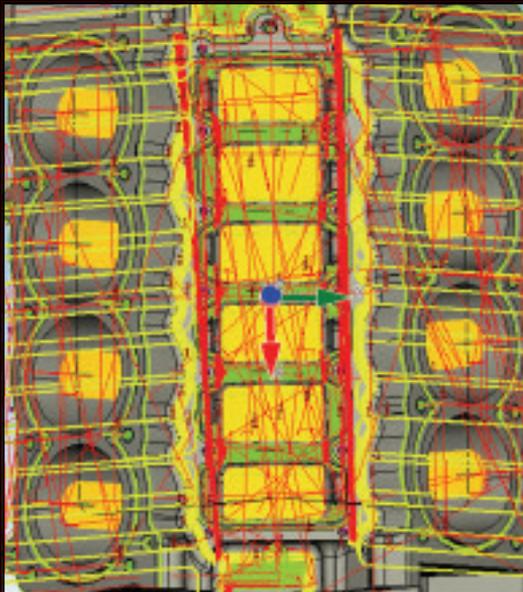


ROTTLER

THE CUTTING EDGE
SINCE 1923



Making Dreams Reality Since 1923

In 1923, when Seattle machinist Clarence Rottler developed his first portable boring bar, he solved a problem that others were content to struggle with. And his innovation then was mere foreshadowing - as the industry would advance, Rottler would be right there alongside - often leading the way.

For more than 95 years the Rottler name has been synonymous with leading edge technology. From unpowered portable boring bars to completely automated computer-controlled machines, unmatched research and attention to the needs of the engine rebuilding market has allowed the Rottler family to refine - and redefine - the standard in rebuilding equipment.

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.

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 surfaces on the engine block needed attention as well, and cutting edge surfacing equipment was developed.

Customer Service

As engine designs have changed, Rottler's equipment has met new machining standards - because Rottler SETS 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 is an integral part of Rottler's corporate legacy. When Rottler engineers go to work on new designs and development, customer satisfaction is a critical component. **"We understand that our customers need to start making money with their equipment as soon as possible - otherwise, even the most high-tech machine is just wasting valuable floor space,"** explains Anthony Usher, vice president, sales and marketing director of Rottler Manufacturing. **"Our engine building equipment - from the most advanced to the easiest-to-operate machines, are designed to be versatile - and valuable - business-building tools."**

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 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.

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.

Andy Rottler - 'Customer Confidence is Corporate Credo'

Recognizing that nearly a century of innovation is a strong beginning, Andy Rottler believes that the future continues to be bright for both the company his grandfather founded and the industry he loves. To push on into the future, Rottler has assembled a team of professionals who are dedicated to making Rottler the name to remember for machining needs of every level.

With unmatched attention to the needs of gasoline and diesel engine machinists, Andy has overseen the

Kent, Washington-based manufacturer through impressive growth.

"Our connection to our customer is a key part of our corporate strategy," says Rottler. "When Rottler engineers go to work on new designs and machine advancement, customer satisfaction is a prime consideration for everything we do. Our mission is to make a machine that will meet that customer's immediate and long-term needs without modifications and without the need for unreasonable training and experience."

Customers should feel confident in their purchase of Rottler equipment because they're not just buying

a machine, says the third-generation president. "They're investing in a relationship with us. Together, we will continue to improve profitability for today's - and tomorrow's - machine shop," Rottler affirms.



Anthony Usher - 'The Future Is Accessible With Rottler'

With the creativity of a marketer, the analytical prowess of an engineer and the precision of an engine builder, Anthony Usher is in a unique position to understand what's important to today's machine shop industry.

"We have built relationships with engine builders and machinists at every level," Usher says. "From small custom engine builders working on niche restorations to some of the most advanced production engine remanufacturers reinventing OE technology; from race teams winning championships at the most elite levels to heavy duty facilities keeping trucks, trains and equipment working in the harshest environments imaginable, Rottler is the name preferred by professionals."

Usher understands the importance of history - he knows that Rottler's innovations have been game changers for nearly a century. Just as crucial is the recognition that innovation continues. "Our new concept – UNIVERSATILITY – says everything about where we want to position our company for success in the future," Usher says. "Rottler machines offer UNIVERSAL functionality and unmatched VERSATILITY to users when working on any component in their shops."

Rottler engineers build in the unprecedented flexibility that other machines either charge more for or just don't offer, meaning that Rottler machines give owners the power they need to service existing customers,

adapt to future demands for parts and products and even grow into non-traditional markets as their business changes.



"This flexibility gives engine builders the chance to adapt many of our machines to work that is not engine related," Usher says. "Customers who start their businesses with a Rottler machine can easily expand their services by manufacturing parts with Rottler equipment as their businesses grow.

"Our commitment to our customers' dreams is what sets Rottler apart in the industry."

Customer feedback ranges from machine ergonomics (how does it FEEL) to the computer interface (how does it WORK) and everything in between. Future designs may incorporate those requests.

Today's technology allows Rottler to talk to people across the world in real time. When they buy a CNC 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. Rottler engineers are able to work with customers simultaneously to fix their problem – if necessary, taking over the computer for diagnostic or instructional purposes.

"We want our customers – no matter how long they've been in the business – to be able to run the machine, do the engine work on it and make the money. You can't make money if you're struggling to learn the machine," says Usher. "We are passionate that automation reduces customers' machining steps and stress, allowing jobs to be completed in less time, increasing productivity and profitability."

Rottler equipment is engineered in Seattle, built in the USA and designed for the world.

High tech has meant different things over the years and today, of course, computer technology continues to advance at an astonishing pace. And Rottler continues to lead by example.

At Rottler, we understand our customers. Our machines were once dreams that we took to reality.

- **A hone with automatic hole-to-hole machining capabilities for the most demanding championship racing needs.**
- **A multi-axis machine that turns billet aluminum into bulletproof engines and eliminates programming problems.**
- **A fully capable CNC machine able to handle the largest cylinder heads and engine blocks.**

We are constantly envisioning our next step - because we understand that our customers continue to dream.

Next Generation CNC Machining Centers

Rottler's innovative EM Series CNC Machining Centers have been specifically designed to be the most technically advanced industry-specific systems available. 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 newest EM Series equipment is designed for maximum ease of use and efficiency thanks to our advanced 4C Machining Software. This advanced software lets users know they are machining with the most state-of-the-science equipment available.

Seamlessly integrating 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.

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.



EM69HP

Offering high power, high precision and high performance, the EM69HP offers impressive versatility. When maximum cutting power and speed are required for machining large billets and castings, the EM69HP spindle motor offers 43HP 32kW up to 20,000 rpm.

Powerful programming on the machine

All 4 manufacturing stages are done on the machine, with no outside software.





Both EM69P and EM69HP are versatile CNC machining centers capable of a wide variety of work from cylinder head digitizing and porting to engine block boring/sleeve, surfacing and line boring, crankshaft modifications to design and manufacture of parts from billet or casting.



EM69P

Rottler's Next Generation 5-Axis CNC Multi-Purpose Machining Center offers the precision and speed needed to reproduce cylinder heads with exceptional accuracy – with no handwork needed. The EM69P also has the capability of porting intake manifolds with the same techniques used to port cylinder heads while also performing engine block jobs such as boring and sleeving, surfacing, lifter bores, main and camshaft line boring, lightening and additional work such as parts machining.

One of the main features is the EM series' massive 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. Rottler's 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.

Can't find the parts you need for that one-off project? Make them yourself! More and more customers, after researching the real-world adequacy and challenges found in top-of-the-line industrial CNC machines, recognize the value and benefits of the parts machining capabilities built into Rottler's equipment. Many of the EM Series machines can easily be programmed to custom-create the parts you need when you need them.

Customers say it is the most user-friendly software they have ever operated, because it allows even novices to be productive right away. Thanks to the speed and efficiency of 4C software, some machinists report being able to produce parts and port cylinder heads four- to five-times faster than with other systems.

The software is only part of the secret to the EM Series' attractiveness. These machines are designed to be up to the task of creating whatever our customers can dream up.

A lot of research and development has been put into sourcing and engineering the new high output spindle motors in the EM machines. CNC machine spindle motor power and torque is commonly given in two different ways – continuous and peak.

Continuous power and torque rating refers to the maximum cutting load that a spindle can sustain running non-stop, 24 hours per day without overheating. Advanced technology spindle motors are able for a limited time period to deliver substantially more power and torque before overheating.

Peak power and torque rating can be significantly higher compared to continuous rating but the limiting factor is heat. It is common when CNC machining that spindle motors are not running continuously (for example when changing tools). The depth of cut and feed rates will also determine to amount of heat that the spindle motor has to overcome. The integral spindle motors on the EM 5 axis models are liquid cooled and the liquid's temperature is accurately controlled by special AC chiller unit allowing peak operation for longer periods of time.

CNC offers the real, tangible benefits of accuracy and repeatability, meaning every rebuilding machining operation will be precise and exact. But Rottler's EM Series machines and the unprecedented 4C software not only ensure that block and head machining operations are on the money but give you the ability to create a whole new reality.

From Imagination to Reality

JFC Racing, Auburn, Washington, USA

JFC Racing, Auburn, Washington, understands that the racing experience starts with a passion for cars and that trust and confidence are required to get the best performance on the track – they work with teams and individuals to ensure that the details and logistics are finalized before the car even rolls off the grid.

This passion and commitment to detail is also evident in the JFC Racing production facility, as the move from imagination to reality is clearly seen.

JFC Racing designs billet race engines and manufactures them on a 4C powered Rottler machining center. "When we started production of our JFC-V8, we also started our relationship with Rottler Mfg.," says Brian Roberts, Director of Operations, JFC Racing, "We needed a CNC Machining Center that could handle the task of making a complete engine block. The capabilities of the

machine and the intuitive software have made life easier for our engineers."

After importing a 3D STEP file into the machine the CNC work is performed. Roberts says the software functionality and machine simplicity gives full control over manufacturing details compared to contracting an outside production facility.

"Design and manufacturing has become one of our easier assignments," says Roberts. "The software and user-friendly interface is an environment that most can relate to and not be intimidated by its functions. With the Rottler CNC machine, the opportunities are endless.

"We imagined our JFC-V8 powering a LMP2 car, now it is a reality."

- Brian Roberts, Director of Operations, Auburn, Washington

EM69ATC**ADVANCED SPINDLE POWER**

The EM69ATC 3 and 4-axis CNC Machining Center is powerful, versatile and great for machining engine blocks and making custom parts with a 24-tool Automatic Tool Changer.

**What are customers making in their shops?**

- Custom tools and fittings
- Carburetor spacers
- Suspension components
- Connecting rods
- Bushings
- Custom intake and exhaust manifolds
- Non-standard blocks and cylinder heads
- Industrial components

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.

So Advanced, It's Simple

For 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.

Rottler has always pushed the boundaries with electronics to provide programming (memory) and ease of operation. We pioneered automation for engine builders and today offer machines that are easy to learn, easy to run, reduce labor cost and save time.

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 – R&D is focused 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.

Thanks to continued 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.

Rottler automation means operators are freed from the restraints that typical manual machines put on them. The machines handle the repetitive tasks, allowing skilled professionals to do other jobs in the shop, reducing manpower costs, improving morale, increasing productivity and quality and maximizing profitability.



Benefits to Automation

REDUCED COST

Automated machining equipment reduces material waste and increases productivity. You can vastly increase the quality of your production, have more products finished immediately to the standard required by your customers, and reduce the amount of breakages and waste produced as a result of poor-quality or inconsistent finishing. With products being produced to such a high level each time, you will gain greater yields. In addition, by moving products faster through production, shops can better predict the production rate and ensure a fast and efficient service is delivered.

IMPROVED PRODUCT QUALITY AND CONSISTENCY

Automated machining equipment can produce a consistently high-quality finish and accuracy. Machines can be left running overnight and during weekends with little supervision, so you can increase your output levels and meet your clients' order deadlines. Rottler machines will not need time away from production for breaks, sickness, distractions or lapses of concentration and can be programmed to handle new products off-line, ensuring new products are introduced for faster production.

Automated equipment offers unprecedented production flexibility. Once your processes have been programmed (with Rottler's ergonomic touch screen positioned on the front of the machine it's an easy process), you can easily switch from one to another and maximize your investment by using automated equipment for a variety of products.

IMPROVED EMPLOYEE SATISFACTION

Finding qualified, motivated machine operators is one of the industry's biggest challenges. With Rottler automation, machines are ready to begin work with none of the costs associated with recruitment or ongoing training of people. Machines can offer greater flexibility, both in terms of work patterns and the ability to handle different production tasks, don't complain about working in dusty, hot or hazardous environments and won't suffer from tiredness, distraction or the effects of repetitive and tedious tasks.

Automation can help your best employees be even more motivated and productive. By teaching them how to use Rottler equipment they can easily earn valuable programming skills and do work that makes money, not just take up time.

The SG10X, H85X, S80X 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.



SG10XY

The Rottler SG10XY ACTIV spindle is mounted on a sphere which allows the UNIPLOT to automatically center with the valve guide centerline while the Workhead is floating on air cushions. Once air floating stops and the Workhead clamps, the UNIPLOT and valve guide centerline are maintained while cutting the valve seat.

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 EM69 was the first one sold 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 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 UNIPLOT 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."

– Matt Adams, Owner, Alberta, British Columbia, Canada

Xcelerate Series

H85AX

Automatic Vertical Honing Machine with Hole-to-Hole Automation

The H85X hones a complete line of cylinders – automatically! Hone a complete V block unattended with optional auto-rotate V fixture. Automatic lower crash protection safeguards stones and holders from unexpected – and expensive – damage, keeping jobs on time and on budget. The automatic load control gives perfectly round and straight cylinders; and automatic CNC control finishes every cylinder to the same size. Because the H85X accepts both diamond and CBN abrasives, shops get 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.

Calculating Return on Investment

Rudd Racing Engines, Ardmore, Oklahoma, USA

To an accountant, figuring out Return on Investment (ROI) is simple – divide the benefit you receive from an investment by its cost. In the machine shop that means a case of determining how much you make versus how much it cost.

For race engine builder Michael Rudd, the ROI calculation in multiple ways – dollars made and time saved.

“We opened this shop six years ago with an F69A, an H85AX hone, an SG10X seat and guide machine and a VR9 valve refacer,” Rudd says. “Prior to that, I had been working at another shop with older, manual equipment. Everything was done by hand and, to be fair, they DID get the job done, but it took all day to do one operation, compared to the Rottler equipment.”

Rudd says his F69A lets him bore, deck and probe all of his block locations in about 20 minutes – he then transfers the block to the H85AX hone, which requires about another 15 minutes of service. “Operations like that would have taken two days at my previous shop,” Rudd says. “Here, they take around an hour.”

The machines are so easy to operate and do the jobs so fast, he says, he actually had to hang out the “Help Wanted” sign. to keep

up. “I thought the automated aspect of the machines meant I could do everything myself,” he says. “But I found I got so much work from being able to do the jobs so fast that I couldn’t really keep the machines busy enough.”

Rudd praises his Rottler equipment for increasing his productivity and his Rottler sales representative for the customer service. Because I started as a one-man show, the expert help was very important.” Rottler’s ease of use and speed of operation were 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 know guys who are experienced with other systems and they all say it’s so much simpler than G-code.”

Rudd points to the bottom line: “When you have machines that do the work themselves, you don’t need to hire 15 people – you can be extremely efficient with two or three machines being run by one person. The time these machines save us and the ability to run multiple machines at one time are true advantages for our shop.”

- Michael Rudd, Owner, Ardmore, Oklahoma



S80X

CNC Automatic Surfacer

Quick-clamp cylinder head on the fixture table, level with two handles and dual axis level then press cycle start - the S80X will scan the head gasket fire deck with a laser probe, automatically measuring the surface and length of the head and automatically surfacing the head without any additional involvement by the operator.

When ‘Good as New’ Isn’t Good Enough

OE engines are vastly superior in power and performance than their predecessors but as many drivers find out, they’re not always flawless. Thankfully production engine remanufacturers are able to reinvent OE technology, solving problems inherent in automotive and truck manufacturing processes. Production Engine Remanufacturers are an intrepid bunch – they look at what has been produced and envision ways to make it better. Some of the best engines in the history of the transportation industry have only gotten more popular once PERs started making them better than new.

Today’s Production Engine Remanufacturers (PERs) continually reinvent OE technology, producing engines that can finally be everything they were intended to be – and more.

The need for precision, repeatability, speed and efficiency in the remanufacturing process is satisfied every day thanks to Rottler’s robust lineup of equipment. For production shops remanufacturing small- to medium-size gasoline and diesel engines, Rottler offers automatic machines that are easy to learn and fast to operate, so any block can be machined quickly and accurately. Maximizing production line processes is now easier than ever, and PERs can move out of the manual machine age and into the computer age. Thanks to features such as Rottler’s Windows Touch Screen Control Panel and Conversational Programming that eliminates the need to speak a computer language, workers on any production shift can quickly master machine operation.

What is Remanufacturing?

Simply put, remanufacturing is the process of returning a used product to at least its original performance with a warranty that is equivalent to or better than that of the newly manufactured product. In the engine remanufacturing business this often means identifying common failure points, reverse engineering those design defects and developing production processes to put the engine back into service – at a price and delivery pace that is attractive to the end user.

To a customer, the remanufactured engine can be considered the same as a new product, providing a more attractively priced alternative to the original. In the case of engines, the price difference between a new and a reman engine can be substantial (with reman costs typically 20% – 30% lower than new).

Today’s PERs utilize manufacturing processes that aren’t materially different from any top-tier facility – because that’s what they are. And they depend on Rottler’s technological expertise to keep the production lines in operation.



Original equipment manufacturers depend on PERs to meet their supply needs – and PERs depend on Rottler to maximize productivity.



Designed to Meet Production Needs of All Levels

EM69ATC

The EM69ATC CNC Machining Center 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 3- and 4-axis CNC machining center is versatile and great for machining engine blocks and creating custom parts.

H85AXY

The H85AXY CNC Vertical Honing Machine includes automated features that help to increase productivity while maintaining a competitive, affordable price. Automatic hole-to-hole software and optional auto rotate fixture allows the H85AXY unit to hone a complete V block unattended. Likewise, two opposed engine blocks such as Subaru can be honed at once. The fixture automatically rotates the blocks so coolant drains out, ready for unloading and loading the next block.



F10X

Designed for small- to large-capacity machine work, this heavy duty cylinder boring machine is capable of servicing large diesel blocks such as Cummins 855, Detroit 12V71, Mercedes 444V12, small jobs down to 1.5" (38mm) bore diameter with optional cutterheads. and odd jobs such as gear cases and connecting rods. This special version CNC machine offers automatic hole-to-hole unattended boring, Windows-based control and simple, intuitive software through a 15" touch screen, making programming and automatic control for cycles such as boring, sleeving, counterboring and blind-hole machining simple and repeatable.

SG10XY

When it comes to cylinder heads cycling through a production facility, the centerlines of all the valve guides are rarely in perfect alignment. The SG10XY Cylinder Head Seat and Guide machine handles the technical challenge of getting the centralizing pilot into the valve guide automatically. With valve guides getting smaller and smaller, and 6mm or .250" guides being common, Rottler's ACTIV Spindle allows each head casting to be precisely located every time so the pilot can enter the valve guide without missing its mark.



S80X

The S80X Automatic CNC Surfacing Machine is the most advanced surfacing machine available today and gives today's PER the surfacing accuracy and flexibility to adapt to whatever comes down the line. Quick clamp cylinder head on the fixture table, level with two handles and dual axis level then press cycle start - the S80X will scan the head gasket fire deck with a laser probe - automatically measures the surface and length of the head and automatically surfaces the head without any additional involvement by the operator.

Building the Best, Using the Best 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 pays 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 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.

ACTIV Spindle

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.

The logo for CONCEN, featuring the word "CONCEN" in a bold, red, sans-serif font with a white outline. A stylized red and white graphic element resembling a valve or a mechanical part is positioned to the right of the text.

Lightweight Workhead Floats on Base Plate

The new TRIPLE FLOAT design SG 10/100 series machines utilize 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.

Valve Refacing

Proper valve refacing procedures have been the holy grail of machining for more than 100 years – today's engine builders and machinists know that Rottler equipment is designed to make that quest successful.

Rottler's VR12 features the versatile Centerless Grinding System, giving operators the ability to easily grind a set of valves to the exact same length without adjusting settings. The Centerless System uses precision drive rollers to rotate the valve stem on its own centerline, while a pneumatic low friction steady rest supports the valve stem. This design – similar to the most accurate balancing machines – provides unmatched concentricity, resulting in extremely accurate stem-to-seat runout less than .0002" (.005 mm).



ManualMatic Versatility

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

Rottler's exclusive MANUALMATIC Technology System and UniPilot tooling allow even the least computer-savvy employee to achieve levels of productivity and accuracy you may never expect. Designed for operators who are accustomed to standard manual equipment, Rottler's Touch Screen is easy to operate on Day One. Actual buttons and switches have been eliminated – manual controls are simply placed on the Touch Screen and operators push screen buttons that mirror manual operation. This saves time and effort, giving productivity increases of 30 to 50 percent almost immediately.

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.



SG9MTS

Featuring Rottler's versatile MANUALMATIC functionality, the SG9MTS offers dramatically increased productivity. The operator doesn't need to push any buttons yet is afforded the familiar control layout they know. Simply turn the spindle feed steering wheel up and down and the control takes care of all the functions like workhead float/clamp, pilot centering in the valve guide and spindle on/off.

SG100M

The all new SG100M has a MANUALMATIC Touch Screen control similar to previous MANUALMATIC models but now features the proven ACTIV spindle system mounted on triple air float centering system to improve CONCEN accuracy and allow the use of small diameter pilots for small diameter valve seats. Spindle down feed is operated by the steering hand wheel. The table of the machine is mounted on linear slideways to allow effortless IN/OUT adjustment in the Y direction.



SG100XY

Rottler's Focus on Large Cylinder Heads

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.



Maintaining A Legacy Isn't Enough Memorial Machine, Tulsa, Oklahoma, USA

Carrying on a 45-year family legacy requires determination, drive and the most versatile equipment available to do the biggest jobs right the first time. Rex Crumpton of Memorial Machine in Tulsa, OK, says maintaining isn't enough – he intends to grow the diesel and industrial engine rebuilding business to continue meeting customer expectations in the decades to come.

"We firmly believe that in order to survive we must continue to grow and evolve," Crumpton explains. His partnership with Rottler is evidence of that commitment – Memorial Machine installed the first SG80A seat and guide machine nearly 15 years ago and purchased the very first SG100XY heavy duty seat and guide machine in 2017.

What's his personal mantra and advice for the future? "Stay focused and work hard," he encourages. "Our industry still offers many opportunities to those that choose to be focused and stay on track."

- Rex B. Crumpton, VP/Operations Manager, Tulsa, Oklahoma



SG100XY

The SG100XY offers the maximum functionality for machine shops servicing diesel cylinder heads of all configurations. Spindle speed variation matches spindle RPM and controls acceleration and deceleration faster than humanly possible, giving unmatched CONCEN and sealing accuracy.



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.



Smooth Operators

Today, surface finish is more critical than ever, thanks to such industry advancements as MLS gaskets and bimetal engine construction. A surfer 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.

Today, the S80 Series Surfacing Machines is simple to operate thanks to innovative 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.

Design improvements make the S80 Series surfacing machines ideal for shops of nearly any size. The series combines cutting edge control technology with Rottler's proven Traveling Column design, Linear Motion construction and dry surfacing technology to create the worlds most versatile surfacing machines available today.

The traveling column design, proven for decades in Rottler engine block machining centers, reduces floor space requirements and improves accuracy of surface finish – the work head travels vertically on a separate column, extending the travel and eliminating the need for parallels while being able to surface a variety of jobs from small single cylinder heads to tall diesel blocks with quick changeover time.

Vertical and horizontal movements are by direct drive ball screws and on linear rolling bearing slideways, combined with infinitely variable speeds and feeds, giving precise motion control resulting in unmatched 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.



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.



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.

Fixturing Flexibility

Rottler's S80 Series Surfacing Equipment offers an array of fixtures that adapt to a variety of engine components.

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. 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.

V-Block Fixture

Rottler's V-block fixture has two modes of operation: one mode automatically aligns to the main bearing and pan rail; the adjustment mode allows the fixture to be aligned to the original deck surface. Block hanger allows easy handling for loading/unloading and rotation of the block. Fixture offers multiple adjustment angles: 15°, 30°, 60° and 90°.

Universal Head and Block Fixture

Mount V and inline blocks, angled and parallel heads or manifolds on one universal fixture. The 2.000" (50.80mm) Main line Bar can be leveled for decking blocks parallel to the main line centerline or fine adjusted with eccentric bearings. Custom fixtures can be easily mounted to the base of the machine.

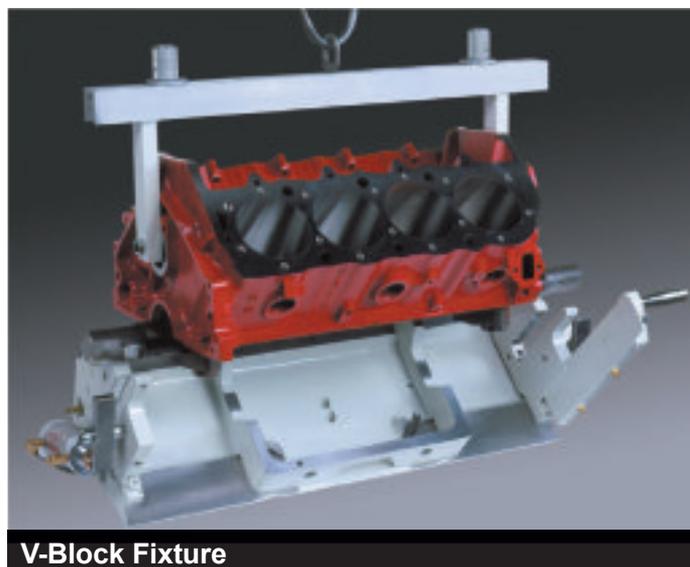
Extra clearance below and behind the fixture allow high deck height V-blocks to be rolled to both banks for surfacing without removing the block from the machine.

Intake/Exhaust Manifold Tooling

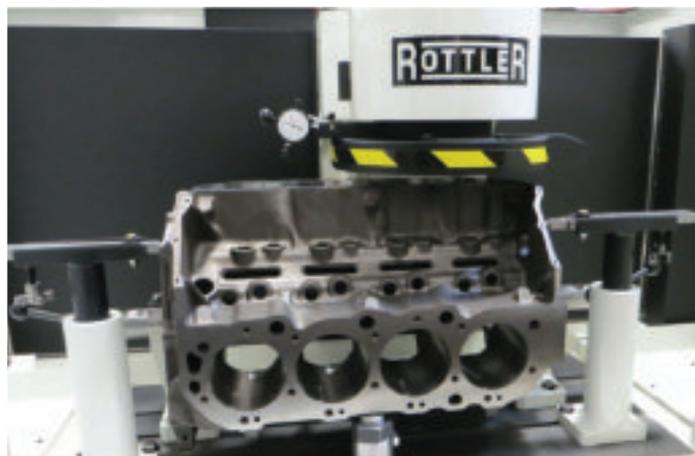
Increase flexibility and profit with the S80 Series surfer. Damaged manifolds can be surfaced with an indexable shell mill in just minutes.



Dual-Axis Leveling Table



V-Block Fixture



Universal Head and Block Fixture



Intake/Exhaust Manifold Tooling

Consistency – Accuracy – Repeatability

Today's honing standards are more demanding than ever, and engine builders must be responsive to the industry's dynamic changes. With the latest piston ring sealing requirements and diverse number of block configurations, staying on top of the latest trends is vital. The versatility offered by the Rotler H80 Series provides the machinist with the latest technology to meet the demand of the evolving honing market.

Cylinder finish requirements are now a science and Rottler tools are engineered to create cylinder surface finishes to meet your honing requirements both today and tomorrow.

Rottler pioneered the concept of "walk away" honing – the latest H85 CNC automatic vertical honing machines take that efficiency to the next level, allowing operators to be more productive, accurate and profitable.

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.

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 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.

With the H85 series, Rottler offers a true vertical stroking machine without any rocking motion. 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.





Upgradeable, Not Obsolete

Far from being a “bare bones” entry level machine, the H85A is designed with manual operators in mind. Its intuitive design allows for manual ease with digital accuracy. Manual operators create programming by utilizing Touch Screen icons for easy control and accuracy.

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.

Once a shop realizes a need for greater automation, the H85A can be easily upgraded to allow for Increased efficiency including walk-away machining. 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.

Rottler’s retrofit upgrade feature also allows a customer to purchase a H85AX at a lower price and, as budget allows, upgrade to the H85AXY in the field to get the full automation for maximum productivity.

‘To Make the Best, We Use the Best’ Total Seal Piston Rings - Phoenix, Arizona, USA

The pinnacle of perfection with cylinder surface finish is the OE manufacturer – everyone else is just playing catch up. “It’s very difficult to duplicate the quality of what comes out of the OEs. They’ve got very sophisticated, very high-dollar equipment that most shops can’t afford,” says Keith Jones, Total Seal Piston Rings. “Proper cylinder finish is paramount. Today, we have to get the bore geometry, which is extremely critical, truly straight and round.”

Total Seal knows about critical dimensions. As one of the leading performance piston ring manufacturers, Jones recognizes the importance of the relationship between ring and cylinder wall. “The engine will run, but if the bores are not straight and round, it’s going to have blow-by, oil control problems and other issues.”

Thankfully, this quality is no longer out of reach.

“The guys at Rottler have really strived to put this level and quality of equipment within reach of the average or traditional machine shop. It’s really astounding how good their stuff is,” Jones says.

Total Seal pre-laps all of its rings, the way they would be broken in in the field – inside a cylinder. “We’ll run a stack of rings – 80-100 rings – into a cylinder sleeve and it cycles back and forth. Depending on the coating of the ring, the material of the ring or what we’re trying to

achieve, the ring could easily exceed 600 to 1,200 cycles.”

Because the rings are lapped on such a massive scale Total Seal’s test rig features unprecedented stresses as well. “We run that machine harder than any other place I could think of – after about 1,800 cycles, we’ve worn that the cross hatch right out of the cylinder.”

Jones says Rottler’s H75A hone keeps Total Seal up to speed.

“We have to hone the cylinder very similar to what it would be like in the engine – the same types of finishes, same types of cross hatch angles, etc. We have thousands of these of lapping sleeves and they need to get re-honed. With the H75A hone being automated, we load the sleeves up, set the torque plates, put the sleeves in, punch in the bore dimension, push the button and walk away. It’s like having another employee because instead of the operator having to stand in front of that machine, running it all day long, he can run another machine and simply come over and change out the rack of sleeves when needed.”

Smooth surfaces, smooth operators and smooth service. Total Seal counts on Rottler to provide it all.

– Keith Jones, Technical Specialist, Phoenix, Arizona

The Original Reimagined

Evolving from the original Rottler boring bar, which has been the industry standard since 1923. Rottler's F Series Boring Machines represent the next generation of boring equipment. Thanks to improvements in electronic motors and cutting tool technology, Rottler boring machines are two to three times more productive than challengers on the market.

Offering 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 longer lasting, inexpensive inserts are capable of handling today's high speeds and feed rates and do not require sharpening. Combined with the world famous Rottler Windows Touch Screen Control with the latest technology CNC BISS encoder servo motors, one pass sleeve cuts and automatic equal depth counterboring are all possible.

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.



F10A

The F10A Boring Bar has been designed for standard and large capacity machine work. The spindle diameter is larger than that of the F9A. It has been increased to 3.25" (8.2mm) for extra heavy duty machining up to a 9" (230mm) bore size. Large sleeve cuts can be taken at high spindle rpm's, and in many blocks, one pass sleeve cuts are possible, which increases productivity.



F9A

The FA machines are the industry standard worldwide for boring bars. Designed for all automotive blocks up to big block V8's 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 boring bar is the fastest, most powerful boring machine available to the jobber shop. The simple setup and manual push button controls make this a very user-friendly and economical machine to operate.



F69A

The F69A is a truly amazing machining center. Blueprint bore, line bore, deck blocks, surface heads, true lifter bores, automatic milling to size, all in fully automatic operational modes. The real advancement is in the Rottler Windows program control. All the listed functions are formatted in operations tabs on the touch screen that any shop hand can understand

A Lasting Partnership Built on Success

Roush Yates Performance Engines

Mooreville, North Carolina, USA

The inspired team at Roush Yates Engines puts every ounce of energy into designing, testing and building purpose-built race engines. Engineers, technicians and track-side experts work together with Ford Performance to build the most powerful and reliable engines in racing.

That partnership extends to the relationship with Rottler. Since 2012, Roush Yates and Rottler have worked together on some of the most innovative and successful engines in racing.

"We have machined over 6,500 blocks with the Rottler H75A and F69A for our NASCAR Ford FR9, Ford EcoBoost, and RY45 engines," explains Doug Yates, CEO and President of Roush Yates Engines. "We have been leveraging the technology and machinery from Rottler since 2012. We immediately picked up performance and efficiency gains, while experiencing no downtime over the past seven years."

The development staff at Roush Yates Engines uses a system level approach to development. This approach includes parallel development of hardware, software, controls and calibration to ensure the base engine and all integration components are optimized as a system to maximize performance, reliability and fuel economy.

- Base engine development including rotating components, cylinder heads, cylinder blocks, valvetrain and cooling/lubrication systems
- Port flow and combustion chamber development
- Advanced combustion analysis including ignition timing and fuel delivery optimization to maximize performance, fuel economy and reliability
- Turbo system control optimization
- EFI control system development and calibration

The team builds the Ford FR9 engine V8 engine for NASCAR competition (EFI platform for the Monster Energy Cup Series and carbureted for the NASCAR Xfinity Series); the twin-turbo Ford EcoBoost V6 that powers the Ford GT Supercar in the IMSA and FIA series; and the RY45 engine, a purpose-built V8 engine to support Dirt Late Model, Off-Road Truck, Marine, Hill Climbing and Drifting competition.

"In order to optimize performance and reliability at Roush Yates Engines, we rely on Rottler's premier machines," Yates says.

— Doug Yates, CEO and President, Mooreville, North Carolina

Purpose-Built Machining Centers

The EM70 Series machines are designed for both the small- to medium-size diesel engine rebuilder and remanufacturer 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 blocks to inline blocks in just a few minutes, and the CNC control stores all settings in memory for instant recall.

Performance Racing Engine Builders require a versatile machining center that can handle a wide variety of engine machine work.

Diesel Engine Remanufacturers require an automatic machine that is easy to learn and fast to operate so any block can be machined quickly and accurately. The EM79 offers both!

The EM79 performs multiple jobs such as boring/sleeving, surfacing (heads and blocks), main and camshaft line boring, industrial CNC machining, and can handle a wide variety of engine machine work.

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, the optional Renishaw Wireless Probe can automatically find bore centers and measure diameters.

- Manage a variety of work on dual workstations and even large diesel blocks with the extra long T-slot Table
- Increase productivity with the optional 4th axis roll over fixture
- Accommodate production machining with the optional Automatic Tool Changer
- For increased safety and chip containment, utilize the optional full enclosure

Rottler Unique Right Angle Drive

Rottler has over 30 years of experience in line boring with right angle drives. Main and Camshaft Line Boring for any application 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.



EM79ATC

The Automatic Tool Changer allows the EM79ATC to change tools automatically without operator involvement. 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.



Universatility

Rottler's innovations have been documented (and emulated) for nearly a century – but one of our most exciting concepts is UNIVERSABILITY. Thanks to the UNIVERSAL functionality and VERSATILITY of Rottler machine equipment, users are given unprecedented flexibility when working on today's engine components.

With its inspired design characteristics, advanced software and user ergonomics, operators say that a Rottler machine gives them the power they need to service existing customers, adapt to future demands for parts and products and even grow into non-traditional markets as their business changes.

Even for shops servicing engines from yesterday, many of Rottler's multi-function CNC machines are ready today to meet the needs of tomorrow. From the smallest cylinder bore to the largest industrial lathe requirements, Universatility sets Rottler machines apart from the crowd.

Off-Road and Industrial Engines Have Big Needs, Provide Big Opportunity

Off-highway diesel and gas engines are designed to perform in many different applications across multiple industries. These engines must be able to perform consistently and reliably in extreme conditions where there's dust, vibration, high altitudes and generally harsh weather conditions. Such engines can be found in excavators, cranes, backhoes, forklifts and others that perform a particular job.

Off-highway gas and diesel engines are configured to meet the heavy-duty demands for specific applications including construction, mining and industrial, and time is money in the world that these machines live. Downtime is a profit killer that no fleet manager can allow if at all possible. And while preventative maintenance practices have stepped up for many operators, the environment that they work in means at some point a rebuild will be necessary. Engine builders who position themselves for the off-highway or non-road diesel market can find a wide range of engine sizes and applications, more than what is available in the on-highway segment.

Is there opportunity? According to recent industry figures, diesel engines power two-thirds of all the equipment in more than \$19 billion worth of tractors, combines, irrigation pumps and other farm equipment. Construction equipment is 100 percent powered by diesel engines in nearly \$17 billion worth of machinery, and mining uses about 72 percent diesel-powered machines. All told, there are approximately 15 million diesel-powered, off-highway engines in use today and the market for the equipment is trending upward as the global economy is reaching full stride.

The economic value of the sectors is almost as staggering as the number of engines and types of equipment. So what happens when that equipment stops functioning?

Service and machining needs are frequently seen with virtually every component in the engine, say experts. Let's face it – maintenance in the field is often neglected, fuels and other fluids

are often contaminated and operating conditions are often less than ideal. Expert machinists recommend careful inspections of every component in a heavy duty engine any chance you get the opportunity to service it.

Understanding the differences between light duty and heavy duty engines as well as having the expertise and equipment to service them can be a daunting task, but for machine shops willing to make the investment, the potential is huge.

Experts acknowledge that it is more difficult, expensive and time consuming to put these machines back into service but for most industrial customers there is no option. Time is money and if these large pieces of equipment, which often run 24-hours a day, seven days a week, pausing in their jobs only long enough to change drivers aren't in service, operators are losing money by the minute.

Damage to the camshaft, counterweights, the rods and the block must be addressed. Without attention, a reassembled engine will likely fail again. Take the time to do a careful inspection and document what you find. In some cases, it may take more than 8 hours to check a block of significant size – machining of the major components and a final cleaning will take even longer. It's a lot of work but it's what's going to make that block run like new.

Cylinder heads are another place you can impress your customer with "better than exchange" quality. Eliminate the corrosion between surfaces – block and manifold. Less corrosion means less likelihood that the manifold will crack, break bolts or studs due to fatigue.

Industry leaders servicing mining, marine, stationary power, oil and gas pumping operations say each of these markets represent significant opportunities, primarily due to the high level of demand – and they are quality-driven markets where engine reliability takes precedence over price.

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 – your investment in time, training and equipment will help keep the big wheels turning. 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 EM100H 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. All EM100H machines 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 EM100H 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 Roller Bearing 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 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.



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.

EM105H

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, and others.





Productivity Maximized

Today's engine machines are required to be able to handle a wide variety of machine work and jobs. Rottler had to invent a complete new concept in machine tool design. The EM100H machines are engineering marvels designed to quickly, easily, accurately and affordably machine engine blocks and vehicle parts.

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In addition, the machines offer Rottler's Linear Roller Bearing 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.

EM100H

The EM100H Series Multipurpose CNC Machining Centers are versatile machines capable of handling a very wide variety of machine work found in heavy equipment shops. The EM100 machines have an open-sided traveling column design where the fixturing and workpiece are firmly fixed down to the machine table

and the machine table is likewise firmly anchored down onto the solid concrete floor. The workpiece is therefore stationary, and the machine column moves left/right over the workpiece. This allows for very heavy and odd shaped fixtures and parts to be easily set up on the EM100H machines.



EM104H

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 CAT3516 and 399, Cummins QSK 60, MTU 4000 V16, Waukesha 7042 and others.

EM103H

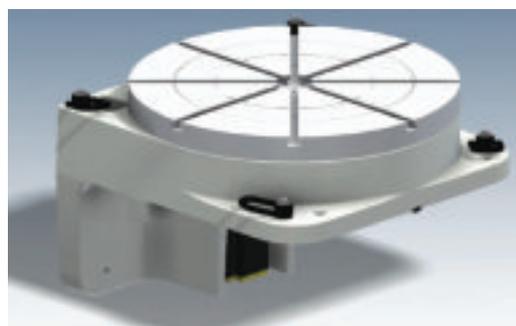
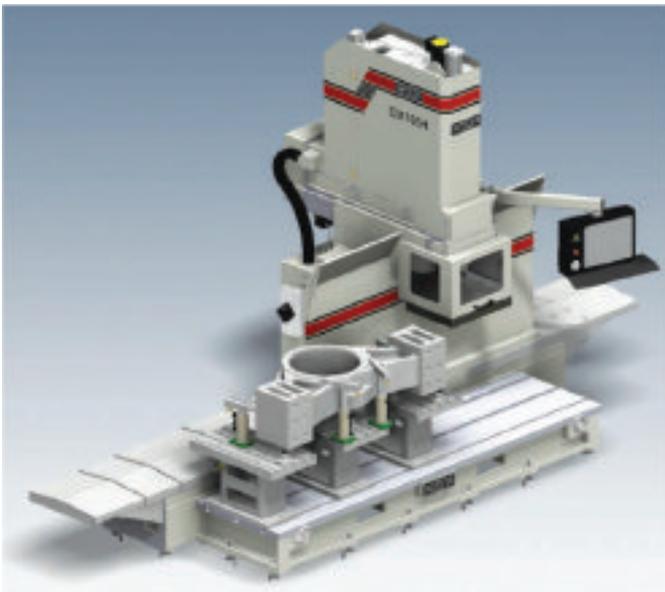
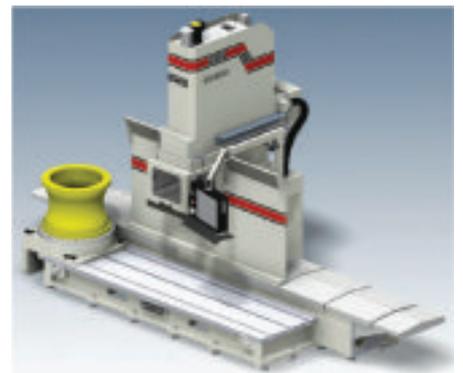
The EM103H is designed for machining smaller engine blocks used in 'On Highway' applications such as trucks and buses. At the same time it is a large machine capable of machining mid-range size blocks up to the size of a CAT3508 and 3412, Komatsu 170 V12, MTU 2000 V16, Cummins K38, Detroit 60, Mercedes 400 V12, and similar.



VERSATILITY

The EM100H Series Multipurpose CNC Machining Centers are versatile machines capable of handling a very wide variety of machine work found in heavy equipment shops. The EM100H machines have an open-sided traveling column design where the fixturing and workpiece are firmly fixed down to the machine table and the machine table is likewise firmly anchored down onto the solid concrete floor. The workpiece is therefore stationary, and the machine column moves left/right over the workpiece. This allows for very heavy and odd shaped fixtures and parts to be easily set up on the EM100 machines.

Rottler has designed a 4th axis system that is able to function in different methods. The 4th axis can be set up as a vertical lathe and is able to rotate and index round parts such as mining truck wheel hubs. The 4th axis can be set up as a traditional 4th axis to allow round parts such as crankshafts to be rotated and indexed for machine work. For example, the counterweight mounting surfaces on crankshafts can get damaged or worn and this system allows them to be milled and repaired.



EM107H and EM109H Multi-Purpose CNC Machining Centers

In both size of the engines and scope of the market, “heavy-duty” has taken on a new and more important role on the world’s stage. Around the globe, businesses depend on heavy-duty equipment for transportation, construction, mining and innumerable other functions. And though they operate in some of the most severe conditions imaginable, they are quite efficient – yet when they are out of service, they are extremely costly.

Rottler’s commitment to this arena has earned a reputation among OEM remanufacturers and large engine rebuilders worldwide. 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 EM100H 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.

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 German-engineered HSK spindle design. Often used in modern industrial machine tools this design represents a dramatic improvement over conventional spindle tapers, with increased rigidity and performance of the metal-cutting functionality of these super heavy-duty machines. 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 automated operating system, one of Rottler’s signature traits, increases the EM100H’s versatility for everything from gigantic earthmoving equipment to ocean-going vessels to industrial compressors and locomotive engines. 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.

The machines are designed with a two separate-castings base, which allows for increased versatility and extreme weight carrying capacity. The traveling column is supported on heavy duty linear slideways that are considerably lower in friction compared to conventional box way slideways giving accurate positioning unseen in machines of this size. This unique machine design also allows the installation of a vertical lathe for jobs such as machine mining truck wheel hubs.





EM 107H

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!



EM 109H

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.

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.

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.





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