

**ROTTLER**  
THE CUTTING EDGE

# EM100 SERIES

## EM107H & EM109H

Extra Heavy Duty, Multi Purpose  
CNC Machining Centers

Now with **DIRECT DRIVE**  
Ball Screws, High Torque  
Spindle Drive System  
and Linear Roller Bearing  
Slideways



Machining Equipment  
Created for Performance  
Racing & Engine  
Remanufacturing.

*EM109H set up for upper  
end work on CAT 3616  
Engine Block*

So Advanced, It's Simple.

# EXTRA HEAVY DUTY MULTI-PURPOSE CNC MACHINING CENTER

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.

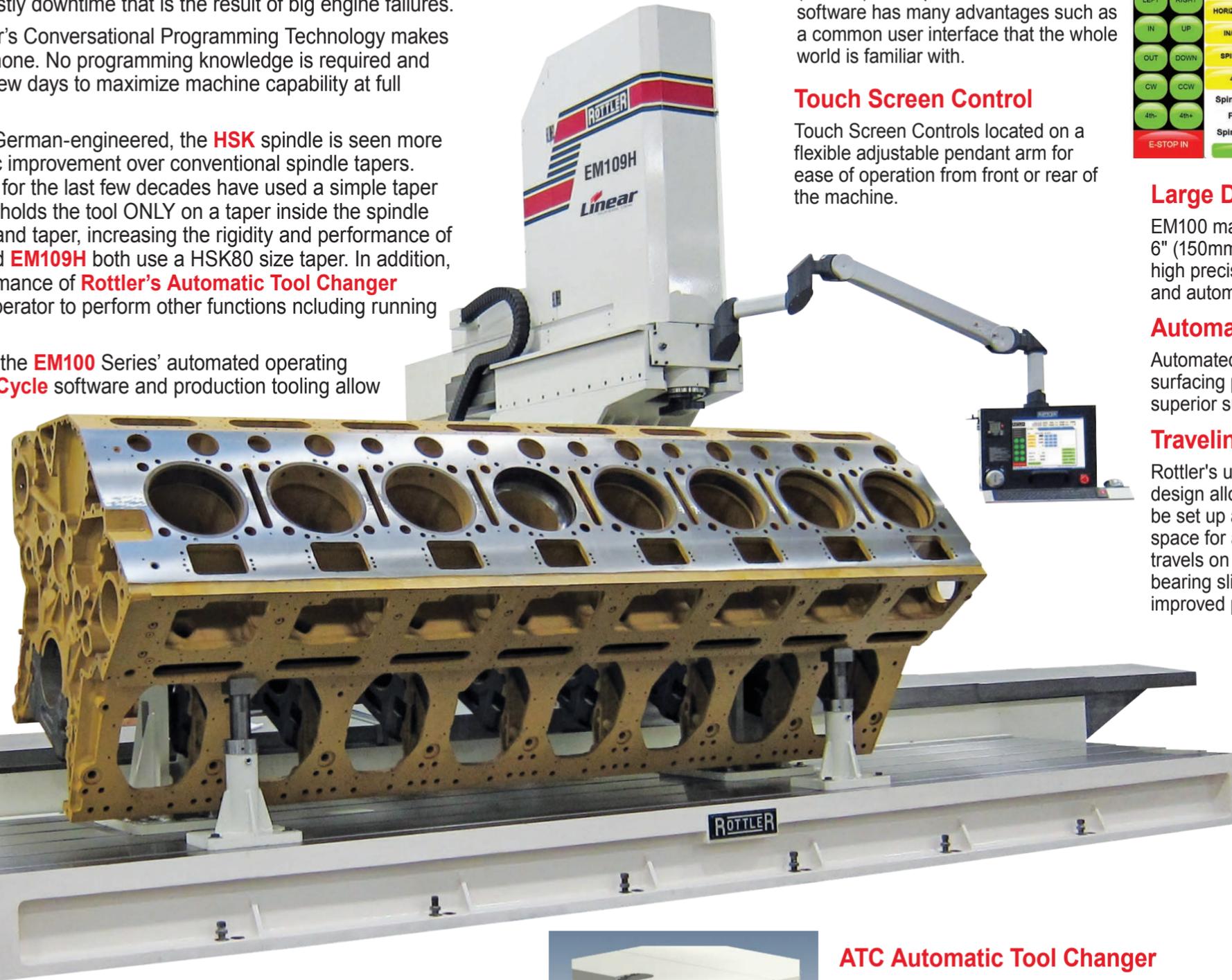
In addition, the machines offer Rottler's **Linear Roller Bearing Slideways**, which are considerably lower in friction than conventional systems. The column is mounted on heavy-duty hardened steel linear roller bearing slideways and the X-axis horizontal movement is powered by **Direct Drive** ball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

## 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

## Slideway and Base Castings

The EM100 machine base is made in 2 major sections. 1. Slideway for moving column. 2. Table for fixtures and workpieces. The separate parts allow excessive loads/weights on the table and will not affect the precision alignment of the slideways allowing very accurate line bore alignment certified by laser.



## Windows Operating System

Rottler uses Windows OS and Touch Screen Technology through 19" (483mm) touch panel. The Windows software has many advantages such as a common user interface that the whole world is familiar with.

## Touch Screen Control

Touch Screen Controls located on a flexible adjustable pendant arm for ease of operation from front or rear of the machine.



## Large Diameter Spindle

EM100 machines incorporate the use of a 6" (150mm) hard chromed spindle, utilizing high precision angular contact bearings and automatic lubrication.

## Automatic Workhead Tilt

Automated workhead tilting system for surfacing provides "back clearance" for superior surface finish.

## Traveling Column Design

Rottler's unique traveling column machine design allows extremely heavy jobs to be set up and at same time saves floor space for a compact machine. The column travels on hardened linear steel roller bearing slideways for reduced friction and improved positioning accuracy.

## DIRECT DRIVE Ball Screws and AC Servo Motors with BISS Encoders

Anti friction ball screws and AC Servo motors provide precise machine positioning and rapid feed rates.

## ATC Automatic Tool Changer

The rotary ATC allows up to 16 tools to be stored and changed automatically unattended. Many operations such as cylinder bore resleeving and water hole repairs require multiple tools. The Rottler software can be programmed to change tools during a programmed automatic cycle allowing the operator to attend to other work while the EM100 works unattended improving productivity and ROI return on investment.



# EXTRA LARGE BLOCKS

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. 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. The machines can be run manually and many unique jobs such as large connecting rods, gear housings and other often overlooked jobs can be performed with this versatile equipment.

## LOCOMOTIVE ENGINES

Locomotives are capable of hauling hundreds of thousands of tons of cargo and are powered by huge engines worldwide. Rottler specially designed the EM109H to be able to machine the largest V20 EMD and GE locomotive engines in service worldwide. These engines have been in service for decades and require updating and modifications for improved emissions and the EM109 is able to do this kind of machine work.



EM109H shown machining upper and lower areas of EMD 710 V20 frame.



# EM109H OVERVIEW

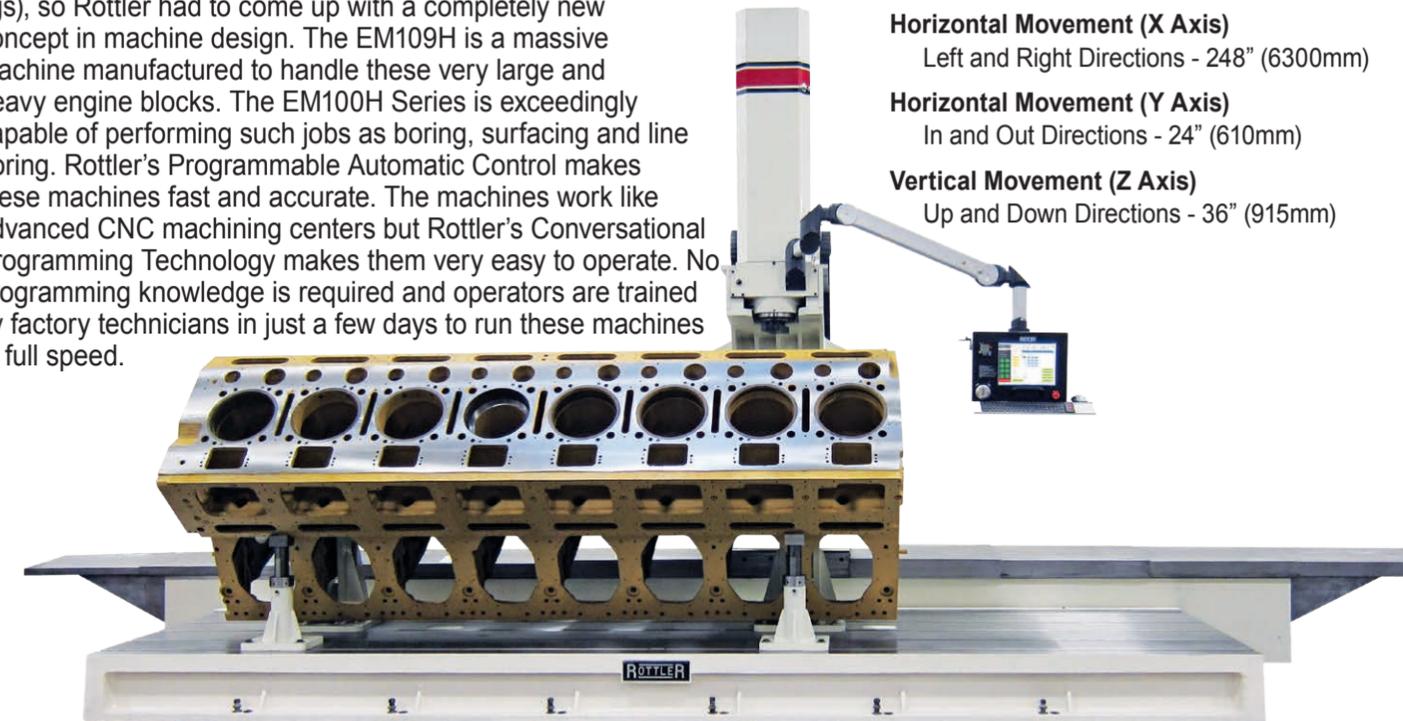
Extra large blocks weigh in excess of 20,000 lbs (10,000 kgs), so Rottler had to come up with a completely new concept in machine design. The EM109H is a massive machine manufactured to handle these very large and heavy engine blocks. The EM100H Series is exceedingly capable of performing such jobs as boring, surfacing and line boring. 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.

## The EM109H Travel

**Horizontal Movement (X Axis)**  
Left and Right Directions - 248” (6300mm)

**Horizontal Movement (Y Axis)**  
In and Out Directions - 24” (610mm)

**Vertical Movement (Z Axis)**  
Up and Down Directions - 36” (915mm)



## Dual Workstations

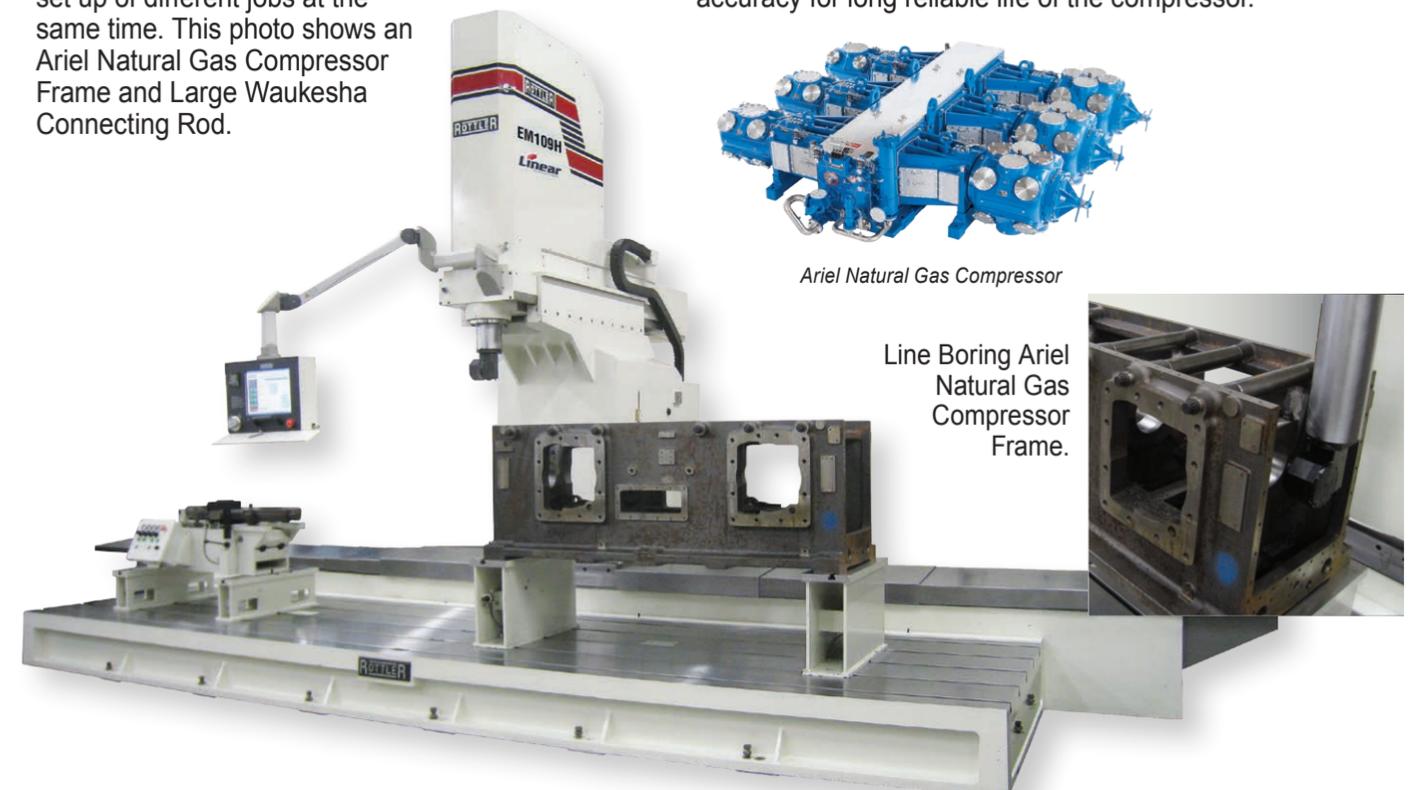
The large work table of the EM109H provides space for multiple fixtures to allow the set up of different jobs at the same time. This photo shows an Ariel Natural Gas Compressor Frame and Large Waukesha Connecting Rod.

## Compressor Frames

At the center of compressors such as this Ariel natural gas compressor, is a frame and crankshaft. The bearing bores of these frames are required to be line bored to extreme accuracy for long reliable life of the compressor.



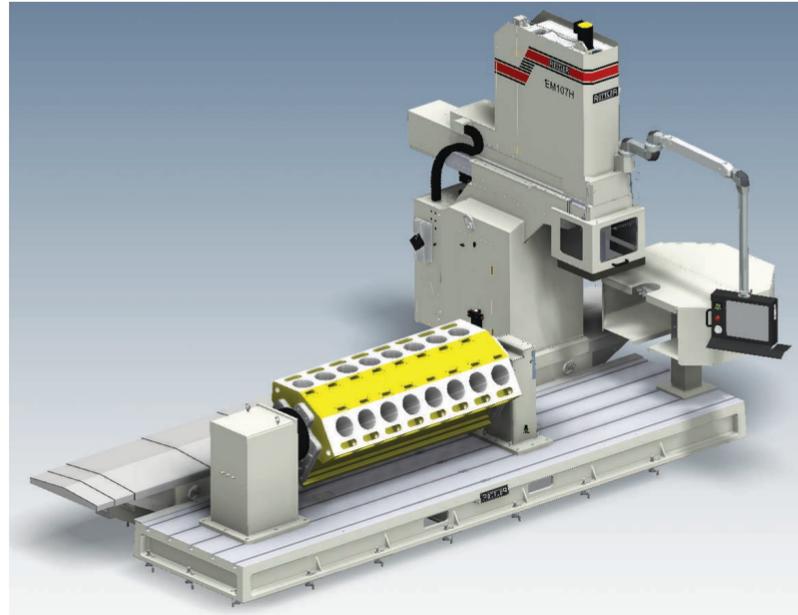
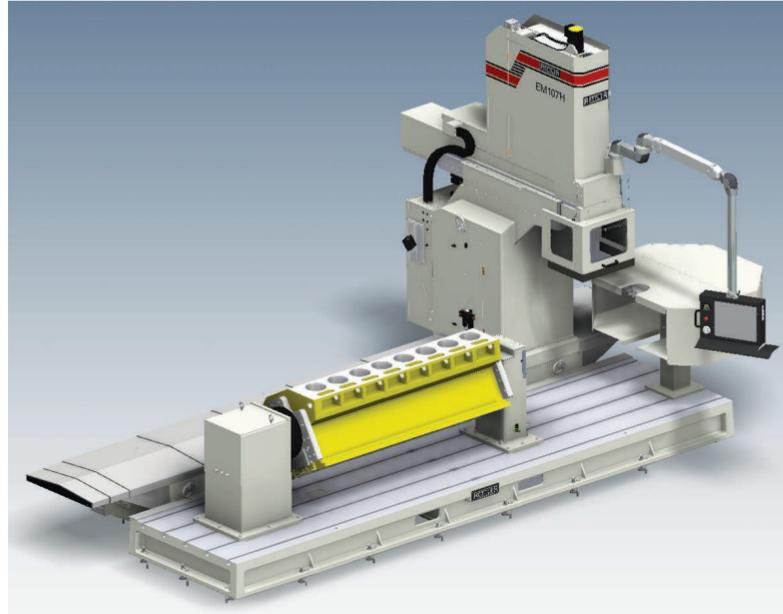
Ariel Natural Gas Compressor



Line Boring Ariel Natural Gas Compressor Frame.

# EM107H OVERVIEW

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 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.

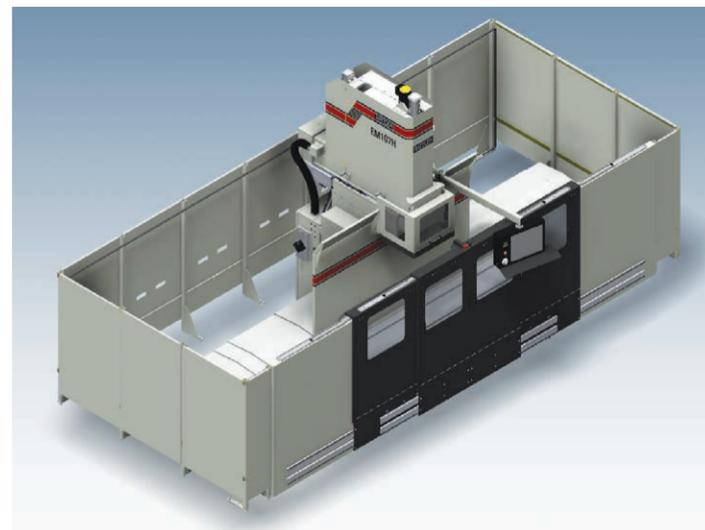


The size of the fixed worktable and traveling column design allows massive blocks/frames to be set up as well as multi work stations for set up of a variety of different parts or fixtures at one time. The extra long travel of the column allows a vertical lathe to be installed at one end of the machine 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 can machine some of the above engines but 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 ATC (Automatic Tool Changer) many operations can be completed automatically – unattended – giving savings of 50-75% time and cost.

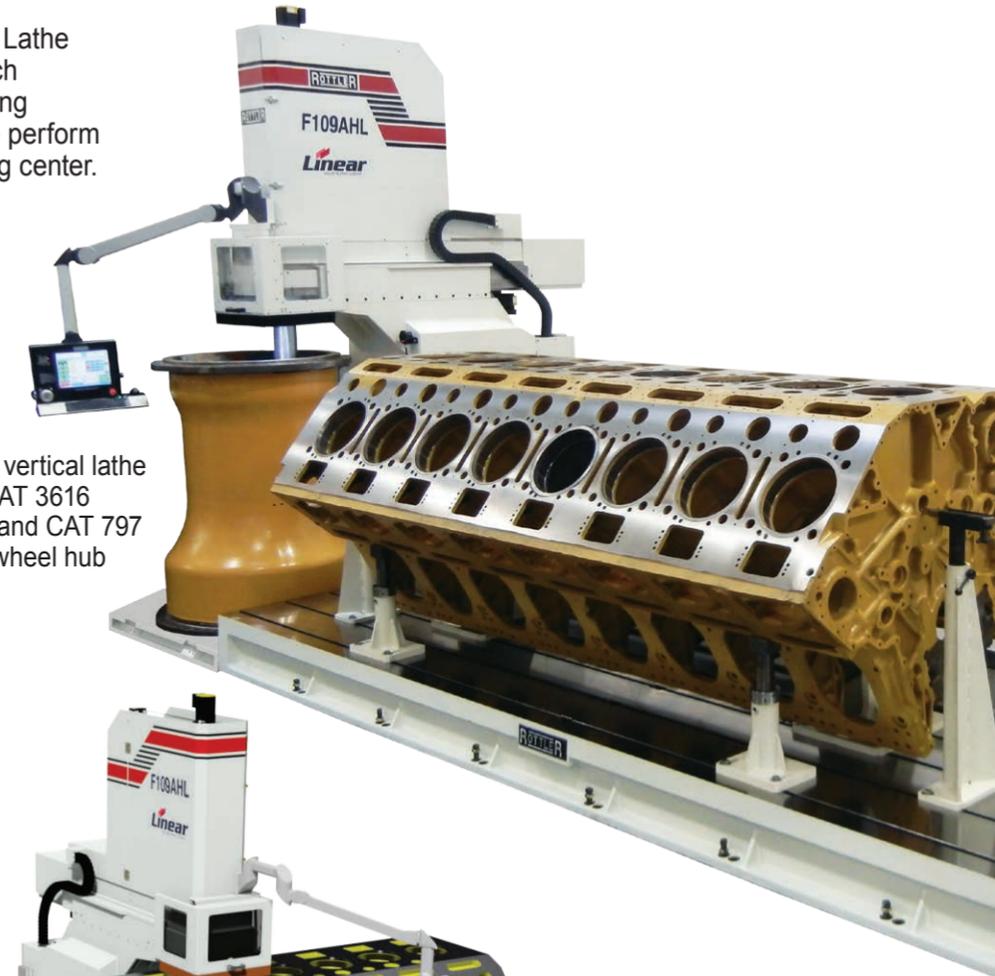
## Full Surround Safety Enclosure

Rottler is able to design and manufacture a special full surround safety enclosure with sliding doors. The operator control panel is located outside the enclosure and the sliding doors are interlocked when the machine is in motion. The enclosure shown in this drawing mounts on the concrete floor and is separate from the machine.



# VERTICAL LATHE

The EM100H is available with Vertical Lathe for machining large diameter parts such as wheel hubs and spindles – increasing versatility and allowing the EM100H to perform as a complete multi purpose machining center.



EM109H with vertical lathe shown with CAT 3616 engine block and CAT 797 mining truck wheel hub



## Block End Machining

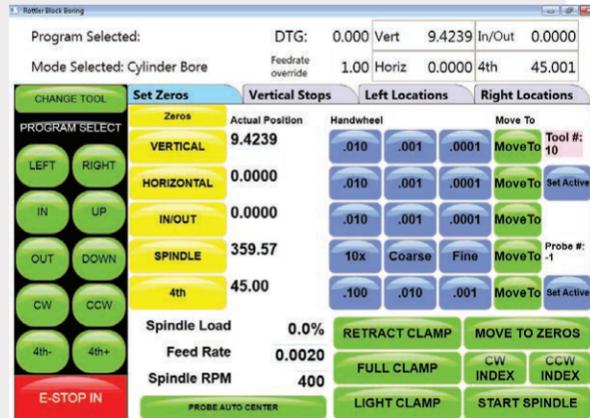
The Unique Traveling Column design allows the workpiece to be stationary so that some difficult jobs to be set on the floor for machining. Shown here is a block supported on the floor and the end being machined with right angle drive tooling.

# ROTTLER EXCLUSIVE TOUCH SCREEN PROGRAMMING



## Mode Screen

Select the operation that this required, information is saved in the Computer Memory.



## Set Zeros

Simply set zeroes to begin the set up of the job and start automatic cycle.



## Vertical Stops

Enter length of bore, sleeve, counterbore, etc and the machine will bore to the exact depth. Lower Sleeve Repair allows a lower diameter that is larger than an upper diameter to be bored in one automatic cycle.

The conveniently located control pendent centralizes 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.

## Fully Programmable Cycles

Conversational three axis CNC control, PC based with Windows operating system.

Dimensions and Control through Touch Screen:

- Program Bore Centers, Exact Depth, Speed, Feed, etc.
- Machines complete bank or main line in Automatic Cycle.
- Automatic Cycle.
- Circular Interpolate Counterbores for Radius Undercut or Wide Counterbores.
- Surfacing/Milling – Multiple Pass – program for Rough Cut and Finish Cut creating superior surface finishes.
- Line Boring – program the bearing bores and length of each bore and the machine automatically moves from bore to bore, completing the line unattended.
- Face Main Line Thrust Faces square to centerline of Crankshaft using Rottler Circular Interpolation software.

## Features

- Automatic
- Programmable
- PC Control/Windows
- Versatile and Flexible
- Variable Speeds and Feeds
- AC Servo Motors
- Power Drawbar
- Hardened Boxway Bed
- Turcite Coated Bedways
- Precision Ball Screws
- T-Slot Table

## Benefits

- Moves accurately from bore to bore unattended
- Saves all settings in memory for future use
- Can be easily updated for additional functions
- Bore, surface, line bore, ream, drill, tap, etc.
- Allows surface finishes as low as 10Ra.
- Maximum torque and performance at all speeds.
- Quick, easy tool changing at the press of a button
- Ensures exceptional rigidity for accurate machining
- Reduced friction for smooth movement and long life
- Precision ball screws give accurate positioning
- Clamp any fixture and job quickly and easily

## Centering - Three Methods

### 1. Blueprint

Enter centers of bores from blueprint drawing into touch screen and the machine will bore to exact blueprint dimensions.



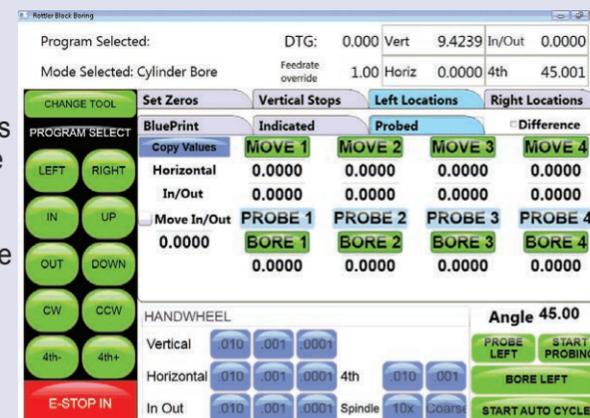
### 2. Indicate

Center Cutterhead in bore using digital or dial gage then touch – Set button – and the machine memorizes the bore center.



### 3. Probe

Machine will automatically probe all bores and memorize dimensions of centers and measures bore diameters.



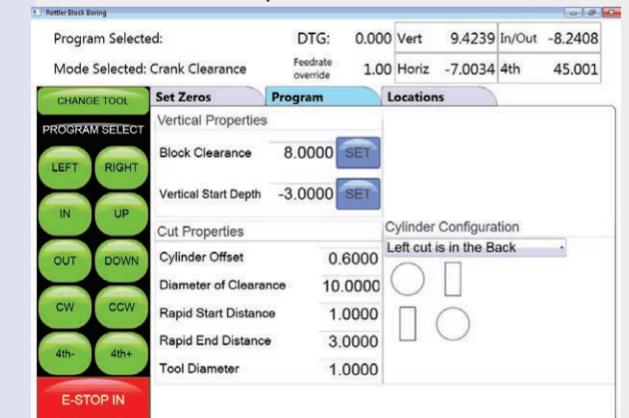
After centering is completed, touch –Auto Cycle – and the machine will automatically bore to the exact dimensions. These dimensions are saved under a block name for future use.

## Versatility & Simplicity



## Main & Cam Line Bore

Enter distance to each bore and length of each bore and the machine automatically bores the complete line.



## Thrust Cutting

Allows operator to easily program for thrust cutting on main cap.



## Connecting Rod

Combined with Rottler Connecting Rod Fixtures, allows both big end and small end to be bored in one set up ensuring perfect parallelism and center to center distance.

# SET UP & MEASURING INSTRUMENTS

Rottler has a wide selection of micrometers, probes, indicators, setting fixtures and magnetic holders to allow versatile and accurate size setting for all machining requirements.

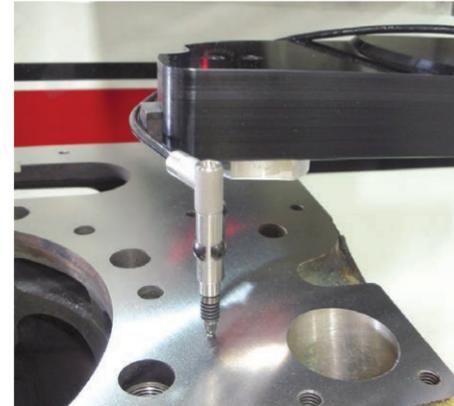


## Wireless Probing

Computer controlled wireless probe automatically finds cylinder bore centers and at the same time measures bore diameters. The difference between the drawing blueprint and the probed dimensions can be displayed by touching one button!

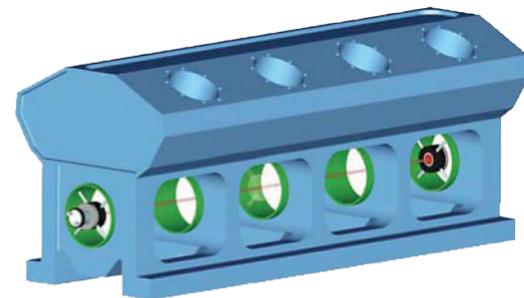
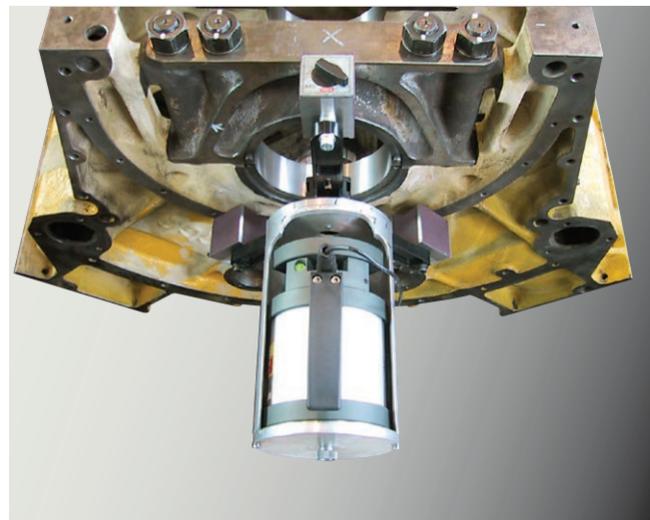
The deck (head gasket face) can be probed to check flatness and squareness to ensure accuracy and minimum metal removal when surfacing.

With the use of a radio probe, the upper and lower bores of wet liner blocks can be probed to check concentricity and perpendicularity to ensure that the block is set up correctly before machining.



## Digital Run Out Probe and Readout

Where the wireless probe is not able to be used because of size restrictions, the digital run out probe allows leveling and precise centering with digital readout on the control panel. Check level and alignment of decks, center in cylinder bores and main lines, etc.



## Laser Alignment

Engine Block Laser Alignment has provided engine machinists with a fast, reliable method of measuring a line bore for straightness. The laser system has proven to decrease inspection times significantly and virtually eliminated dedicated, expensive gauging. Computer printed results are available for future reference.

# TOOLONG & CUTTERHEADS

Rottler has a wide selection of tools, interchangeable cutterheads and spindle adapters to allow endless cutting operations.

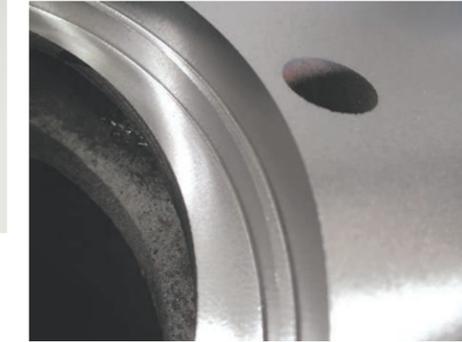


## Flycutters and Milling Heads

Surfacing with the EM100 machines can be done during the same set up as boring. 10" (250mm), 14" (360mm), 18" (460mm) and 22" (570mm) flycutters can be used with CBN inserts for high speed dry surfacing giving excellent surface finish results. The deck of a large block such as a V16 can be surfaced in less than 10 minutes! Multi Teeth Milling Heads can be used for milling welded and spray built up surfaces. Small diameter milling heads are ideal for facing main bearing housing contact surfaces in preparation for line boring to standard diameter.

## Milling Cutter Holders

Collet Kits with ISO 40 chuck and wrench allow milling tools such as end mills, slot drills, reamers to be used.



## Circular Interpolation Single Point Counterbore Tool

Combined with Rottler's unique software, counterbores and thrust faces can be finished with a single point machining method resulting in perfectly flat surfaces and fine surface finish. Special software and cutting inserts allow vertical undercuts to increase the corner radius to suit OEM requirements.



## Boring Cutterheads

Rottler manufactures a complete range of quick change boring cutterheads for boring and sleeving operations from .750" (19mm) to 20" (500mm). The air assisted quick change retention system minimizes down time between tooling changes. Cutterheads can be changed in as little as 10 seconds!

## Spindle Adapters

A selection of spindle adapters allows the use of a wide variety of industrial tooling. ISO 40 Taper, R8, Morse Taper #5 and 1" (25.4mm) are available. Rottler also provides a blank spindle adapter to allow customers to machine to adapt special requirements.

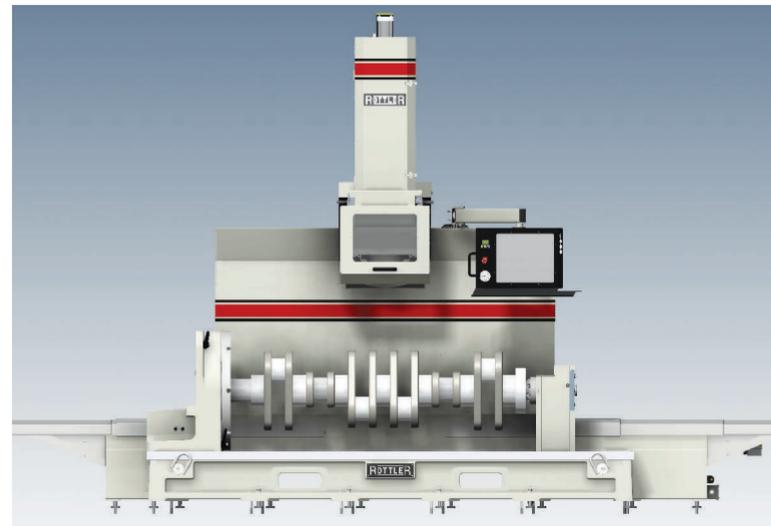
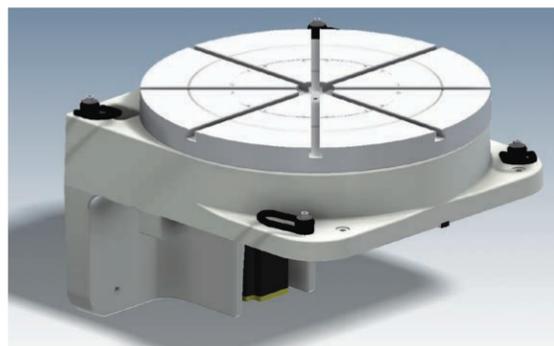
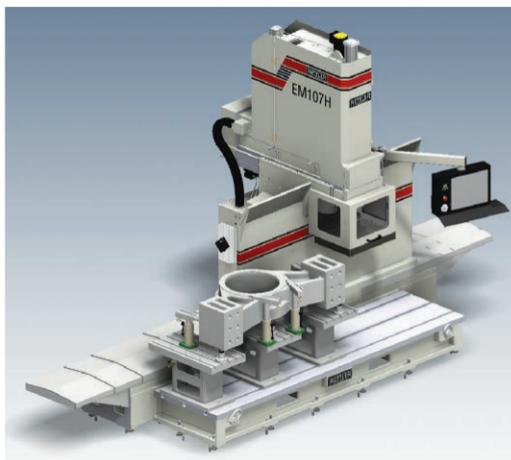
## Multi Tool Milling Head

Multi Teeth Milling Heads can be used for milling welded and spray built up surfaces. Small diameter milling heads are ideal for facing main bearing housing contact surfaces in preparation for line boring to standard diameter. Special Surfacing Software allows very wide surfaces up to 46" (1170mm) to be surfaced.



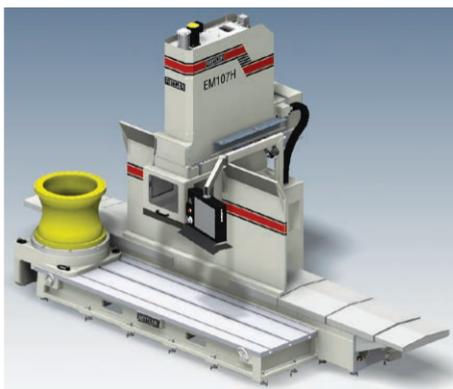
# VERSATILITY

The EM100 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 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.



## Optional 4th Axis and Vertical Lathe

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.

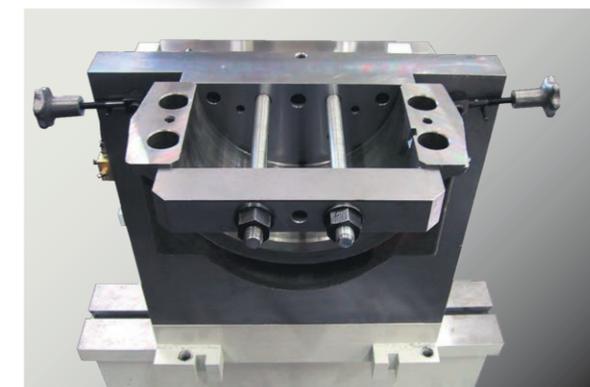
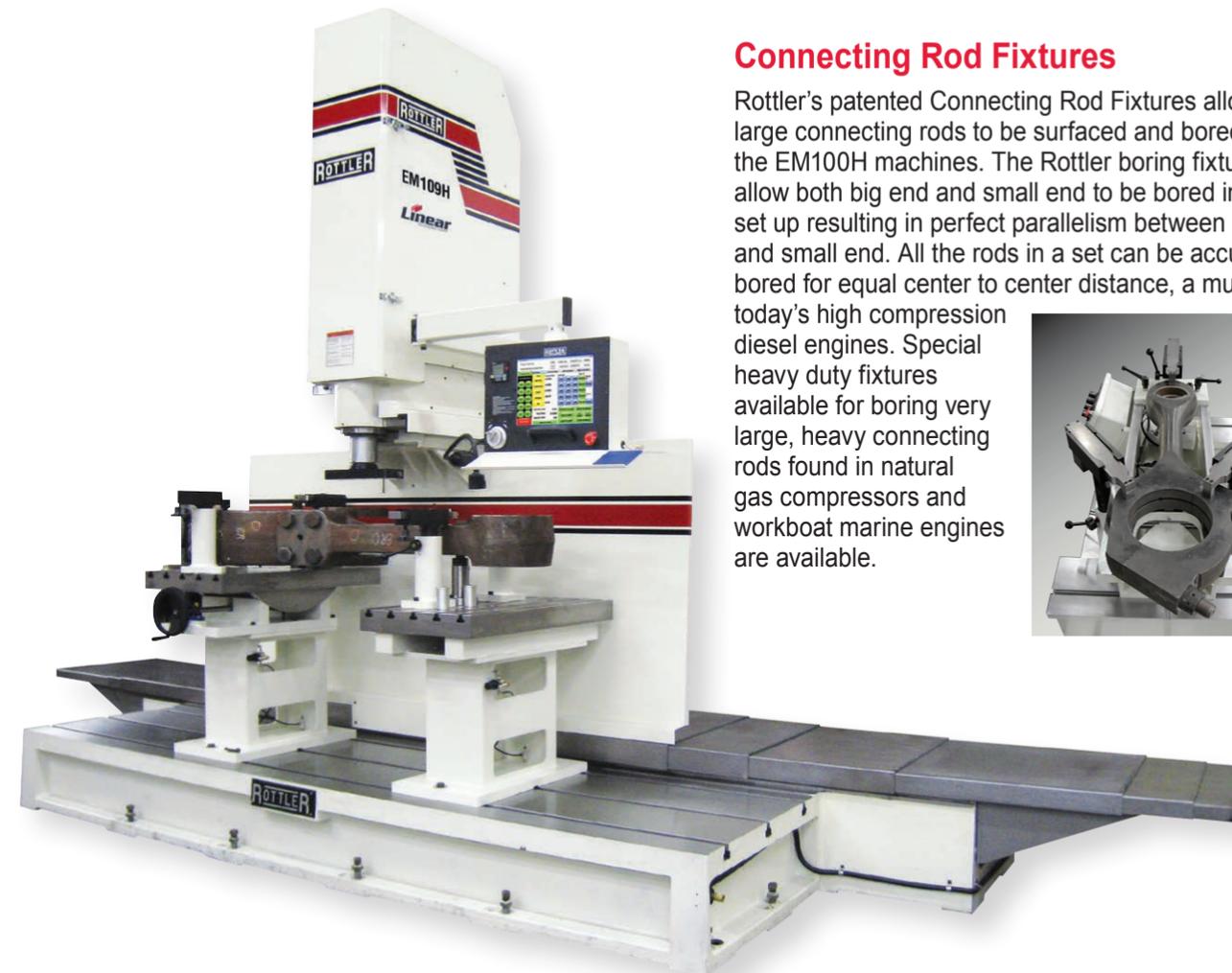


Disclaimer: The drawings shown in this brochure are design concept drawings and the actual equipment may look and operate differently. The drawings are only to show the versatility of the machine. Rottler may not design and manufacture this equipment.

# LARGE CONNECTING ROD MACHINING

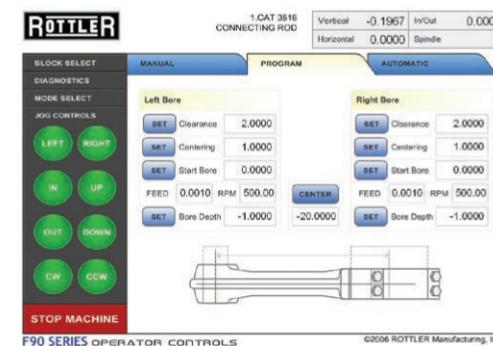
## Connecting Rod Fixtures

Rottler's patented Connecting Rod Fixtures allow large connecting rods to be surfaced and bored on the EM100H machines. The Rottler boring fixtures allow both big end and small end to be bored in one set up 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. Special heavy duty fixtures available for boring very large, heavy connecting rods found in natural gas compressors and workboat marine engines are available.



## Surfacing Fixture

Heavy Duty surfacing fixture to prepare Natural Gas Compressor Rods for boring.

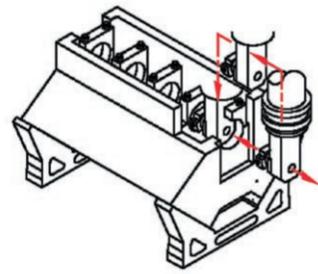


Connecting Rod Touch Screen Control



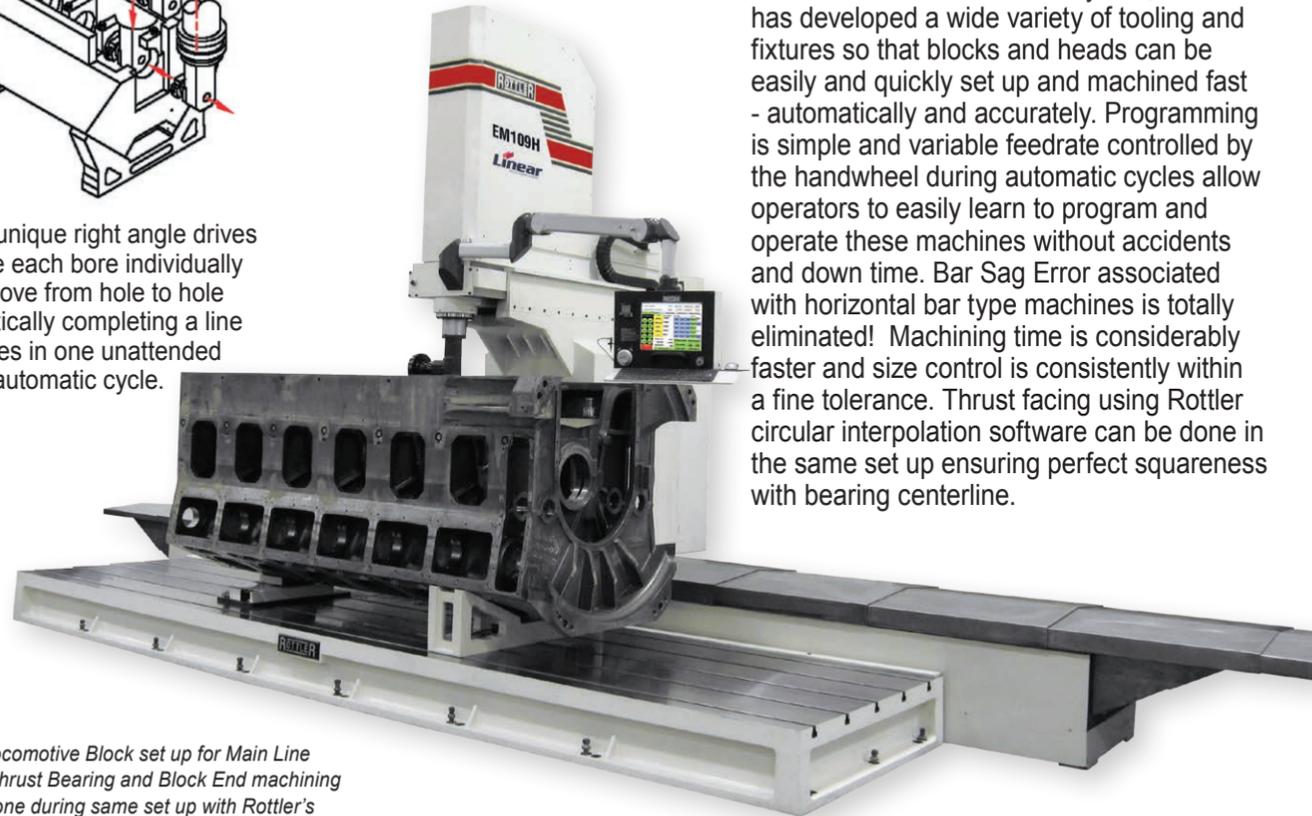
## Leveling Table

Rottler's Dual Axis Leveling Table with two piece vice used for surfacing Connecting Rod Caps and Main Bearing Housings in preparation for main line boring.

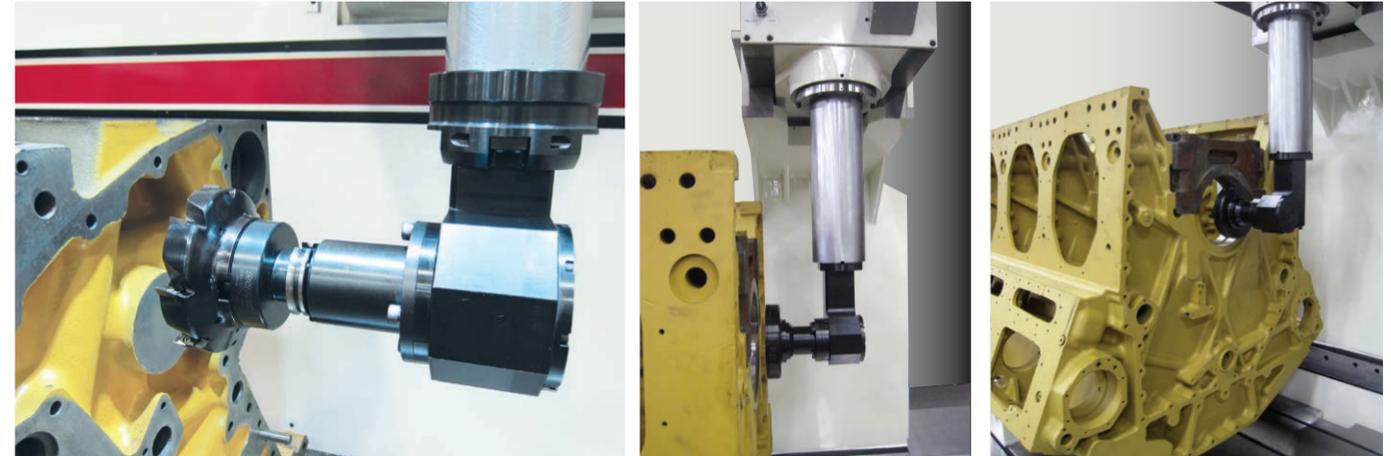


Rottler's unique right angle drives machine each bore individually and move from hole to hole automatically completing a line of bores in one unattended automatic cycle.

Over 20 years ago, Rottler pioneered right angle drive line boring and today are world leaders in this field. Over the years, Rottler has developed a wide variety of tooling and fixtures so that blocks and heads can be easily and quickly set up and machined fast - automatically and accurately. Programming is simple and variable feedrate controlled by the handwheel during automatic cycles allow operators to easily learn to program and operate these machines without accidents and down time. Bar Sag Error associated with horizontal bar type machines is totally eliminated! Machining time is considerably faster and size control is consistently within a fine tolerance. Thrust facing using Rottler circular interpolation software can be done in the same set up ensuring perfect squareness with bearing centerline.

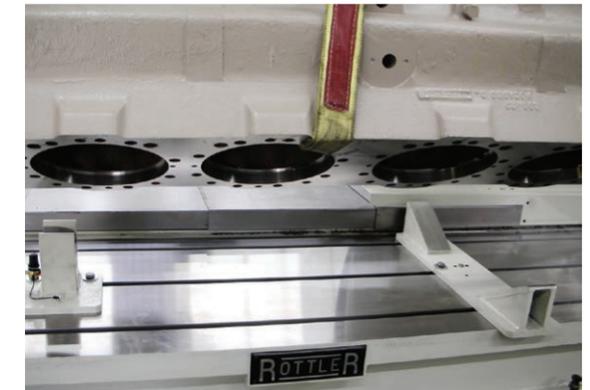


GEVO Locomotive Block set up for Main Line Boring, Thrust Bearing and Block End machining can be done during same set up with Rottler's Special Right Angle Drive Tooling.



## Line Bore Tooling

Rottler's Unique Right Angle Drive Line Boring Attachments allow for accurate machining of bearing lines from small cylinder heads such as CAT3406 and Detroit 50/60 Series up to large blocks such as CAT3616, Waukesha AT, White Superior 16G825, MTU1163 and 8000, and EMD 645 and 710. Special cutterheads with micro adjust tools are available from Rottler's engineering department. Repairs such as sleeving and cutting spray weld can be done. Operators like this system as there is no bar in their way when measuring and boring/repairing bearing housings.



## Line Bore Fixtures

Heavy duty fixtures allow heavy blocks such as CAT3616, Waukesha AT, White Superior 16G825, MTU1163 and 8000, and EMD 645 and 710, to be set up and adjusted for line boring. Adjustable fixtures are air floated to allow easy positioning on the machine's work table.

## Thrust Facing

Rottler's unique circular interpolation software and thrust facing tooling allow thrust faces to be machining perfectly square to bearing centerline using the same right angle drive that is used for line boring. Single point cutting allows build up to be removed without chatter resulting in fine surface finish.



The EM100 series are able to machine main bearing cap registers in the block to ensure they are perfectly flat for maximum contact with main bearing caps. At the same time, the diameter is reduced for line boring back to standard diameter.



# STANDARD EQUIPMENT & SPECIFICATIONS

- CNC (Computer Numerical Control) Machine Using Windows Operating System and Industrial PC with Intel Processor.
- Programming and Control Thru A 15" (400mm) Computerized Touch Screen.
- Precision Position Display in .0001" (.002mm) Resolution
- Software Options Available for Programmable & Automated Cycles Such as Boring, Surfacing, Lower Sleeve Offset Boring, Water Hole Repairs, Main & Cam Line Boring, General CNC Machine Work
- USB flash drive for file transfer to and from computer
- Internet connection to the machine computer must be provided for training support and service.
- Machine/computer can operate in either inch or metric system
- 3 Axis Movement by Direct Drive Precision Ball Screws & AC Servo Motors with BISS Encoders - Infinitely Variable
- Horizontal Movement (X Axis) - Left and Right Direction - EM109 - 248" (6400mm), EM107 - 164" (4166mm)
- Horizontal Movement (Y Axis) - In and Out Direction - 24" (610mm)
- Vertical Movement (Z Axis) - Up and Down - 36" (915mm)
- Vertical, Horizontal and Spindle Load Monitoring for Fast Overload Shut Down
- Electronic Handwheel for Manual Movement - Per Click: Coarse Mode .01" (.25mm) Medium Mode .001" (.01mm) Fine Mode .0001" (.002mm)
- Infinitely Variable Feedrates 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
- Fast Rapid and Jog Speeds for Reduced Cycle Time
- Automatic Workhead Tilt System for Back Clearance during Surfacing
- Air Assisted Quick Change Cutterhead Draw Bar System
- Heat Treated Mehanite Cast Iron Machine Castings
- Air Pressurized Column for Less Friction and Accurate Positioning
- Turcite Coated Slideways for Low Friction and Extended Life
- Automatic Central Lubrication System Monitored by Computer
- Chip Guard with LED lights – vertically adjustable
- Operation, Programming and Spare Parts Manual - Digital

**Made in U.S.A.**

	<b>EM109 Inch/Metric</b>	<b>EM107 Inch/Metric</b>
Maximum Height – Table to Spindle Taper	67.58" 1716mm	67.58" 1716mm
Table Size – 4 T-slots	67.5 x 240" 1700 x 6100mm	67.5 x 240" 1700 x 6100mm
Maximum Distance – Spindle Center to Column	43.50" 1100mm	43.50" 1100mm
Horizontal Column Travel (X Axis)	248" 6300mm	164" 4166mm
Vertical Column Travel (Z Axis)	36" 915mm	36" 915mm
Workhead Travel In/Out (Y Axis)	24" 600mm	24" 600mm
Spindle Speeds Infinitely Variable	To 1,000RPM	
Spindle Motor-Continuous Power	17 HP 12.75kW	17 HP 12.75kW
Cylinder Bore Range with Optional Cutterheads	.75 – 20" 19 – 500mm	.75 – 20" 19 – 500mm
Line Bore Range with Optional Cutterheads	2 – 12" 50 – 300mm	2 – 12" 50 – 300mm
Surfacing Cutterhead Diameters	10", 14", 18" & 22" 250, 340, 460 & 575mm	10", 14", 18" & 22" 250, 340, 460 & 575mm
Floor Space Requirements	362 x 130" 9200 x 3300mm	362 x 130" 9200 x 3300mm
Machine Weight	50,000 Lbs 22,500kgs	50,000 Lbs 22,500kgs
Power Requirement	220V, 60A, 50/60Hz, 3Ph	
Air Requirement	100PSI 6Bar	100PSI 6Bar
Paint Color Code	RAL9002 (Grey White)	

*Specifications and design subject to change without notice.*

November 2018

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