

ROTTLER

SG90MTS HEAVY DUTY CYLINDER HEAD SEAT & GUIDE MACHINE OPERATIONS MANUAL



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THERE IS A MINIMUM ORDER OF \$25.00

MANUAL SECTIONS

INTRODUCTION

SAFETY

CONTROL DEFINITIONS

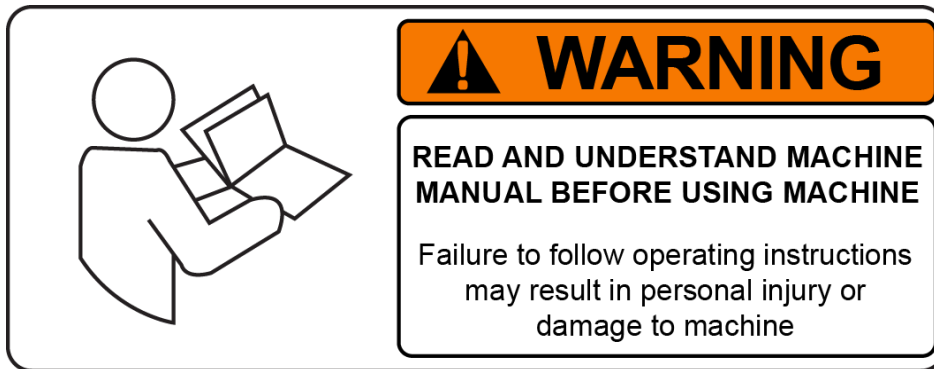
OPERATING INSTRUCTIONS

INTRODUCTION

Contents

Introduction	1-1
Description	1-2
Disclaimer	1-2
Limited Warranty	1-3
Online Documentation Access	1-4

Introduction



READ THE SAFETY CHAPTER BEFORE INSTALLING MACHINE. THOROUGHLY UNDERSTAND ALL SAFETY ISSUES BEFORE OPERATING MACHINE.

ATTENTION OWNER/BUSINESS MANAGER

To validate the warranty on your new Rottler machine, please be sure to sign and complete the “Installation Report” located in the Installation Chapter of this manual.

We suggest that the new user of the SG90MTS read the CONTROL DEFINITIONS to get an idea how the machine operates.

The Operating Instructions chapter should be read in order to familiarize the user with the actual button pushing sequences required to carry out a job. These chapters in the manual should be considered an introduction. As the operators of the SG90MTS series machines gain experience using the different functions of the machine, the operator will become an expert in utilizing the machine tool.

Beyond the Operating Instructions this manual contains information and part number references on fixtures, cutting tools, and machine maintenance. The operator should read and become familiar with these areas as well.

Description

The Rottler SG90MTS series were created specifically for heavy-duty cylinder head applications. Although the machine is primarily geared towards large diesel or natural gas cylinder heads, the SG90MTS also can handle small engines with performance applications as well. This makes the SG90MTS the most versatile machine in the Rottler Seat and Guide machine lineup.

The Rottler SG90MTS represents a pinnacle of innovation in modern seat cutting technology. New to this type of machine is the Rottler patented Uni-Pilot tooling technology which allows the operator to move hole-to-hole while cutting seats without the need of re-positioning the pilot or using multiple pilots to process a cylinder head. Furthermore the SG90MTS is outfitted with the Rottler patented Active Spindle technology which automates the locking and unlocking process between centering and cutting operations on previous generations of seat-cutting machines.

The Rottler SG90MTS can be used in either the manual or manual-matic software modes. These modes can be selected from the main screen and are further defined in the sections below. Beyond these two modes, operators will find that the SG90MTS also has features to allow automated tapping, reaming, and drilling cycles for other work such as guide work or work on the manifold sides of cylinder heads.

Software Modes:

MANUAL – This mode allows the operator to control the base functions of the machine individually. These functions include; floating the workhead and cradle, locking/un-locking the sphere, and turning the spindle on and off. Within this mode the operator can also set the zero for the spindle position DRO, as well as set the spindle RPM for cutting and finishing. This mode is very useful when cutting only one seat or testing parameters to setup a MANUALMATIC program.

MANUALMATIC – This mode automates the seat cutting process by storing spindle positions, which when the spindle DRO matches these stored values will cause the machines functions as mentioned above to activate automatically. Values can be stored by moving the spindle to the desired height, and then pressing the "set" button next to the labeled values. Manualmatic programs can be created for both intake and exhaust seats on specific cylinder heads to allow the operator to process heads by simply selecting the program and then moving the spindle through the stored values to cut a seat. This is explained further in the operating instructions section.

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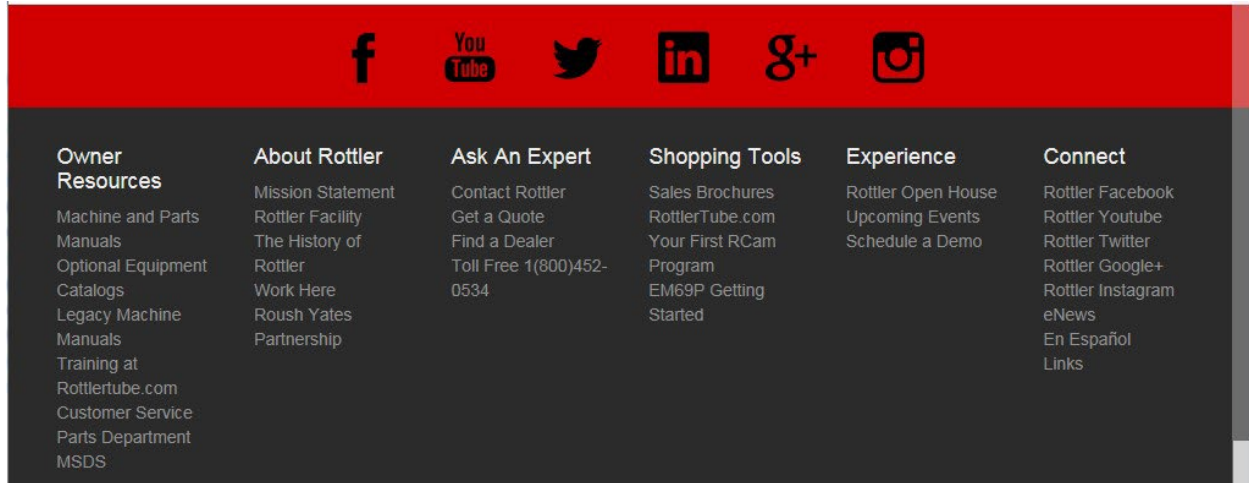
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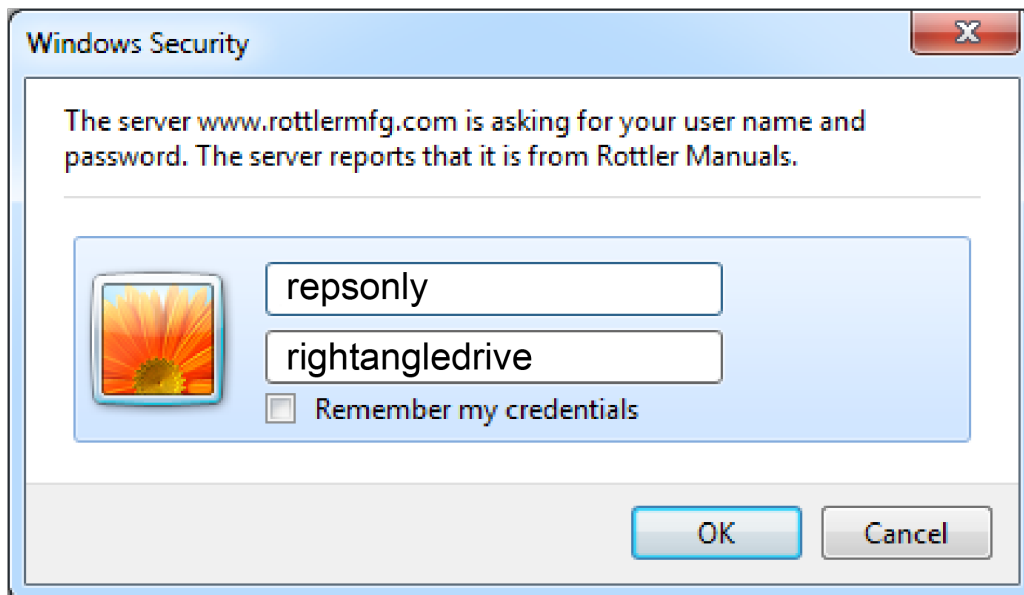
Online Documentation Access

Online documentation for machines and optional equipment can be accessed at the Rottler website. To access documentation open your browser and navigate to <https://www.rottlermfg.com>.

Scroll to the bottom of the page and under the Owner Resources title click the type of documentation you want to access.



If a log in window pops up asking for user name and password fill in the blanks as shown.



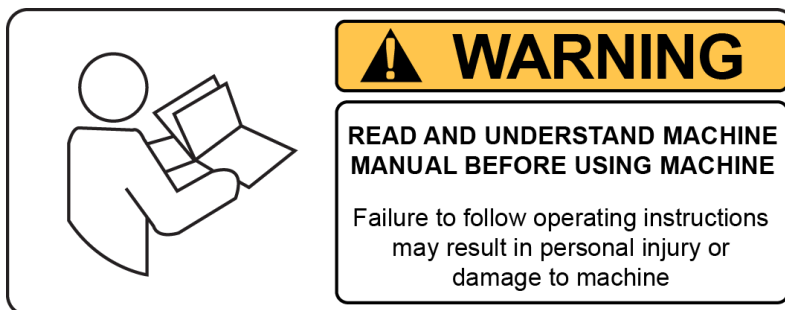
SAFETY

Contents

Safety Information	2-1
Safety Instructions for Machine Use	2-1
Electrical Power	2-3
Machine Operator	2-5
Emergency Procedure	2-6
Computer and Controller System Safety	2-6
Electrical Safety Features Of Rottler DM Controlled Machines	2-7

Safety Information

For Your Own Safety Read This Instruction Manual Before Operating This Machine.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Safety Instructions for Machine Use



This machine is capable of causing severe bodily injury

ONLY A QUALIFIED, EXPERIENCED OPERATOR SHOULD OPERATE THIS MACHINE. NEVER ALLOW UNSUPERVISED OR UNTRAINED PERSONNEL TO OPERATE THE MACHINE. Make sure any instructions you give in regards to machine operation are approved, correct, safe, and clearly understood. Untrained personnel present a hazard to themselves and the machine. Improper operation will void the warranty.

KEEP GUARDS IN PLACE and in proper working order. If equipped with doors, they must be in the closed position when the machine is in operation.

KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.



KEEP CHILDREN AND VISITORS AWAY. All children and visitors should be kept a safe distance from work area.

WEAR THE PROPER APPAREL. DO NOT wear loose clothing, gloves, rings, bracelets, or other jewelry which may get caught in moving parts. Non-Slip foot wear is recommended. Wear protective hair covering to contain long hair.



ALWAYS USE SAFETY GLASSES. Also use face or dust mask if cutting operation is dusty. Everyday eye glasses only have impact resistant lenses, they are NOT safety glasses.



DO NOT OVER-REACH. Keep proper footing and balance at all times.

USE THE RECOMMENDED ACCESSORIES. Consult the manual for recommended accessories. The use of improper accessories may cause risk of injury.

CHECK DAMAGED PARTS. Before further use of the machine, a guard or other part that is damaged should be checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, breakage of parts, mounting, and other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.

NEVER OPERATE A MACHINE WHEN TIRED, OR UNDER THE INFLUENCE OF DRUGS OR ALCOHOL. Full mental alertness is required at all times when running a machine.

IF AT ANY TIME YOU ARE EXPERIENCING DIFFICULTIES performing the intended operation, stop using the machine! Then contact our service department or ask a qualified expert how the operation should be performed.

DO NOT MODIFY OR ALTER THIS EQUIPMENT in any way. If modifications are deemed necessary, all such requests must be approved and/or handled by Rottler Manufacturing. Unauthorized modifications could cause injury and/or damage to machine and will void the warranty.

SAFETY DECALS SHOULD NEVER BE REMOVED. They are there to convey important safety information and warn of potential hazards.

ALL LOCAL SAFETY CODES AND REGULATIONS should be followed when installing this machine.

ONLY QUALIFIED PERSONAL should perform service on the electrical and control systems.

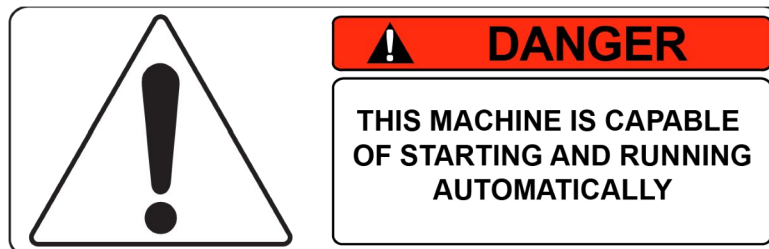
When boring the machine is capable of throwing metal chips over 10- feet from the cutting area. Always use the guards. Eye protection must be worn at all times by the operator and all other personnel in the area of the machine.



CAUTION No list of safety guidelines can be complete. Every piece of shop environment is different. Always consider safety first, as it applies to your individual working conditions. Use this and other machinery with caution and respect. Failure to follow guidelines could result in serious personal injury, damage to equipment or poor work results.

Electrical Power

THIS MACHINE IS AUTOMATICALLY CONTROLLED AND MAY START AT ANYTIME

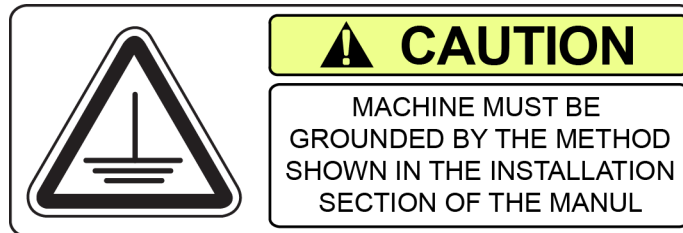


All electrical power should be removed from the machine before opening the rear electrical enclosure..



In the event of an electrical short, grounding reduces the risk of electric shock by providing a path of least resistance to disperse electric current.

Electrocution or a fire can result if the machine is not grounded correctly. Make sure the ground is connected in accordance with this manual. **DO NOT** operate the machine if it is not grounded.



CAUTION No single list of electrical guidelines can be comprehensive for all shop environments. Operating this machinery may require additional electrical upgrades specific to your shop environment. It is your responsibility to make sure your electrical system comply with all local codes and ordinances.

WARNING This machine operates under computerized control and, as is all computerized equipment, and is susceptible to extraneous electrical impulses internally for externally produced. The machine may make moves out of the operator control at any time. The operator should work in and around the machine with caution at all times.

The operator and nearby personnel should be familiar with the location and operation of the Emergency Stop Button.

Make sure all electrical equipment has the proper overload protection. This machine should have **a fully isolated power supply** to prevent damage and uncontrolled movement of the machine. If this machine is on the same power lines that are running to other electrical equipment (grinders, welders, and other AC motors) electrical noise can be induced into this machines electrical system. Electrical noise can cause the controller to see false signals to move. Not supplying a fully isolated supply to the machine may void factory warranty. Refer to the Power supply section located in the Installation section for voltage and amperage requirements of this machine.

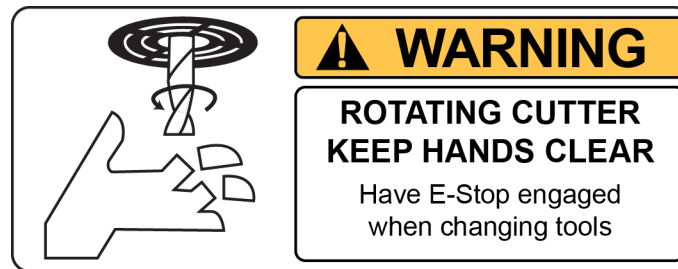
Machine Operator

The operator of this machine should be a skilled machinist craftsman who is well versed in the caution, care, and knowledge required to safely operate metal cutting tools.

If the operator is not a skilled machinist he/she must pay strict attention to the Operating Instructions outlined in this manual, and get instruction from a qualified machinist in both production and operation of this machine.

This machine has the following areas of exposed moving parts that you must train yourself to respect and stay away from when they are in motion:

Cutting Tool Area – Any operation involving hands in the cutter head area, such as inspection or alignment of the cutter head or tools, changing Centering Fingers, tool insertion, and removal, cutter head changes, and size checking etc. requires the machine to be in Neutral.



Machining – Eye protection must be worn during all operations of the machine. Hands must be kept completely away from the cutter head. All chip guards must be in position during machine operations.



CAUTION **Work Loading and Unloading** – Carefully develop handling methods of loading and unloading work pieces so that no injury can result if hoist equipment or lift connection should fail. Periodically check lift components for damage that may cause failure.

CAUTION **Machine Maintenance** – Any machine adjustment, maintenance or parts replacement absolutely requires a complete power disconnection from the machine.

Emergency Procedure

Assuming one of the following has occurred: tool bit set completely off size, work piece or spindle base not clamped, spindle is not properly centered, and these mistakes will become obvious the minute the cut starts

PRESS THE EMERGENCY STOP BUTTON (on the front control panel) **IMMEDIATELY!**

Find out what the problem is; return the spindle to its up position without causing more damage. To restart the machine, turn the Emergency Stop Button CW until the button pops out

Be alert to quickly stop the machine in the event of a serious disruption of the boring process either at the top or bottom of the bores.

“REMEMBER” metal cutting tools have the speed and torque to severely injure any part of the human body exposed to them.



This machine is capable of causing severe injury or death. Doing any of the following without Rottler's direct consent may cause severe injury or death.

Electrical Safety Features Of Rottler Controlled Machines

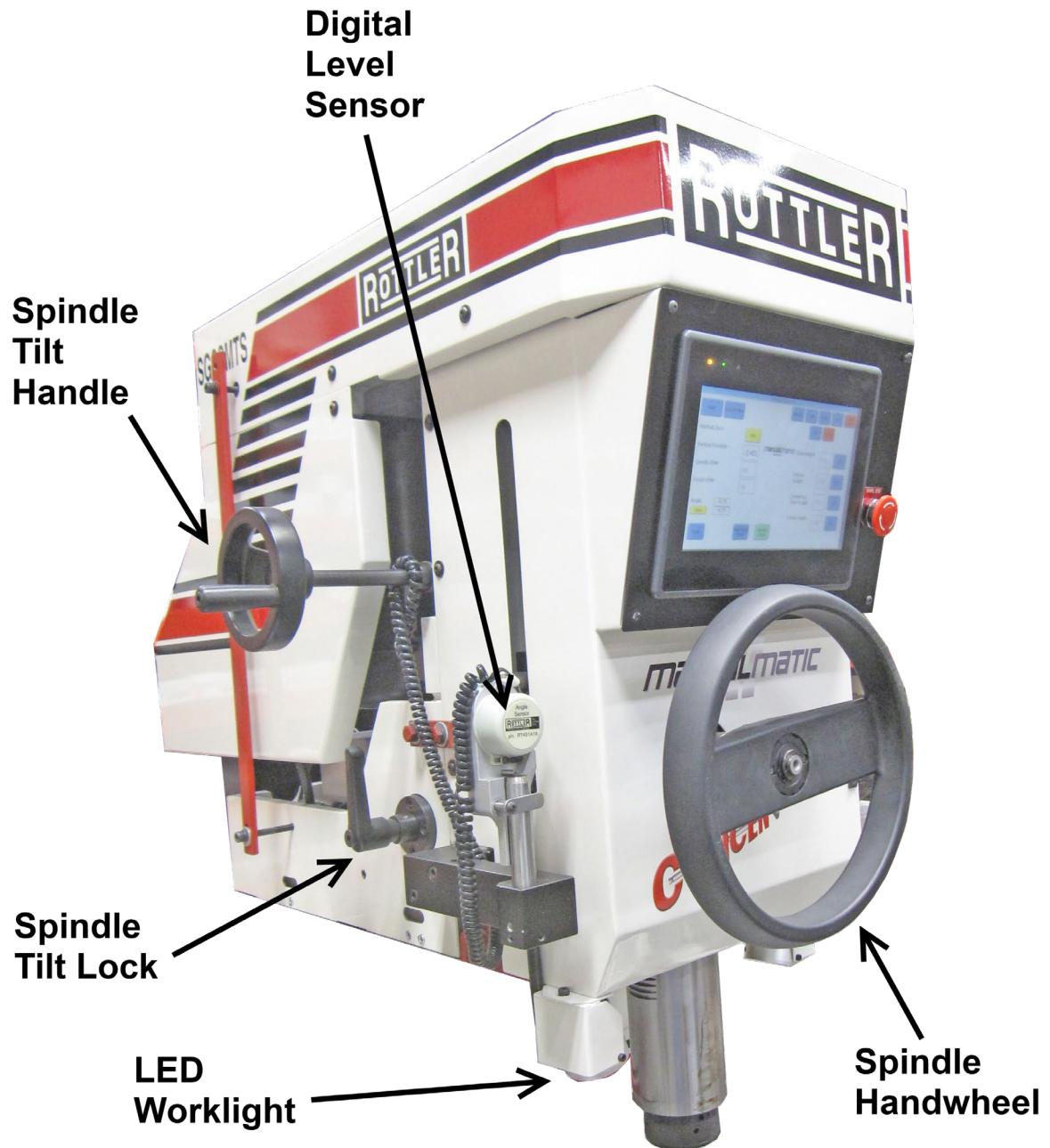
All Rottler machines that use the operational control system are designed to comply with all applicable safety standards. This includes but is not limited to the following systems:

- Thermal sensors in all motors and motor controls.
- Current sensors in all motor control panels.
- Electrical breakers to prevent voltage surges and spikes from reaching electrical system.
- Electrical lockout on main electrical enclosure.
- E-Stop that shuts down all operational systems in an event of an emergency.

All thermal and current limits for motors and motor controls are preset at the factory. In the event that any of those parameters are exceeded during operation of the machine, the machine control system will shut down the machine and a warning of the specific fault will appear on the control screen.

CONTROL DEFINITIONS

Left Side Controls



Right Side Controls



OPERATING INSTRUCTIONS

Contents

Operating Instructions	4-2
Insert Sharpener Operation.....	4-2
Built In Venturi Vacuum Tester	4-3
Mounting Cylinder Heads	4-4
360 Degree Rollover Fixtures	4-4
Overhead Cam C Clamp System	4-4
Alignment and Setup	4-5
Front to Rear Cylinder Head Alignment	4-5
Left to Right Alignment	4-6
Canted Valve Cylinder heads (Automotive Application)	4-6
Multi-Angle Seat Cutting.....	4-7
Checking Valve Seat Concentricity	4-7
Machining valve seats and Counter Boring	4-8
Aligning Spindle to Work	4-8
Changing the Spindle Adapters	4-8
Fine Feed Engagement	4-9
Rottler SG90MTS MANUALMATIC Touch Screen Control Panel	4-10
Safety Tips Before Machining	4-10
Operation	4-10
Buttons	4-11
MANUALMATIC Operation	4-10
MANUAL	4-10
Buttons	4-10
Changing Language	4-12
UNIPILOT Centralizing Pilots	4-14
Pilot Diameter	4-14
Shank Diameter	4-15
Extended Length (EL) Pilots	4-15
Unipilot Tooling	4-15
How to Use UPT Series Unipilot Toolholders	4-16
Using the Unipilot System for the UPT5200 / UPT5400 Series Tool Holders	4-18
Rottler Six and One Instructions	4-19
Adjusting the Square Carbide Inserts	4-22
Cutting Small Diameter Valve Seats	4-22

Operating Instructions

Insert Sharpener Operation

The Rottler sharpening can re-condition inserts to a finish almost identical to new. The grinding wheel is designed to provide a very fine lapped finish across the entire face of the insert. It should be noted that the grinding holder is designed to accept RCA/RCB inserts on one side and the larger formant RCC inserts on the other. It should also be noted that the set screw which holds the inserts in the holder is specifically designed to not interfere with the grinding operation, at no time should a different set screw be used as this can result in damage to the grinding wheel.



Operation:

With the insert set into the holder, use two hands to support the holder and keep the insert face flush and stable against the grinding wheel. Sweep the insert across the face of the wheel with light pressure to clean up the entire face of the insert.



Check the insert as you grind it to make sure that it is cleaning up uniformly, also make sure that the set screw does not contact the grinding wheel. When done properly the insert face should look like the image below:



Built In Venturi Vacuum Tester

Designed to test valve seat and seat surface seal, and particularly to measure the valve seat surface quality after machining. Including a set of 7 pads and connecting extension.



5-2

Mounting Cylinder Heads

360 Degree Rollover Fixtures

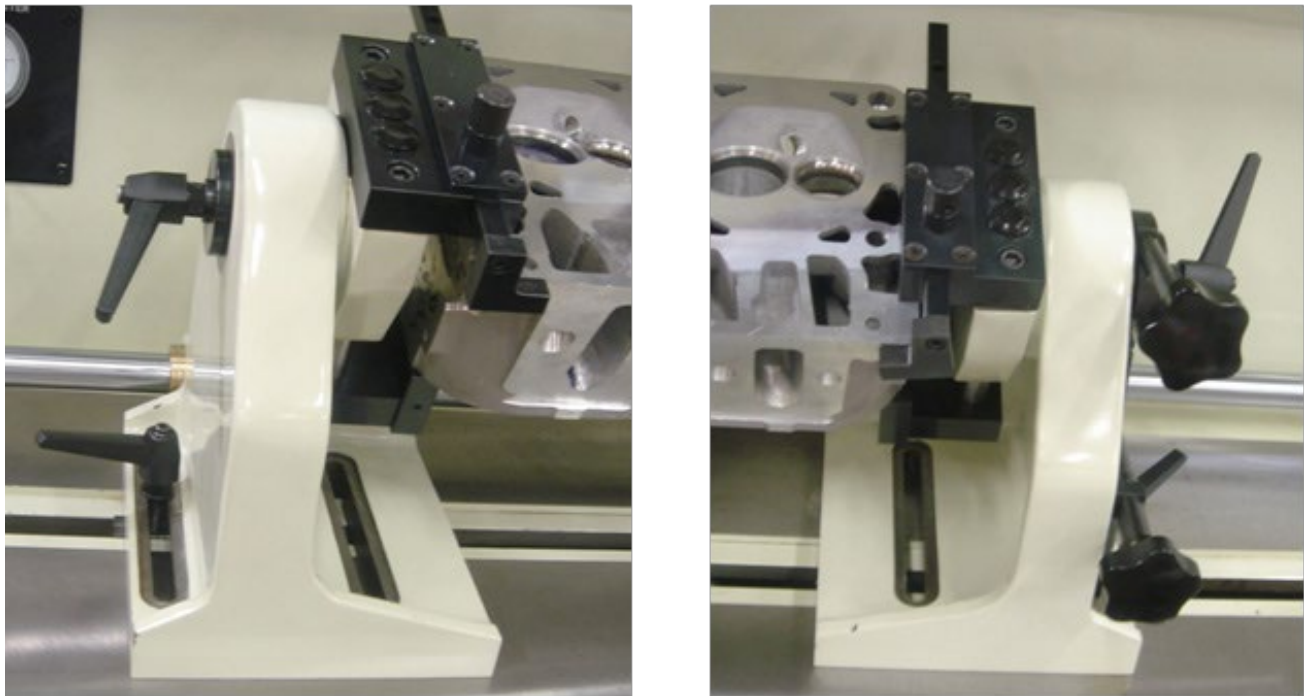
The 360 Degree Rollover fixture is a "clamp-up" design which allows for precise deck height location that results in the ability to achieve equal seat depth when cutting valve seats. The design also allows for easy loading and unloading by rotating the fixture 180 degrees to load the cylinder head deck side down. Once the cylinder head is loaded, the operator can then use the rotary handle to rotate even the largest of cylinder heads back into the cutting position once they are secured.

The 360 Degree Fixture is also supplied with adjustable back stops and safety chains. These features allow easy locating and protect the operator from accidents that may result from the head not being totally secured.

The operator should always check to make sure that the head is secure in the fixture and that all of the safety chains are in working order and properly connected before attempting to rotate the cylinder head in the fixture.

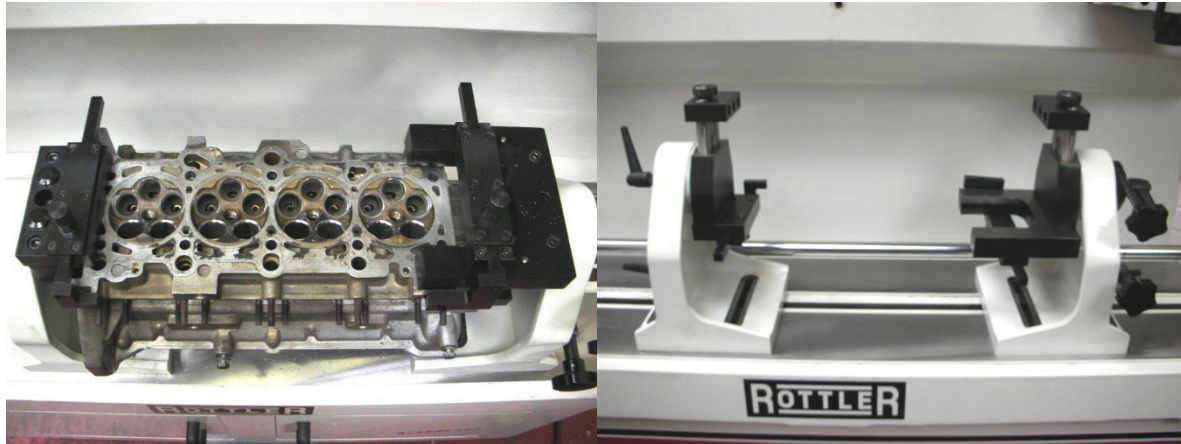
Cylinder Head Setup:

FIGURE 4



Utilize the grooves in the table to align the trunnion supports square to the machine.

5-5



Alignment and Setup

Alignment and setup applies to both the cylinder head and the machine's floating head. The goal is to align the centerline of the spindle with the centerline of the valve guide. This is achieved by using Rottlers uni pilot tooling system in conjunction with floating the work head, to position the valve seat cutter directly above the seat and centered on the guide geometry.

Note: think of the digital electronic level as a comparator. Because the leveling pin is square to the machines spindle, as long as you achieve the same readings front to rear and side to side then the spindle will be in perfect alignment.

Front to Rear Cylinder Head Alignment

With the cylinder head deck face up and the pilot to be used insert in one of the heads guides, position the angle sensor on the pilot as shown in the figures below. Unlock the clamps on the side of the fixture to allow the gear box to rotate freely. Using the rotary handle, watch the angle sensor readout on the main screen and rotate the handle clock-wise or counter-clockwise until the readout states 0.00. Retighten the side clamps of the fixture to lock the cylinder head in place.

Note: The angle sensor may oscillate slightly by .05. This is acceptable and so long as the angle is within $\pm .05$ the seat should cut with accurate CONCEN and acceptable surface finish.

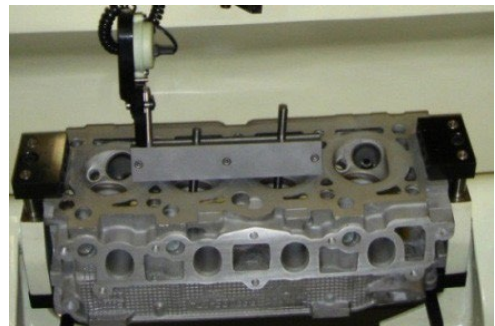
Left to Right Alignment

Obtain the left to right reading from a pilot mounted in a guide in the cylinder head. Align the angle sensor on the pilot as shown in the figure below. Remember or record this value that is shown on the angle sensor readout. Transfer the angle sensor back to the post on the side of the machines work head. With the angle sensor on the work head post match the work head angle to the recorded guide angle by unlocking the work head clamps and adjusting the angle with the rotary handle on the right side of the work head. Once adjusted, re-tighten the work head clamps to secure the work head angle before cutting.



Canted Valve Cylinder heads (Automotive Application)

An optional alignment bar is available that helps establish the front to back alignment on canted valve cylinder heads. The bar is held against two pilots in two adjacent guides. Use the alignment post to adjust the front to back angle of the work head. When using this adapter the side with the post attached to it should be touching the cylinder head deck surface.



Multi-Angle Seat Cutting

Multi angle valve jobs can be completed with ease by utilizing Rottler carbide inserts with desired geometry to create the seat profile. Consult the Rottler Insert Profile Catalog for more information on available seat geometry. Custom seat profiles may also be ordered by request through Rottler manufacturing.

When performing multi-angle seat cutting, the DSP or DSP20 tool may be used to set the desired location of the seat angle. To use these tools simply attach the device to the valve stem as shown in the figure to the right and position the needle as need be to the desired setback amount from the edge of the valve.

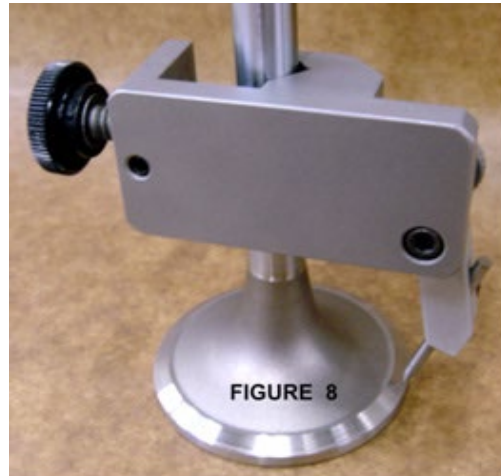
With the DSP needle set you may remove the device from the valve stem and transfer it to the pilot to be used during the seat cutting operation.

With the DSP on the pilot and the pilot placed in the UPT tool holder to be used, position the needle of the DSP so it is in-line with the edge of the seat angle on the chosen insert.

Set the cutting diameter by adjusting the insert holder set screw so that the needle is touching in the crease between the top angle and seat angle of the insert. With the insert set in the desired location make sure to tighten the locking set screws for the insert holder.

Remove the DSP from the pilot and insert the tool holder with pilot into the machine spindle.

Cutting speeds for multi-angle jobs will need to be reduced as the number of angles are increased on the insert.



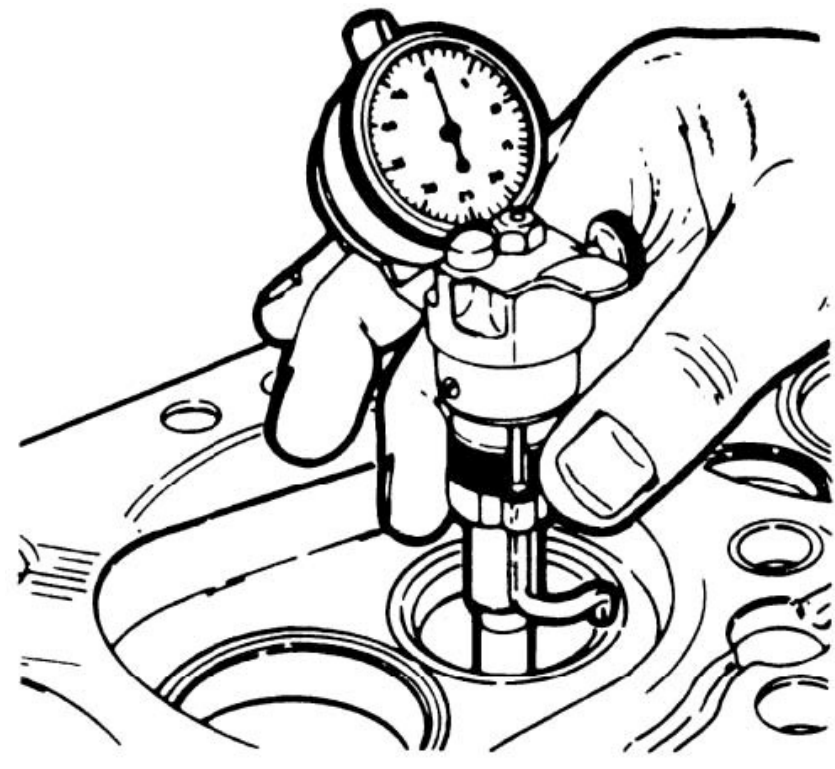
IMPORTANT: When the form tips, the square tips or the triangle inserts are fitted, check that their reference faces are perfectly clean.

Checking Valve Seat Concentricity

Make sure pilot and valve seat to be measured are free from dust, burrs, etc. Use a lint free towel and a lubricant (WD-40) to clean seat surface if necessary. With the pilot in the guide, loosen the brass locking screw and lower dial gauge down over the pilot. Make certain the tip of the concentricity gage is centered on the correct angle of the valve seat to be measured.

Grasp brass frame in middle of gauge and move upward approximately 1/8". The dial pointer should move as this is done. Center the pointer of the indicator pointing upward and lock the gauge to the pilot using the brass locking screw. Test proper alignment by moving the brass frame up and down. The pointer should move.

Inspect the seat run out by rotating the probe around the valve seat by twisting the knurled sleeve with your fingers. Each number on the dial indicator is equal to 0.001", (0.0254mm) run out of the valve seat. Each mark on the dial indicator is equal to 0.0001", (0.00254mm) run out of the valve seat.



Machining Valve Seats and Counter Boring

Aligning Spindle to Work

Most machining operations require the spindle to be directly centered over the work to be performed. This is accomplished by first setting up the machine as outlined above and then using the work head float function to align the tooling on the centerline of the guide. You may need to also re-position the fixture by floating it back and forth to achieve proper alignment. Care should be taken when aligning over the cylinder head valve seat to make sure the neither the workhead nor the fixture are in a position that results in them being at the end of their respective travels.

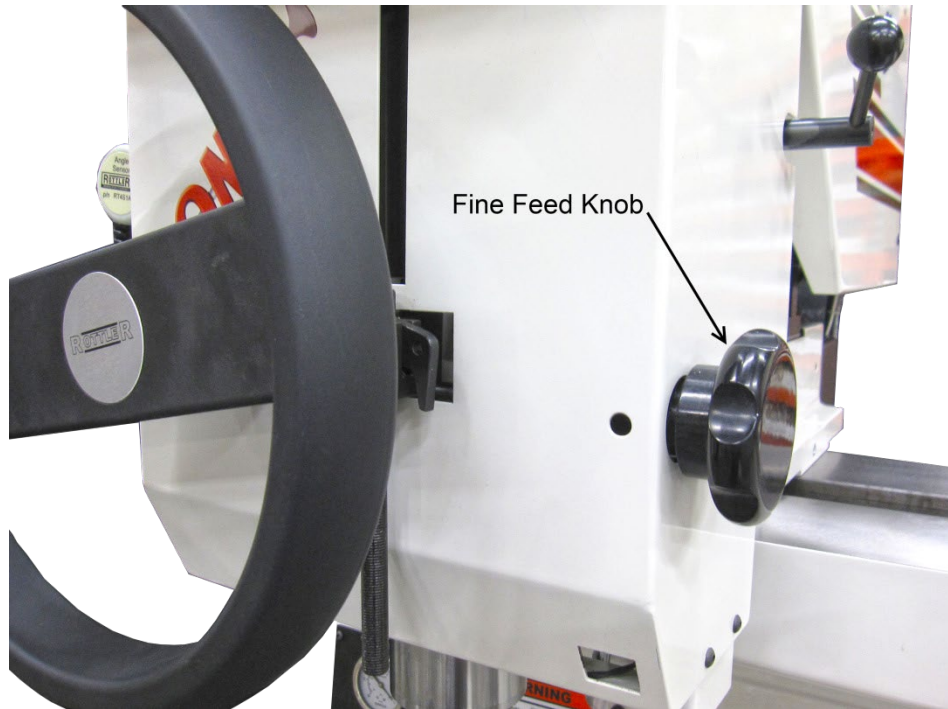
Changing Tools

Make sure the spindle locking nut is in the off lock position, line up the two ears of the spindle adapter and insert into the spindle ISO 40 taper. The locking nut will automatically move to the locked position when the internal release pin is depressed.

To remove the tooling turn the self-locking nut to the left position, while holding the UPT tool holder. The spindle nut will lock in the unlocked position and the tool will drop out of the spindle.

Fine Feed Engagement

To engage the fine feed mechanism it is necessary to push inward on the spindle handwheel while rotating the fine feed knob until engagement is achieved. To disengage the fine feed simply pull outward on the spindle hand wheel.



Rottler SG90MTS MANUALMATIC Touch Screen Control Panel

Safety Tips Before Machining

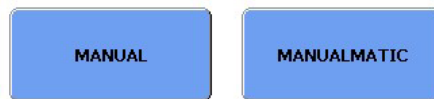
- Always wear proper Safety Items (such as safety glasses and other personal safety equipment as necessary or required).
- Never wear loose fitting clothes or jewelry while working on or around Machine.
- Use proper lifting procedures when moving Cylinder Head.
- Use care when installing and/or removing Cylinder Head from Machine. Lock Head Support Assembly before loading or unloading Cylinder Head.
- Keep area around Machine free of paper, oil, water and other debris at all times.
- Keep Machine and area cleaned of excessive lubricant and lubricant spills.
- Keep Machine clear of tools and other foreign objects not needed for the operation.
- Maintain all tools clean and in their proper storage compartments to maintain them in proper working condition and to prolong tool life.
- Before machining always Inspect tooling for cracks, burrs or bent parts that might affect operation. Inspect Carbide Inserts (Seat Pocket Cutter) and Carbide Cutters (Seat Angle Cutter) to ensure they are sharp, firmly attached and are not damaged.
- NEVER force tools when operating. Tools will do a better and safer job when operated at speed rate for which they were designed.
- Always turn OFF electrical power when performing service on your machine, if service does not require power.
- High Voltage exists inside Electrical Control Enclosure – use caution when working on or around Enclosure. Machine must be disconnected from main power supply before any work can be performed inside of Enclosure.
- Machine must ONLY be operated with all Safety Guards in place and locked.

Operation

Make sure E Stop is in.

Flip switch on Electrical enclosure to ON (up) position, wait for the screen to boot up, this may take a few seconds. When on the screen should present the image shown below

SEAT AND GUIDE MACHINE



Version: _v0.8k

From this screen the operator can choose which mode they would like to machine in.

Manual Buttons:

BACK - goes 1 page back.

VERTICAL ZERO - tap the SET button to set the vertical spindle height.

VERTICAL POSITION - height spindle is at from VERTICAL ZERO height set.

SPINDLE RPM - tap the box and a keyboard will pop up, enter RPM you would like to run and tap enter.

FINISH RPM - this will be activated as soon as spindle reaches finish cutting depth. Set same as above.

ANGLE - this is the actual angle the angle sensor is in.

ZERO - by tapping this button you can ZERO the angle reading for easier setup.

LAMP - turns ON and OFF the LED work lights

CENTER PILOT – locks and unlocks the spindle sphere

WORKHEAD FLOAT - floats the workhead

SPINDLE START - turns ON and OFF the spindle

MANUALMATIC Buttons:

SET UP – turns off auto mode for setup

AUTO MODE - turns on MANUALMATIC mode

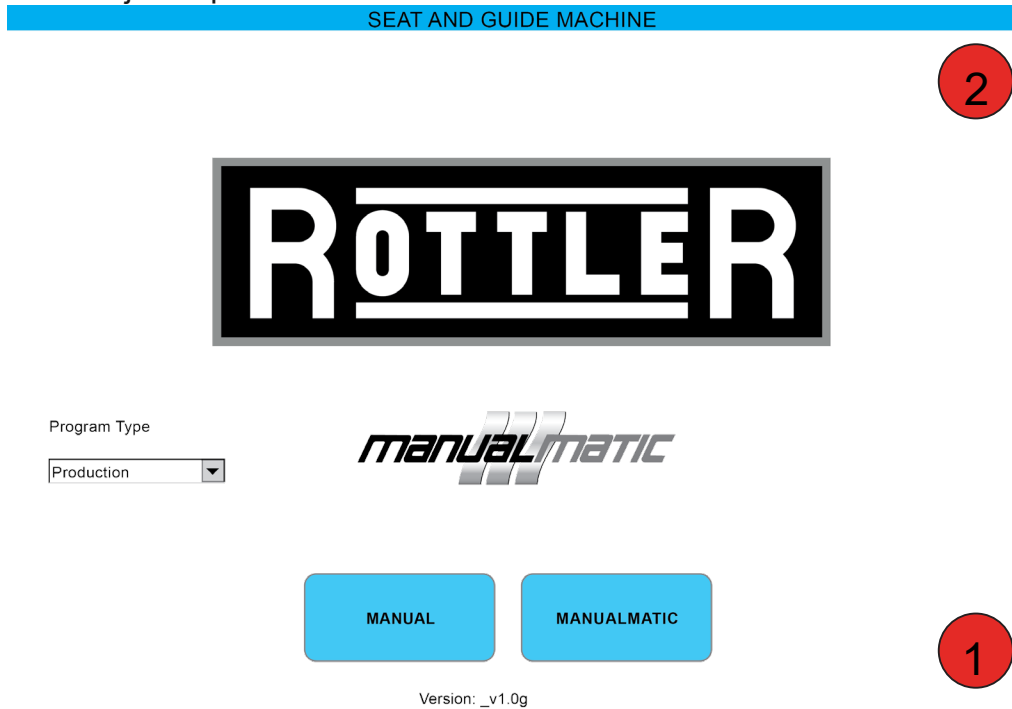
WORKHEAD FLOAT – Vertical height the spindle is at when workhead will float.

CENTERING/START – Vertical height the spindle will be at when the workhead centers.

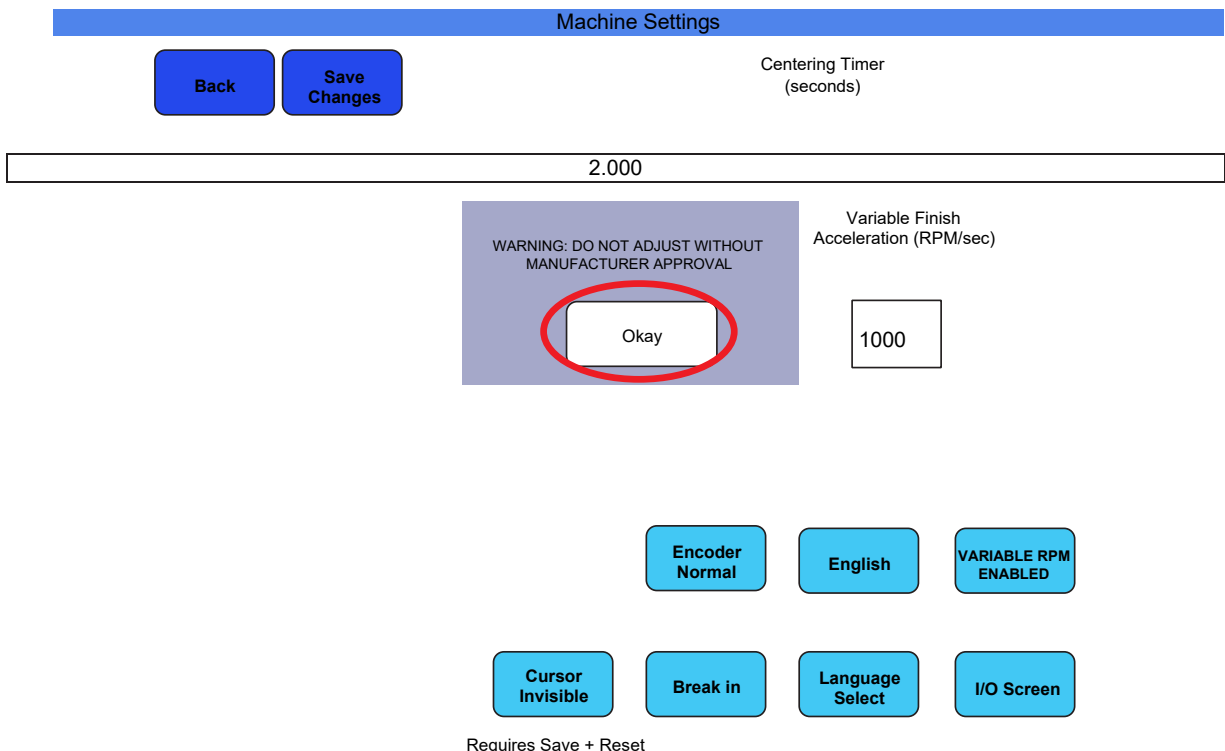
FINISH CUTTING DEPTH - Depth Finish RPM activates.

Changing Language

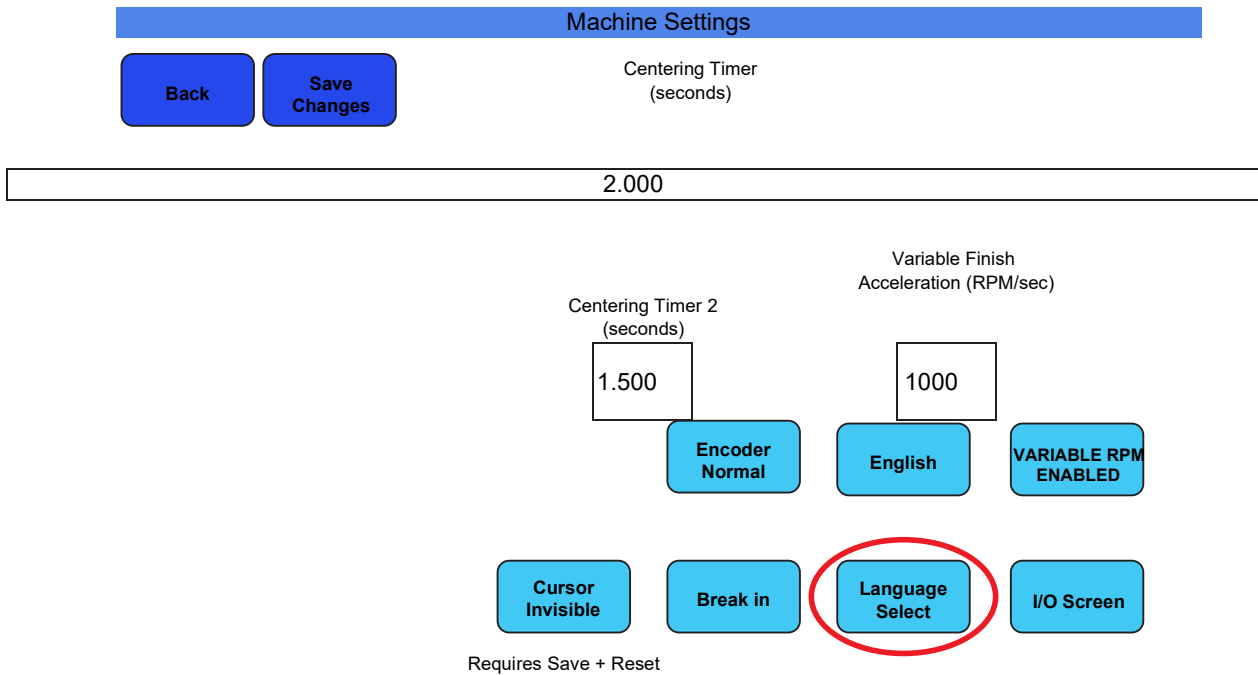
Press the screen in the lower right hand corner, then press the screen in the upper right hand corner to bring up the Machine Settings screen. Be sure to press the screen with your finger and not just tap it.



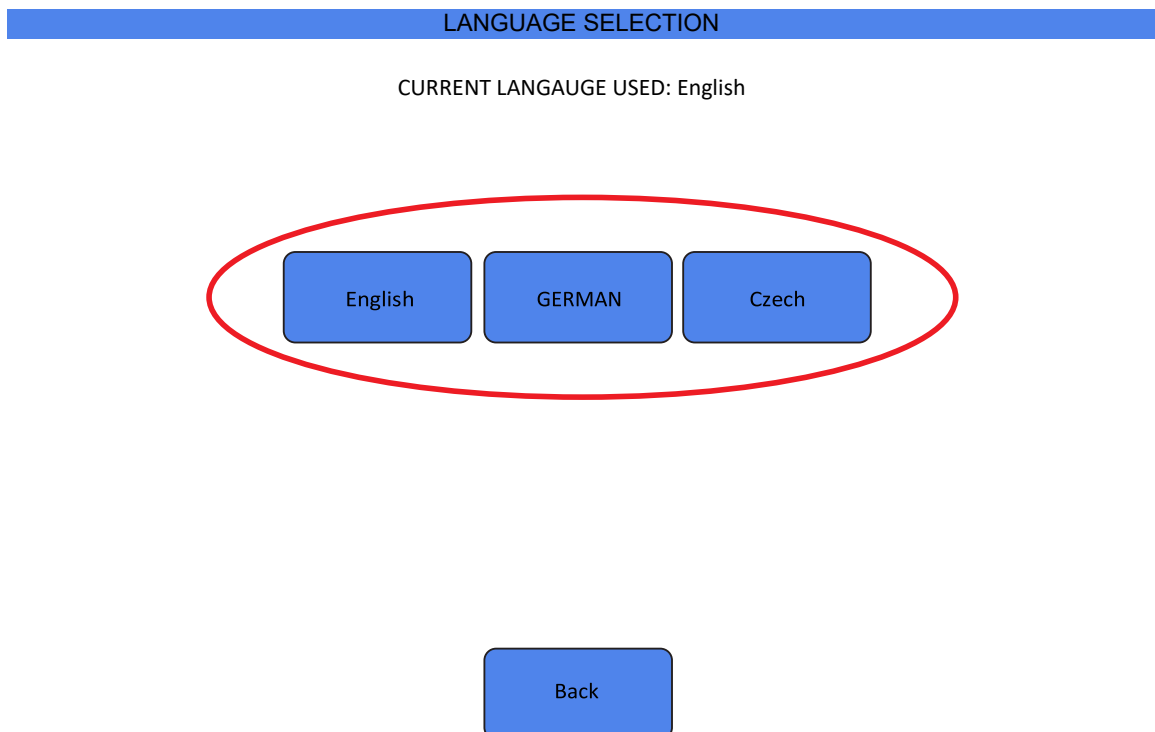
Press the Okay button on the pop up warning box to continue.



Press the Language Select button.



Select the language you want to switch to and press the button.



Confirm that the language you have selected is indicated and then restart the machine for the change to take effect. Turn the main power switch located on the electrical cabinet off and then back on to restart the machine.



CURRENT LANGAUGE USED: GERMAN



YOU MUST RESTART.

Back

UNIPILOT Centralizing Pilots

Rottler UNIPILOT Solid Carbide Centralizing Pilots are designed for a lifetime of precision machining. The unique straight to tapered section shank design, allows for a precise interference fit within the guide to created chatter-free cutting with accurate CONCEN results. Furthermore by using the UPT tool-holder and active spindle system. Rottler machines are able to provide these accurate results while offering hole-to-hole machining all with one pilot.

Pilot Diameter

The straight/parallel part of the pilot that fits in to the valve guide is referred to as the pilot diameter. Rottler pilots are available in 0.01mm (0.0004") increments. For best results, the clearance between the pilot and valve guide should not be more than 0.01mm (0.0004"). If this is not attainable then CONCEN and Vacuum check results may be less than ideal. If pursuing a tight tolerance in either of these measruments, work to improve valve guide geometry such as reaming may be required.

Most new valve guides are manufactured to a nominal size and the valve stem diameters are manufactured to be smaller than the nominal size to allow clearance for heat expansion of the valve stem while the engine is operating. For example: a 7mm valve guide has an internal diameter of exactly 7.00mm (.2756") The valve stem diameter of the intake valve is 6.98mm (.2748") and the exhaust is 6.96mm (.2740"). In order for the pilot to fit most of the valve guides, the first choice could be UCP0699 to give .01mm (0.0004") clearance. If the valve guide is used and has some wear, then the second choice of pilot could be UCP0700 (0.2756"). It is at the operators discretion to determine the best fit for their application, keep in mind that an assortment of carbide pilots may be necessary to process one cylinder head.

Shank Diameter

The part of the pilot that fits inside the tool holder is referred to as the shank. Rottler offers three different shank sizes (6.00mm, 9.52mm, and 20.00mm). For longest tool life and best seat cutting results, the shank needs to go as far as possible inside the tool holder when cutting valve seats or boring out valve seat housings.

Extended Length (EL) Pilots

Some cylinder heads require extended length pilots because the distance from the top of the valve guide to the head gasket surface is longer than normal. Normally this distance is about 1.0" - 1.5", it is when this distance becomes greater that extended length pilots are needed. The pilots are extended by adding material below the shank and above the tapered section of the pilot.

If you think you need an extended length pilot, please see the order form in the back of the catalog and contact Rottler for ordering assistance.



PILOT DIAMETER SHOULD ALWAYS BE GREATER THAN VALVE STEM DIAMETER FOR BEST CONCENTRICITY

Unipilot Tooling

Rottler's patent pending UNIPILLOT tooling system allows the carbide centralizing pilot to remain in the spindle when moving from guide to guide like a live pilot machine, but at the same has a fixed pilot design to give the best concentricity. This system offers the speed of a live pilot machine, with the accuracy of a fixed pilot machine.

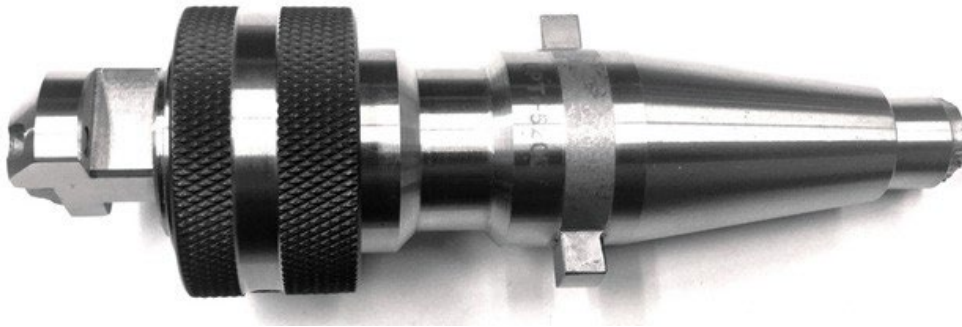
The active spindle "sphere" incorporated in the SG90MTS spindle allows compensation for minor inconsistencies between the guide and seat of the cylinder head. With the active spindle and uni-pilot tooling, the operator is able to position the cutter from hole to hole quickly without concern about perfect alignment.

The UPT series tool holders are what make the use of the UNIPILLOT system possible on the SG90MTS models. These toolholders with either 3/8" or 6mm shank options are spring loaded to allow pilot to compress and extend vertically as it centers in the pilot. The notch in the top of the pilot is designed to engage with the spring-loaded system on the UPT holder to retain the pilot while still allowing this vertical movement. To engage the spring-loaded system the operator must rotate the collar on the UPT holder counter-clockwise and down with the holder in the spindle or in the same orientation as when it is in the spindle. To unlock the system, rotate the collar clockwise and up.

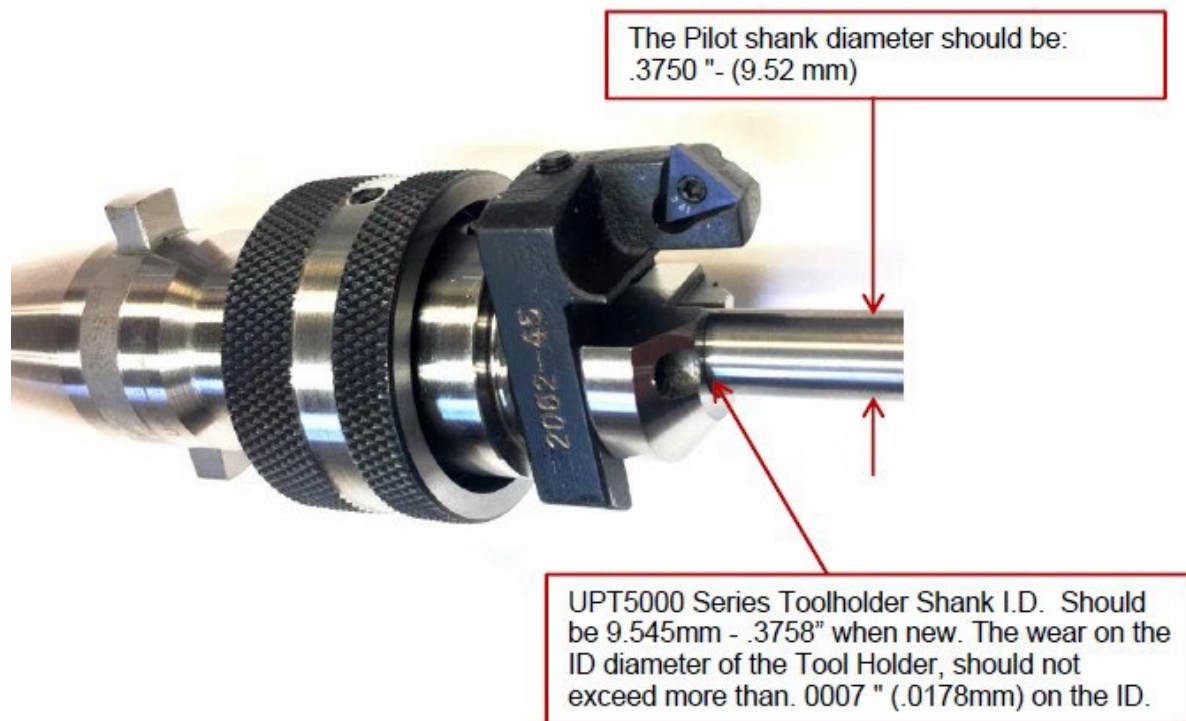
With the collar in the engaged position, any pilot inserted in the holder will engage with the spring system and will be able to compress in the holder but the system will not allow the pilot to fully pull back out of the holder. This is what allows the UPT system to provide hole-to-hole seat cutting while using a fixed style pilot. To remove the pilot from the holder the operator must first move the collar to the unlocked position, and then compress the pilot in the holder slightly before pulling the pilot completely out of the holder.

For high volume applications, it is recommended to have multiple UPT holders assembled and setup with cutting tools to allow for quick changeover between cylinder heads and different seats.

How to Use UPT Series Uipilot Toolholders



1. Pilot shank and toolholder Inside Diameter for the pilot shank must be clean from cast iron dust, few drops on lite oil may be necessary at least twice a day.
2. Measure pilot shank diameter for wear, it's supposed to be .3758" - 9.545mm. The shank should not have more than .0007" - .0178mm of wear less the shank diameter of .375"-(9.525mm) diameter.



3. The UPT5200 Series toolholder shank ID it supposed to be 9.545mm - .3758" when new. The ID diameter should not be more than .0010" - .0254mm of wear.

Note: Please make sure to follow these inspections to avoid concentricity problems on every valve seat that has been machined.

4. Is very important not to over tighten the "C" Looking screws that lock the insert holder on the Toolholder, tightening the locking screws will collapse the ID bore diameter on the toolholder keeping the shank of the pilot not to fit easy into the Toolholder ID.

This is the correct way to lock the Insert holder using the long part of the Allen wrench like you see on the picture below to avoid too much torque and collapse the Pilot shank ID Bore of the Toolholder.



For safety please avoid overtighten the insert holder, it will be better to use the 2.5mm Ball End Metric Screwdriver like the one you see on the picture below.

The 2.5mm Ball End Metric Screwdriver will work to lock the insert holder and it will also to adjusting screw to set the diameter for the seat that you will be machining.



On the Picture below is showing the wrong way to Lock the Insert holder, will put too much torque and collapse the Pilot shank ID bore of the Toolholder. The Pilot shanks will not slide smoothly into the toolholder shank inside diameter; it will create excessive wear on the toolholder and possible over tolerance in concentric limits problems when machining the valve seat.



Using the Unipilot System for the UPT5200 / UPT5400 Series Tool Holders

1. Insert standard 3/8" (9.52mm) shank UNIPILOT into the cylinder head valve guide.
2. Place checking gage next to Pilot shank to inspect range.
3. If pilot is with in MIN. and MAX. range of the checking gauge, (Figure 3) proceed to machine seat inserts after removing gage from the cylinder head.
4. In case pilot height exceeds MAX. limit of the gauge. Inspect valve guides and ream guide if need to be or use proper pilot size diameter till pilot height is within tolerance of the checking gauge.
5. In case pilot is below the MIN. limit of the Gauge, select next size up pilot until pilot height is Gauge within tolerance.

MAXIMUM AND MINIMUM PILOT HEIGHT FROM HEAD SURFACE

Figure 1

On the picture below you will see that the Pilot shank is above the Pilot Gauge. This will damage the Toolholder



Figure 2

On the picture below you will see that the Pilot shank is minimum on the Pilot Gauge mark. If it's below the minimum will create poor centering and possible concentricity problems



Figure 3

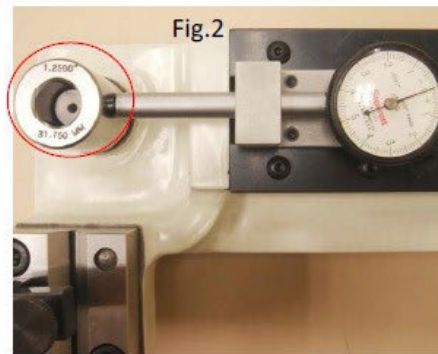
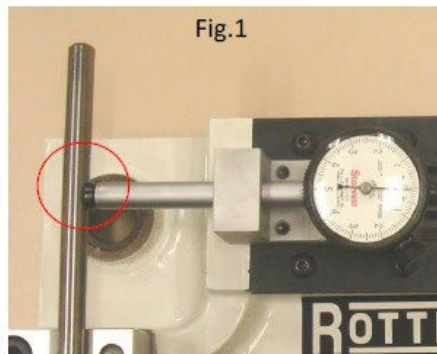
On the picture below you will see that the Pilot shank is within the MAX and MIN range of the Pilot Height Gauge. This is the correct pilot to be used to machine the valve seats



Rottler Six and One Instructions



- 1- Checking the calibration of the six and one Setting Fixture included two tool setting fixtures, 1.250" / 31.750MM and .375" / 9.52MM and on the other end is 6.00MM. On the picture you will see master setting tool (.375" / 9.52MM) this one also will be using it to set you tool holders, for .375" (9.52mm) and 6.00MM ID tooling.,



Calibrating the Digital Micrometer

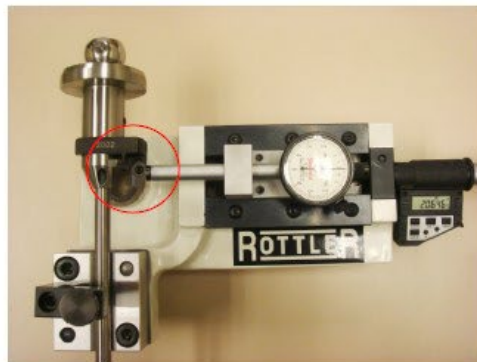
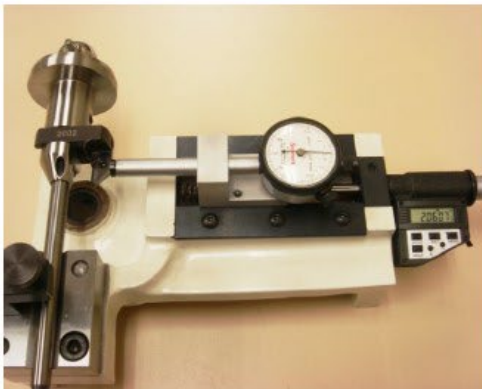
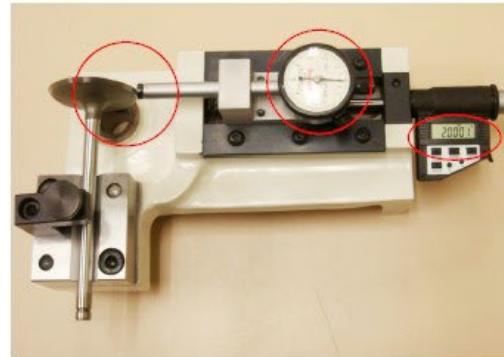
- 2- Turn the digital micrometer thimble in until the end of the micrometer is flush with the edge of the micrometer frame. Then turn the thimble out until the '0' mark on the thimble lines up exactly with the line on the barrel (see fig.1).

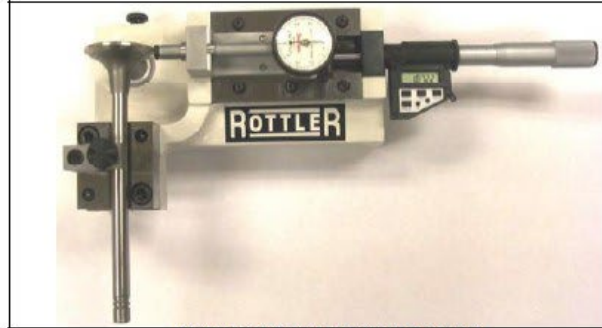


- a. Select mode: Press the **mm/in** button until the desired mode is shown in the digital display.
Note: use a small instrument such as a pen to gently push the buttons; they are quite small and a bit delicate.
- b. Determine which calibrating setting tool you will be using to calibrate the micrometer is going to be used on. (example; calibrating pilot .375" / 952mm side)
- c. Press and hold the **SET** button, then press + or – button. "SET" will be flash in the display. This will place the micrometer in the edit mode
- d. Press and hold the + or – buttons to change the display number to the minimum set diameter Determined earlier (example; setting tool, pilot .375" / 9.52mm side).
- e. After it reach the proper reading, press the **SET** button to exit the edit mode. "SET" should no longer be shown in the display. The digital micrometer head is now set to the setting tool. (After initial setting, there is no need to press the SET button again unless display is lost at which time the micrometer must be reset)

3- MEASURE THE HEAD OF THE VALVE

- a. Position the Valve Stem on V Block and bring the Indicator tip to may contact with the head of the Valve until zero show on the indicator dial, the amount showing of the digital micrometer display is the actual diameter of the Head of the Valve.
- b. From that reading 2.0001"

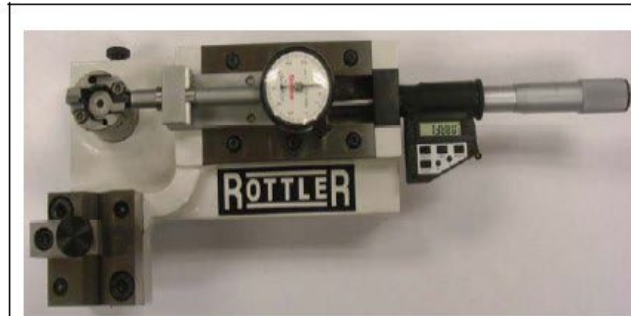




MEASURE VALVE HEAD DIA



MEASURE VALVE STEM AND PILOT DIA.



SET ADJUSTABLE DOUBLE INSERT MILLING CUTTERS



SET ADJUSTABLE DOUBLE INSERT MILLING CUTTERS



SET BORING INSERT FOR HOUSING DIA.



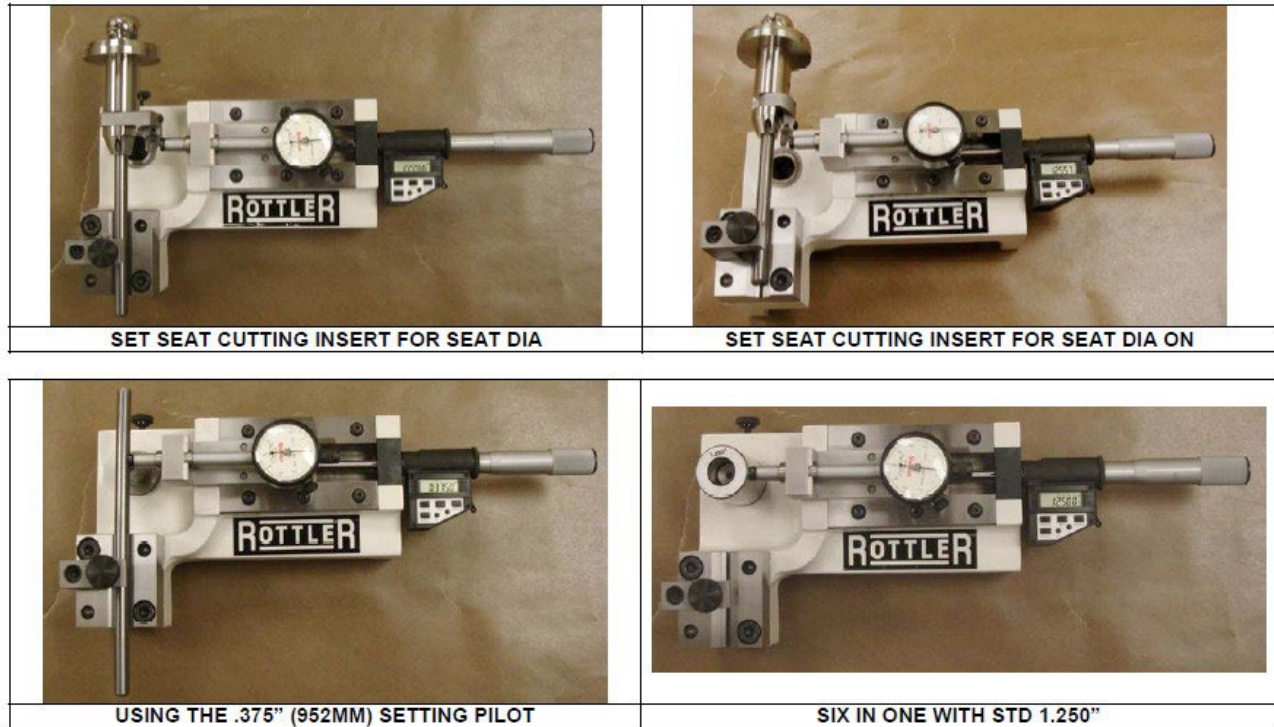
SET BORING INSERT FOR HOUSING DIA WITH TRIANGLE



SET BORING INSERT FOR HOUSING DIA.



SET BORING INSERT FOR HOUSING DIA



Adjusting the Square Carbide Inserts

- The micrometer should be used.
- Set the Digital micrometer (BM) according to the valve seat insert diameter and the required interference.
- Slide the tool holder without the pilot on the micrometer.
- With the setting screw, adjust the square tip holder offset.



IMPORTANT: When 90 degree bits (RCA512) or the Triangle bits are fitted, check that their reference faces are perfectly clean.

The accuracy of the seat angles depends on this.

While rotating the assembly tool holder/carbide tip holder, the carbide bit's cutting edge should just touch the micrometer spindle.

Once in contact with the micrometer spindle, the carbide tip should not be moved at all. If this is not observed, the cutting edge may be damaged and the resulting surface quality, when machining, will be deteriorated.

Cutting Small Diameter Valve Seats

The UPT5200 adapter has a set screw as shown in photo below – push pilot all the way into the UPT5200 and tighten set screw to hold pilot inside the UPT5200. Install the Tip Holder TH1999, adjust diameter, release set screw, and remove pilot. Be sure to use special small diameter cutting inserts such as RCA625 or RCA628 where the seat is close to the pilot side of the insert.

