



OPERATOR'S MANUAL



MANDREL DRAW BENDER MODEL: MB-350

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Book 1 of 2

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THANK YOU & WARRANTY

Thank you for your purchase of a machine from Baileigh Industrial. We hope that you find it productive and useful to you for a long time to come.

Inspection & Acceptance. Buyer shall inspect all Goods within ten (10) days after receipt thereof. Buyer's payment shall constitute final acceptance of the Goods and shall act as a waiver of the Buyer's rights to inspect or reject the goods unless otherwise agreed. If Buyer rejects any merchandise, Buyer must first obtain a Returned Goods Authorization ("RGA") number before returning any goods to Seller. Goods returned without a RGA will be refused. Seller will not be responsible for any freight costs, damages to goods, or any other costs or liabilities pertaining to goods returned without a RGA. Seller shall have the right to substitute a conforming tender. Buyer will be responsible for all freight costs to and from Buyer and repackaging costs, if any, if Buyer refuses to accept shipment. If Goods are returned in unsalable condition, Buyer shall be responsible for full value of the Goods. Buyer may not return any special order Goods. Any Goods returned hereunder shall be subject to a restocking fee equal to 30% of the invoice price.

Specifications. Seller may, at its option, make changes in the designs, specifications or components of the Goods to improve the safety of such Goods, or if in Seller's judgment, such changes will be beneficial to their operation or use. Buyer may not make any changes in the specifications for the Goods unless Seller approves of such changes in writing, in which event Seller may impose additional charges to implement such changes.

Limited Warranty. Seller warrants to the original end-user that the Goods manufactured or provided by Seller under this Agreement shall be free of defects in material or workmanship for a period of twelve (12) months from the date of purchase, provided that the Goods are installed, used, and maintained in accordance with any instruction manual or technical guidelines provided by the Seller or supplied with the Goods, if applicable. The original end-user must give written notice to Seller of any suspected defect in the Goods prior to the expiration of the warranty period. The original end-user must also obtain a RGA from Seller prior to returning any Goods to Seller for warranty service under this paragraph. Seller will not accept any responsibility for Goods returned without a RGA. The original end-user shall be responsible for all costs and expenses associated with returning the Goods to Seller for warranty service. In the event of a defect, Seller, at its sole option, shall repair or replace the defective Goods or refund to the original end-user the purchase price for such defective Goods. Goods are not eligible for replacement or return after a period of 30 days from date of receipt. The foregoing warranty is Seller's sole obligation, and the original end-user's exclusive remedy, with regard to any defective Goods. This limited warranty does not apply to: (a) die sets, tooling, and saw blades; (b) periodic or routine maintenance and setup, (c) repair or replacement of the Goods due to normal wear and tear, (d) defects or damage to the Goods resulting from misuse, abuse, neglect, or accidents, (e) defects or damage to the Goods resulting from improper or unauthorized alterations, modifications, or changes; and (f) any Goods that has not been installed and/or maintained in accordance with the instruction manual or technical guidelines provided by Seller.

EXCLUSION OF OTHER WARRANTIES. THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. ANY AND ALL OTHER EXPRESS, STATUTORY OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. NO WARRANTY IS MADE WHICH EXTENDS BEYOND THAT WHICH IS EXPRESSLY CONTAINED HEREIN.

Limitation of Liability. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY OTHER PARTY FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR DOWN TIME) ARISING FROM OR IN MANNER CONNECTED WITH THE GOODS, ANY BREACH BY SELLER OR ITS AGENTS OF THIS AGREEMENT, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. BUYER'S REMEDY WITH RESPECT TO ANY CLAIM ARISING UNDER THIS AGREEMENT IS STRICTLY LIMITED TO NO MORE THAN THE AMOUNT PAID BY THE BUYER FOR THE GOODS.



Force Majeure. Seller shall not be responsible for any delay in the delivery of, or failure to deliver, Goods due to causes beyond Seller's reasonable control including, without limitation, acts of God, acts of war or terrorism, enemy actions, hostilities, strikes, labor difficulties, embargoes, non-delivery or late delivery of materials, parts and equipment or transportation delays not caused by the fault of Seller, delays caused by civil authorities, governmental regulations or orders, fire, lightening, natural disasters or any other cause beyond Seller's reasonable control. In the event of any such delay, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay.

Installation. If Buyer purchases any Goods that require installation, Buyer shall, at its expense, make all arrangements and connections necessary to install and operate the Goods. Buyer shall install the Goods in accordance with any Seller instructions and shall indemnify Seller against any and all damages, demands, suits, causes of action, claims and expenses (including actual attorneys' fees and costs) arising directly or indirectly out of Buyer's failure to properly install the Goods.

Work By Others; Safety Devices. Unless agreed to in writing by Seller, Seller has no responsibility for labor or work performed by Buyer or others, of any nature, relating to design, manufacture, fabrication, use, installation or provision of Goods. Buyer is solely responsible for furnishing, and requiring its employees and customers to use all safety devices, guards and safe operating procedures required by law and/or as set forth in manuals and instruction sheets furnished by Seller. Buyer is responsible for consulting all operator's manuals, ANSI or comparable safety standards, OSHA regulations and other sources of safety standards and regulations applicable to the use and operation of the Goods.

Remedies. Each of the rights and remedies of Seller under this Agreement is cumulative and in addition to any other or further remedies provided under this Agreement or at law or equity.

Attorney's Fees. In the event legal action is necessary to recover monies due from Buyer or to enforce any provision of this Agreement, Buyer shall be liable to Seller for all costs and expenses associated therewith, including Seller's actual attorneys' fees and costs.

Governing Law/Venue. This Agreement shall be construed and governed under the laws of the State of Wisconsin, without application of conflict of law principles. Each party agrees that all actions or proceedings arising out of or in connection with this Agreement shall be commenced, tried, and litigated only in the state courts sitting in Manitowoc County, Wisconsin or the U.S. Federal Court for the Eastern District of Wisconsin. Each party waives any right it may have to assert the doctrine of "forum non conveniens" or to object to venue to the extent that any proceeding is brought in accordance with this section. Each party consents to and waives any objection to the exercise of personal jurisdiction over it by courts described in this section. Each party waives to the fullest extent permitted by applicable law the right to a trial by jury.

Summary of Return Policy.

- 10 Day acceptance period from date of delivery. Damage claims and order discrepancies will not be accepted after this time.
- You must obtain a Baileigh issued RGA number PRIOR to returning any materials.
- Returned materials must be received at Baileigh in new condition and in original packaging.
- Altered items are not eligible for return.
- Buyer is responsible for all shipping charges.
- A 30% re-stocking fee applies to all returns.

Baileigh Industrial makes every effort to ensure that our posted specifications, images, pricing and product availability are as correct and timely as possible. We apologize for any discrepancies that may occur. Baileigh Industrial reserves the right to make any and all changes deemed necessary in the course of business including but not limited to pricing, product specifications, quantities, and product availability.

For Customer Service & Technical Support:

Please contact one of our knowledgeable Sales and Service team members at: (920) 684-4990 or e-mail us at sales@baileighindustrial.com



INTRODUCTION

The quality and reliability of the components assembled on a Baileigh Industrial machine guarantee near perfect functioning, free from problems, even under the most demanding working conditions. However if a situation arises, refer to the manual first. If a solution cannot be found, contact the distributor where you purchased our product. Make sure you have the serial number and production year of the machine (stamped on the nameplate). For replacement parts refer to the assembly numbers on the parts list drawings.

Our technical staff will do their best to help you get your machine back in working order.

In this manual you will find: (when applicable)

- Safety procedures
- Correct installation guidelines
- Description of the functional parts of the machine
- Capacity charts
- Set-up and start-up instructions
- Machine operation
- Scheduled maintenance
- Parts lists

GENERAL NOTES

After receiving your equipment remove the protective container. Do a complete visual inspection, and if damage is noted, **photograph it for insurance claims** and contact your carrier at once, requesting inspection. Also contact Baileigh Industrial and inform them of the unexpected occurrence. Temporarily suspend installation.

Take necessary precautions while loading / unloading or moving the machine to avoid any injuries.

Your machine is designed and manufactured to work smoothly and efficiently. Following proper maintenance instructions will help ensure this. Try and use original spare parts, whenever possible, and most importantly; **DO NOT** overload the machine or make any unauthorized modifications.

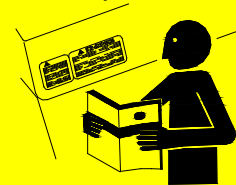


Note: This symbol refers to useful information throughout the manual.



IMPORTANT **PLEASE READ THIS OPERATORS MANUAL CAREFULLY**

It contains important safety information, instructions, and necessary operating procedures. The continual observance of these procedures will help increase your production and extend the life of the equipment.



SAFETY INSTRUCTIONS

LEARN TO RECOGNIZE SAFETY INFORMATION

This is the safety alert symbol. When you see this symbol on your machine or in this manual, **BE ALERT TO THE POTENTIAL FOR PERSONAL INJURY!**

Follow recommended precautions and safe operating practices.

UNDERSTAND SIGNAL WORDS

A signal word – **DANGER**, **WARNING**, or **CAUTION** is used with the safety alert symbol. **DANGER** identifies a hazard or unsafe practice that will result in severe **Injury or Death**.

Safety signs with signal word **DANGER** or **WARNING** are typically near specific hazards.

General precautions are listed on **CAUTION** safety signs. **CAUTION** also calls attention to safety messages in this manual.



DANGER



WARNING



CAUTION

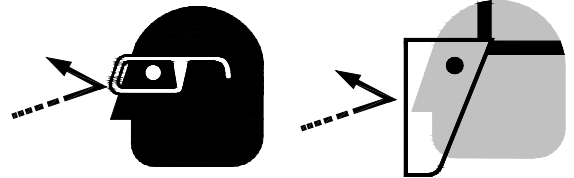


SAVE THESE INSTRUCTIONS.
Refer to them often and use them to instruct others.



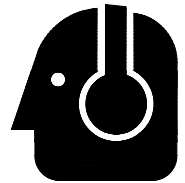
PROTECT EYES

Wear safety glasses or suitable eye protection when working on or around machinery.



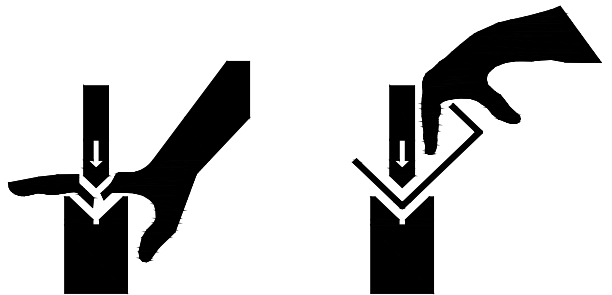
PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear suitable hearing protective devices such as ear muffs or earplugs to protect against objectionable or uncomfortable loud noises.



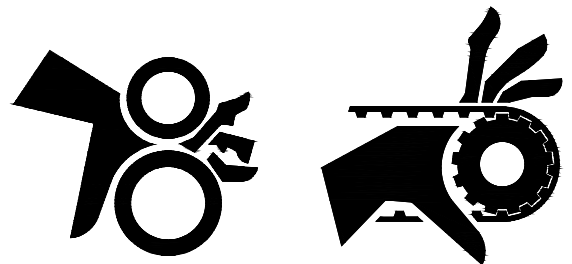
BEWARE OF CRUSH HAZARD

NEVER place your hands, fingers, or any part of your body in the die area of this machine. Be aware of the area on either side of the dies for crush points created by material movement.



BEWARE OF PINCH POINTS

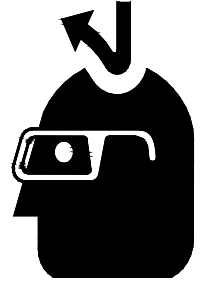
Keep hands and fingers away from the drive mechanisms, cylinders, ratchets, and other moving linkage while the machine is in operation.





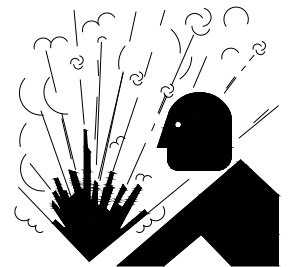
KEEP CLEAR OF MOVING OBJECTS

Always be aware of the position of the material and the swing area in which the material will travel. The material will swing with significant force. This swing area will create pinch points and the force of the material movement may cause serious bodily injuries.



HYDRAULIC HOSE FAILURE

Exercise **CAUTION** around hydraulic hoses in case of a hose or fitting failure.



HIGH VOLTAGE

USE CAUTION IN HIGH VOLTAGE AREAS. DO NOT assume the power to be off.
FOLLOW PROPER LOCKOUT PROCEDURES.





SAFETY PRECAUTIONS



Metal working can be dangerous if safe and proper operating procedures are not followed. As with all machinery, there are certain hazards involved with the operation of the product. Using the machine with respect and caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result.

Safety equipment such as guards, hold-downs, safety glasses, dust masks and hearing protection can reduce your potential for injury. But even the best guard won't make up for poor judgment, carelessness or inattention. **Always use common sense** and exercise **caution** in the workshop. If a procedure feels dangerous, don't try it.

REMEMBER: Your personal safety is your responsibility.



WARNING: FAILURE TO FOLLOW THESE RULES MAY RESULT IN SERIOUS PERSONAL INJURY

1. **Only trained and qualified personnel can operate this machine.**
2. **Make sure guards are in place and in proper working order before operating machinery.**
3. **Remove any adjusting tools.** Before operating the machine, make sure any adjusting tools have been removed.
4. **Keep work area clean.** Cluttered areas invite injuries.
5. **Overloading machine.** By overloading the machine you may cause injury from flying parts. **DO NOT** exceed the specified machine capacities.
6. **Dressing material edges.** Always chamfer and deburr all sharp edges.
7. **Do not force tool.** Your machine will do a better and safer job if used as intended. **DO NOT** use inappropriate attachments in an attempt to exceed the machines rated capacity.
8. **Use the right tool for the job. DO NOT** attempt to force a small tool or attachment to do the work of a large industrial tool. **DO NOT** use a tool for a purpose for which it was not intended.
9. **Dress appropriate. DO NOT** wear loose fitting clothing or jewelry as they can be caught in moving machine parts. Protective clothing and steel toe shoes are recommended when using machinery. Wear a restrictive hair covering to contain long hair.
10. **Use eye and ear protection.** Always wear ISO approved impact safety goggles. Wear a full-face shield if you are producing metal filings.



11. **Do not overreach.** Maintain proper footing and balance at all times. **DO NOT** reach over or across a running machine.
12. **Stay alert.** Watch what you are doing and use common sense. **DO NOT** operate any tool or machine when you are tired.
13. **Check for damaged parts.** Before using any tool or machine, carefully check any part that appears damaged. Check for alignment and binding of moving parts that may affect proper machine operation.
14. **Observe work area conditions.** **DO NOT** use machines or power tools in damp or wet locations. Do not expose to rain. Keep work area well lighted. **DO NOT** use electrically powered tools in the presence of flammable gases or liquids.
15. **Keep children away.** Children must never be allowed in the work area. **DO NOT** let them handle machines, tools, or extension cords.
16. **Store idle equipment.** When not in use, tools must be stored in a dry location to inhibit rust. Always lock up tools and keep them out of reach of children.
17. **DO NOT operate machine if under the influence of alcohol or drugs.** Read warning labels on prescriptions. If there is any doubt, **DO NOT** operate the machine.
18. **DO NOT** touch live electrical components or parts.
19. **Turn off** power before checking, cleaning, or replacing any parts.
20. Be sure **all** equipment is properly installed and grounded according to national, state, and local codes.
21. **DO NOT** bypass or defeat any safety interlock systems.
22. Keep visitors a safe distance from the work area.



TECHNICAL SPECIFICATIONS

Minimum CLR (Center Line Radius)	1.5 x diameter (38mm x diameter)
Maximum CLR (Center Line Radius)	9" (736mm)
Square Tube SS & MS	2.0" x 2.0" x .120" wall (50 x 50 x 3mm)
Capacities Round OD (Mild Steel)	3.0" x .120" wall (76 x 3mm)
Capacities Round OD Stainless Steel	3.0" x .065" wall (76 x 1.6mm)
Minimum Practical Material Diameter	1" (25mm)
Bending Power	4hp (3kw)
Bend Direction	Clockwise
Mandrel Rod Size	1" diameter x 1"-8 Thread
Material Feed	1" (25.4mm)
Index Chuck Thru Hole	2.4" (61mm)
Index Table Length	10ft. (3048mm)
Maximum Bend Speed	180 degrees in 16 seconds
Maximum Bend Angle	200 degrees
Maximum Hydraulic Pressure	3000psi (20.68mPa)
Hydraulic Motor	5hp (3.75kw)
Power	220V / 3-phase / 60hz
Shipping Weight	4000lbs. (1819kgs)

TECHNICAL SUPPORT

Our technical support department can be reached at 920.684.4990, and asking for the support desk for purchased machines. Tech Support handles questions on machine setup, schematics, warranty issues, and individual parts needs: (other than die sets and blades).

For specific application needs or future machine purchases contact the Sales Department at: sales@baileighindustrial.com, Phone: 920.684.4990, or Fax: 920.684.3944.



Note: The photos illustrations used in this manual are representative only and may not depict the actual color, labeling or accessories and may be intended to illustrate technique only.



Note: The specifications and dimensions presented here are subject to change without prior notice due to improvements of our products.



UNPACKING AND CHECKING CONTENTS

Your Baileigh machine is shipped complete. Separate all parts from the packing material and check each item carefully. Make certain all items are accounted for before discarding any packing material.

⚠ WARNING: SUFFOCATION HAZARD! Immediately discard any plastic bags and packing materials to eliminate choking and suffocation hazards to children and animals.

If any parts are missing, **DO NOT** place the machine into service until the missing parts are obtained and installed correctly.

Cleaning

⚠ WARNING: DO NOT USE gasoline or other petroleum products to clean the machine. They have low flash points and can explode or cause fire.

⚠ CAUTION: When using cleaning solvents work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.

Your machine may be shipped with a rustproof waxy coating and/or grease on the exposed unpainted metal surfaces. Fully and completely remove this protective coating using a degreaser or solvent cleaner. Moving items will need to be moved along their travel path to allow for cleaning the entire surface. For a more thorough cleaning, some parts will occasionally have to be removed. **DO NOT USE** acetone or brake cleaner as they may damage painted surfaces.

Follow manufacturer's label instructions when using any type of cleaning product. After cleaning, wipe unpainted metal surfaces with a light coating of quality oil or grease for protection.



Important: This waxy coating is **NOT** a lubricant and will cause the machine to stick and lose performance as the coating continues to dry.





TRANSPORTING AND LIFTING

⚠ CAUTION: Lifting and carrying operations should be carried out by skilled workers, such as a truck operator. Make sure the machine is well balanced. Choose a location that will keep the machine free from vibration and dust from other machinery. Keep in mind that having a large clearance area around the machine is important for safe and efficient working conditions.

Follow these guidelines when lifting:

- The lift truck must be able to lift at least 1.5 – 2 times the machines gross weight.
- Make sure the machine is balanced. While transporting, avoid rough or jerky motion, and maintain a safe clearance zone around the transport area.
- Use a fork lift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
- Remove the securing bolts that attach the machine to the pallet.
- Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
- Move the machine to the required position and lower gently to the floor.
- Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.

INSTALLATION

IMPORTANT:

Consider the following when looking for a suitable location to place the machine:

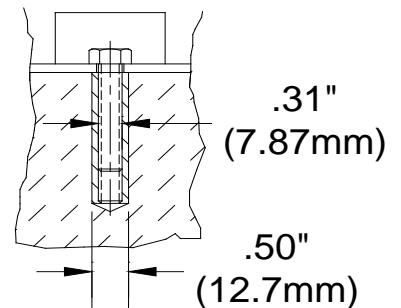
- Overall weight of the machine.
- Weight of material being processed.
- Sizes of material to be processed through the machine.
- Space needed for auxiliary stands, work tables, or other machinery.
- Clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for safety.
- Have the work area well illuminated with proper lighting.



- Keep the floor free of oil and make sure it is not slippery.
- Remove scrap and waste materials regularly, and make sure the work area is free from obstructing objects.
- If long lengths of material are to be fed into the machine, make sure that they will not extend into any aisles.
- **LEVELING:** The machine should be sited on a level, concrete floor. For stationary machines, provisions for securing it should be in position prior to placing the machine. The accuracy of any machine depends on the precise placement of it to the mounting surface.
- **FLOOR:** This tool distributes a large amount of weight over a small area. Make certain that the floor is capable of supporting the weight of the machine, work stock, and the operator. The floor should also be a level surface. If the unit wobbles or rocks once in place, be sure to eliminate by using shims.
- **WORKING CLEARANCES:** Take into consideration the size of the material to be processed. Make sure that you allow enough space for you to operate the machine freely.
- **POWER SUPPLY PLACEMENT:** The power supply should be located close enough to the machine so that the power cord is not in an area where it would cause a tripping hazard. Be sure to observe all electrical codes if installing new circuits and/or outlets.

Anchoring the Machine

- Once positioned, anchor the machine to the floor, as shown in the diagram. Use bolts and expansion plugs or sunken tie rods that connect through and are sized for the holes in the base of the stand.
- This machine requires a solid floor such as concrete at a minimum of 4" (102mm) thick. 6" (153mm) minimum is preferred.

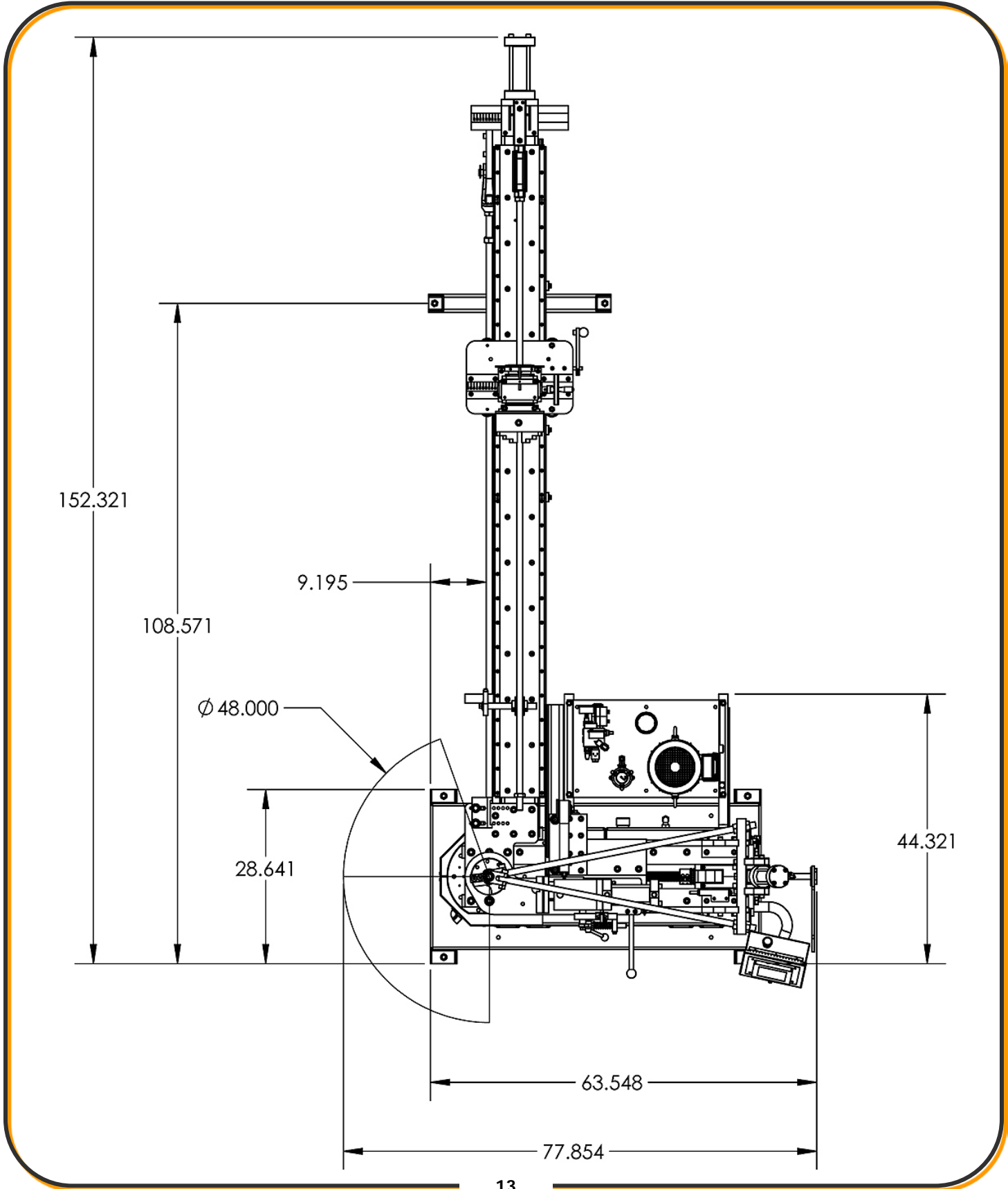


Tank Filling

The hydraulic oil is the primary medium for transmitting pressure and also must lubricate the running parts of the pump.

After installation of the machine and before machine startup, bring the oil level up to 90% of capacity. Verify that any cylinder rams are in the retracted position to prevent overfilling of the tank. Recheck the oil level after the first few hours of operation and again after the first full week of operation.

A shortage of hydraulic oil can cause hydraulic system breakdown and damage to major mechanical parts due to overheating.





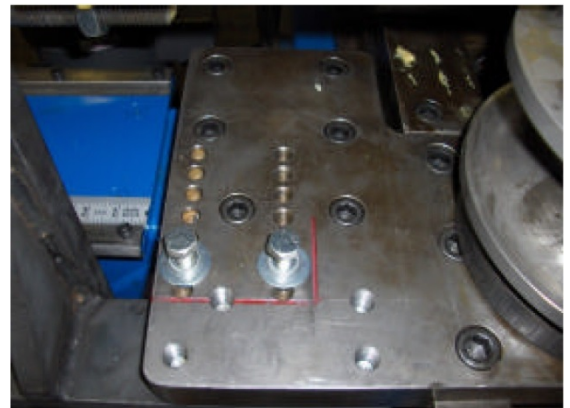
INTRODUCTION

- You have made a MB-350 Mandrel Fully Programmable Bending Machine. It has been carefully built of high quality materials and designed to give many years of efficient service. The simplicity of design and minimum effort required to operate the machine contributes towards meeting schedules and producing greater profits.
- The MB-350 Mandrel is an electric powered rotary draw mandrel bender. A user-friendly touch screen operating station can store up to 140 bend programs with 10 sequential bends inside of the main program.
- The MB-350 Mandrel was designed to use Pines #2 Style tooling. The MB-350 Mandrel you have purchased is built of solid steel ensuring maximum rigidity. Tongue and groove design with grade 8 bolts throughout provides very high rigidity and stability.

ASSEMBLY AND SET UP

⚠ WARNING: For your own safety, **DO NOT** connect the machine to the power source until the machine is completely assembled and you read and understand the entire instruction manual.

1. Once unloaded, the machine can be positioned in the desired location.
2. Be sure to rest machine on a flat surface, using the adjusting screws to level. After the machine is leveled, anchors may be used to fasten it to the floor.
3. The mandrel extraction table needs to be level and square with the base machine, torque (6) 5/8-11 mounting bolts to 100ft/lbs.
4. Attach the mandrel extraction table under the main spindle plate as shown.
5. Have a certified electrician install and inspect the electrical connection, and the incoming voltage to verify that it is correct for the machine before the machine is turned on.





ELECTRICAL

⚠ WARNING: Baileigh Industrial is not responsible for any damage caused by wiring up to an alternative 3-phase power source other than direct 3-phase. If you are using an alternate power source, consult a certified electrician or contact Baileigh Industrial prior to energizing the machine.

⚠ CAUTION: HAVE ELECTRICAL UTILITIES CONNECTED TO MACHINE BY A CERTIFIED ELECTRICIAN!
Check if the available power supply is the same as listed on the machine nameplate.

⚠ WARNING: Make sure the grounding wire (green) is properly connected to avoid electric shock. DO NOT switch the position of the green grounding wire if any electrical plug wires are switched during hookup.

Motor Specifications

Your tool is wired for 220 volt, 60Hz alternating current. Before connecting the tool to the power source, make sure the machine is cut off from power source.

Considerations

- Observe local electrical codes when connecting the machine.
- The circuit should be protected with a time delay fuse or circuit breaker with a amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your tools. Before connecting the motor to the power line, make sure the switch is in the "OFF" position and be sure that the electric current is of the same characteristics as indicated on the tool.
- All line connections should make good contact. Running on low voltage will damage the motor.
- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This tool is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.

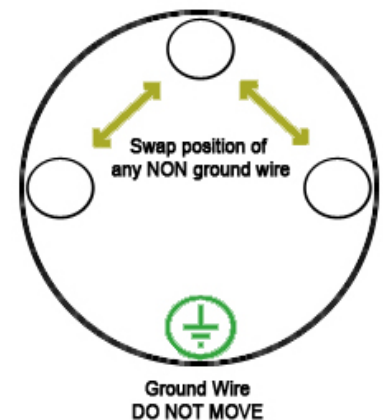


⚠ WARNING: In all cases, make certain the receptacle in question is properly grounded. If you are not sure, have a qualified electrician check the receptacle.

- Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.
- Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.
- Repair or replace damaged or worn cord immediately.

Plug Connection

1. Have a certified electrician verify that the power source is correct for the machine's specifications, and that the plug is correct and properly grounded to an earth ground. The warranty is void if incorrect power is supplied to the machine.
2. Have an electrician install the correct plug for the application.
3. Once hooked up, test the machine for proper operating direction.
4. The Hydraulic pump needs to be phased, (Press F3 momentarily and note the direction of the hydraulic pump motor). The motor should turn clockwise; if it turns counter clockwise the input power leads can be swapped to reverse the motor's direction.
5. If not, cut the power to the machine. Swap the position of any two of the three power wires; but **DO NOT** change the position of the green grounding wire!
6. The machine is supplied with a lockable disconnect switch, the machine must be locked out for any maintenance work.





OPERATION

⚠ CAUTION: Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.

⚠ CAUTION: Keep hands and fingers clear of the dies and swing arms. Stand to the front of the machine to avoid getting hit with the material during the bending process. When handling large heavy materials make sure they are properly supported.

Programmer Overview

- The MB-350 Mandrel utilizes a fully programmable touch screen operator interface. The unique operator interface allows you to write and save 140 programs with 10 bends per program. Operation is extremely simple to learn. Simple foot pedal controls allow you to easily produce fast and accurate bends. The following instructions will walk you through the basic functions.
- Be sure to follow the dry running instructions to familiarize yourself with all the functions of the control before any actual bending of material is performed.

Machine start-up and Homing

1. Turn the main power switch to the "ON" position
2. It takes about 1 minute for the programmer to boot up. The machine has been homed from the factory and does not need to be re-homed unless the encoder or drive motor needs servicing.
3. The programmer will display the "RMD MAIN SCREEN" (Figure 26)
4. At this point, the screen displayed allows only one bend direction.
5. On the MAIN SCREEN, you can chose "MANUAL MODE" or "RUN, VIEW OR EDIT A PROGRAM"

Programmer Display and Key Functions

The touch screen control is very self-explanatory; by touching the labeled boxes will select that parameter.

The exit box will return you to the previous screen and get you back to the MAIN SCREEN. When entering names and degrees, a keypad will be displayed. (Figure 32)



Main Menu Choices (Setting up Programs)

1. From the MAIN SCREEN, choose "RUN, VIEW OR EDIT A PROGRAM" Select this Feature if you want to do any of those functions.
2. Up to 140 programs with 10 bends per program can be created using any alphanumeric characters.
3. To edit a program, choose the program you wish to edit by entering a number or by using the up down arrow keys (Figure 27).
4. After selecting the program touch the VIEW/EDIT button and the program parameters will be displayed (Figure 33).
5. Make changes as necessary, press the <F1> key to save any changes.

Delete Program

1. Follow the above steps to get to the edit screen (Figure 27) and press and hold the CLEAR PROGRAM button to erase all of the bend data for the selected program.

Run Program

2. Select this feature if you want to run an existing program.
3. To edit a program, choose the program you wish to edit by entering a number or by using the up down arrow keys (Figure 33). After selecting the program touch the
4. RUN button and the program parameters will be displayed (Figure 27)
5. At this point, pressing the forward foot pedal will start the bending process; the machine will rotate in the selected direction at the chosen speed to the desired degree totaling the bend angle plus the spring back degrees.



NOTE: THE MACHINE WILL NOT BEND FORWARD UNLESS THE CLAMP DIE, MANDREL AND PRESSURE DIE ARE OPENED OR HOMED (A GREEN LIGHT CONDITION)

6. When at the final position, the control will prompt you to PRESS REV PEDAL TO HOME (Figure 29)



NOTE: THE MACHINE WILL NOT REVERSE UNLESS THE CLAMP DIE, MANDREL AND PRESSURE DIE ARE OPENED OR HOMED (A RED LIGHT CONDITION)



Manual Bend

1. Select this feature to bend manually without the need to create a program. The actual degree will be displayed while in this mode. This mode also allows you to enter in one bend angle and on spring back value (Figure 30)
2. With the arrow keys a bend speed from 1-6 can be selected

OEM menu & Homing

1. To set the home position, you must access the OEM screens, consult Baileigh for the password, once in the OEM MENU press the HOMING ROUTINE button, and follow the directions on the screen to set the home position. The Home position is saved forever even if the power is shut down. You may lose the home position if power is lost to the machine during a move or if wiring or electronics are disconnected inside the electrical cabinet.
2. Any other parameters in the OEM MENU should only be done after consulting Baileigh Ind. changing these parameters without consulting will void the warranty.

Creating a Program

1. Choose "RUN, VIEW OR EDIT A PROGRAM" from the MAIN SCREEN (Figure 26)
2. Select a program number from 1 to 140 (Figure 27)
3. When you reach the desired program number, press, VIEW EDIT (Figure 27)
4. On the edit screen enter the desired PROGRAM NAME by touching that field
5. Enter the bend ANGLE (Figure 33)
6. Enter the SPRING BACK (Figure 33)
7. Enter the SPEED from 1-6
8. Enter an Index Table Linear Position if desired
9. Enter a MATERIAL ROTATION if desired.
10. Repeat above steps for Bends #2 to #10.
11. Press the <F1> key to save all data. (Note: if escape key is pressed, data will be lost)



Running a Program

1. Choose "RUN, VIEW OR EDIT A PROGRAM" from the MAIN SCREEN (Figure 26)
2. To edit a program, choose the program you wish to edit by entering a number or by using the up down arrow keys (Figure 32). After selecting the program touch the RUN button and the program parameters will be displayed (Figure 35)
3. Bend data will be displayed (Figure 35).
4. Press and hold the Forward foot pedal down to produce the sample bend.
5. When at the final position, the screen will read, "PRESS REVERSE PEDAL TO HOME (Figure 36)
6. Press and hold the reverse foot pedal until the spindle reaches "0"degrees.
7. If a second bend was programmed, this will be the next bend and so on all the way to the last programmed bend up to bend 10
8. If no data was entered after bend 1, bend 1 will be repeated until escape is pressed.

Dry Running

1. Once you are familiar with the machine and programming unit, it is important to dry run a few programs.
2. Follow the previous steps to produce a generic bend and dry run without material.
3. Repeat this process as many times as needed to fully understand the functions and controls.
4. It is always a good idea to remove the mandrel for dry running the machine.



IMPORTANT: THE DO NOT ATTEMPT TO OPERATE IF YOU ARE NOT CONFIDENT, OR DON'T UNDERSTAND THE CONTROLS.



TOUCH SCREEN SCREENSHOTS



Figure 26 Main Menu Screen

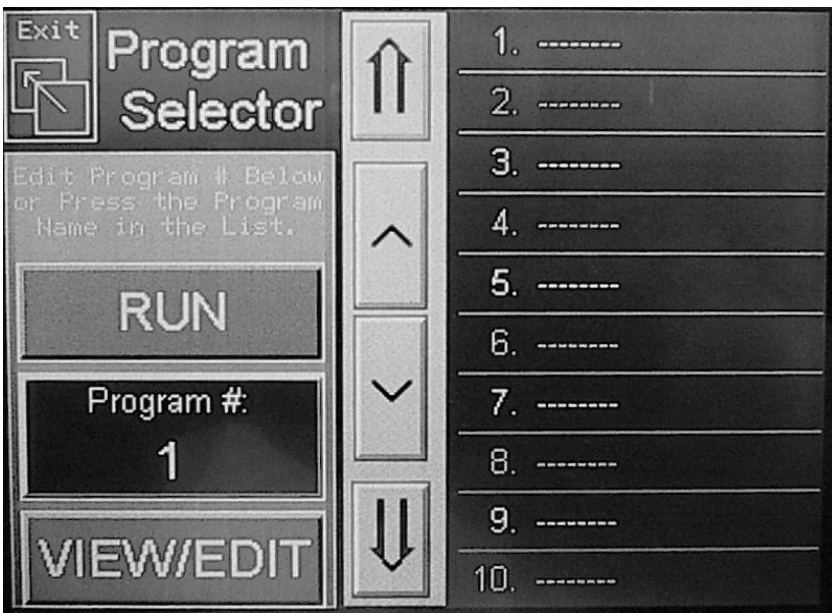


Figure 27 Program Select Screen

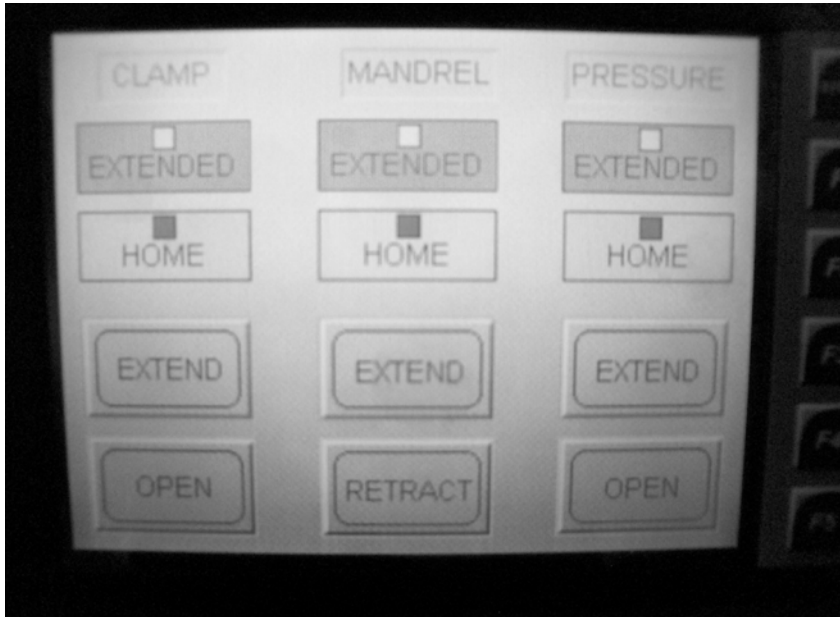


Figure 28 Hydraulic Status Screen



Figure 29 At Final Degree in Manual Bend Screen

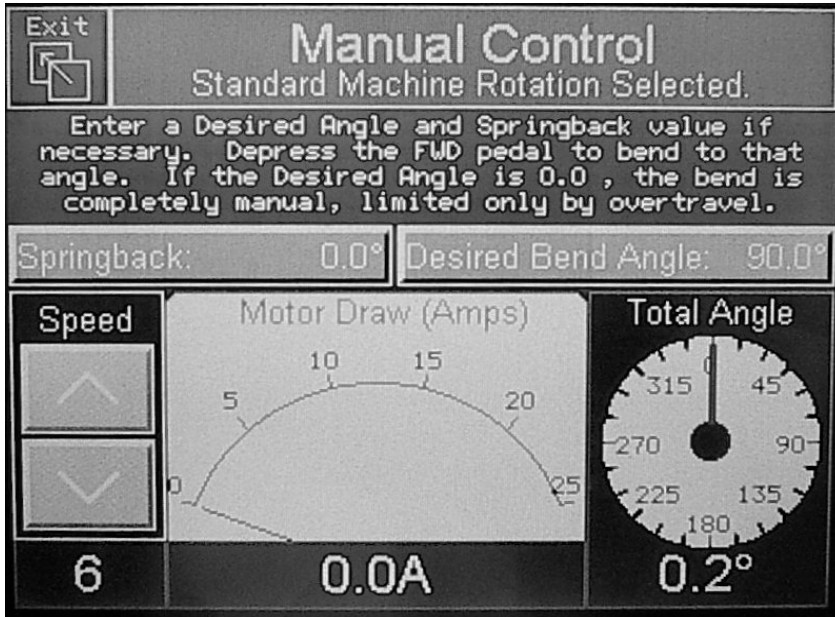


Figure 30 Manual Bend Screen

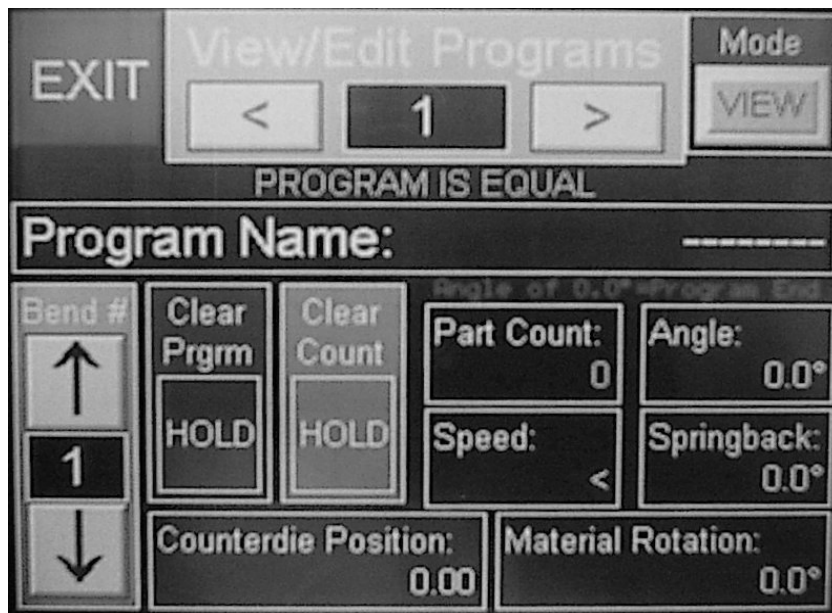


Figure 31 View Program Mode Screen



Figure 32 Enter Data Screen

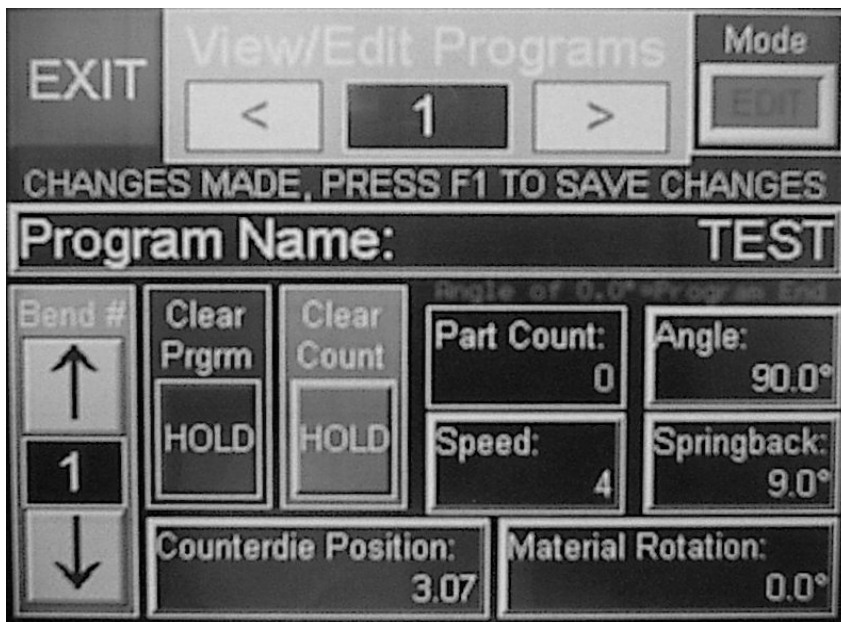


Figure 33 Editing programs screens

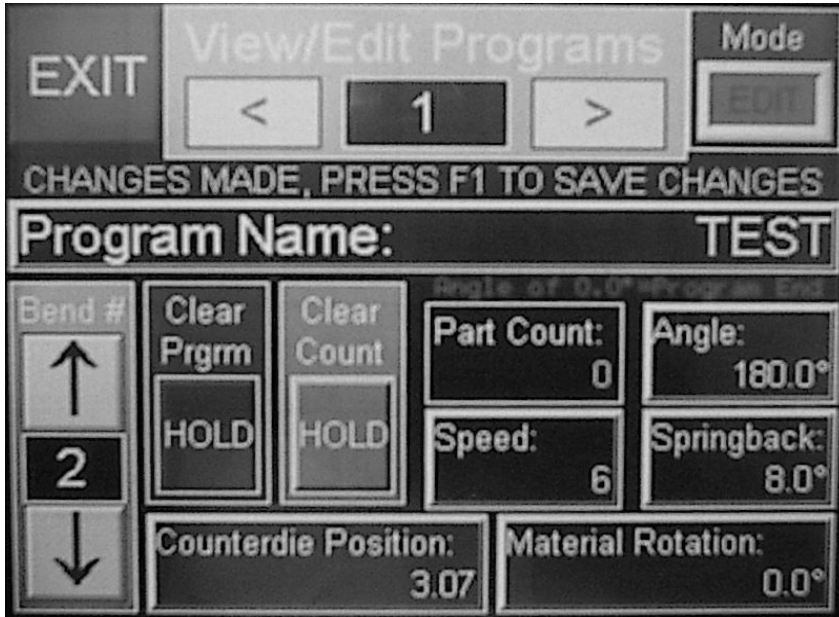


Figure 34 Bend #2 Screen

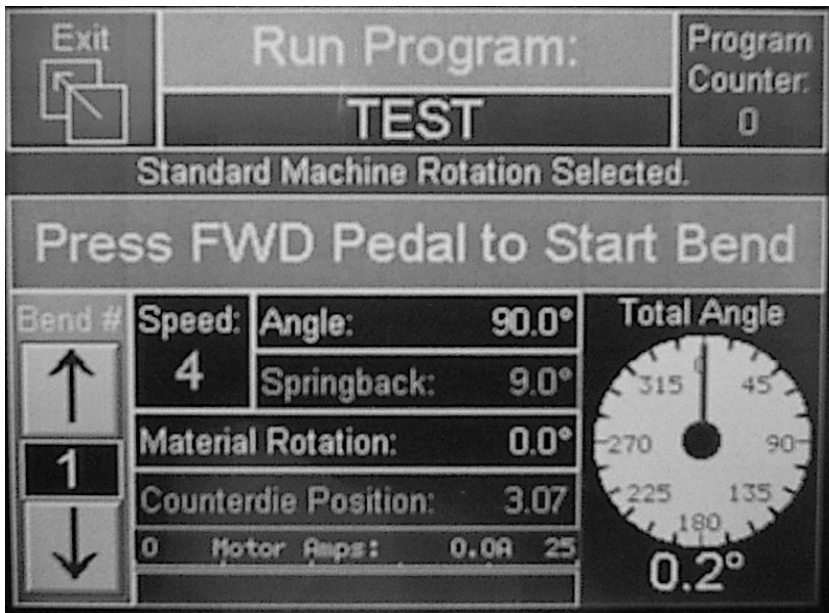


Figure 35 Run Program Screen

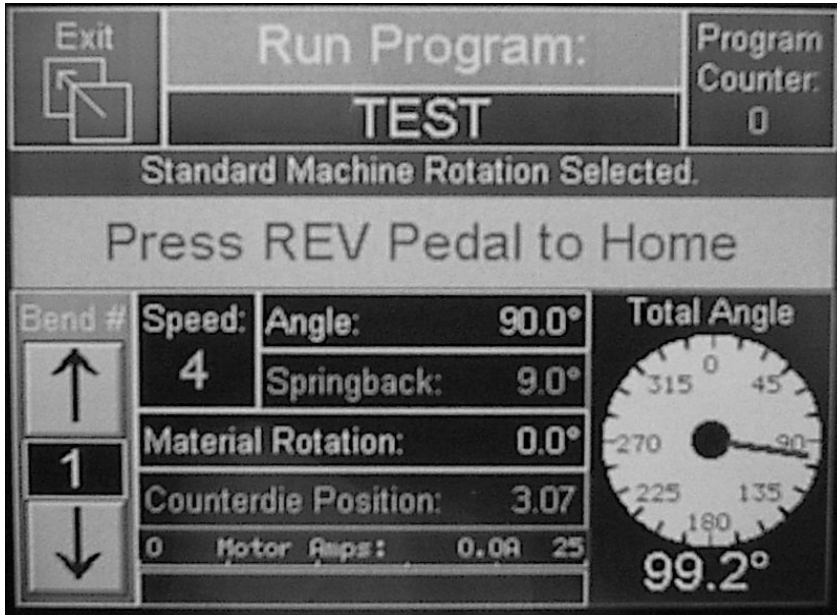


Figure 36 Finish Bend # 1 Screen

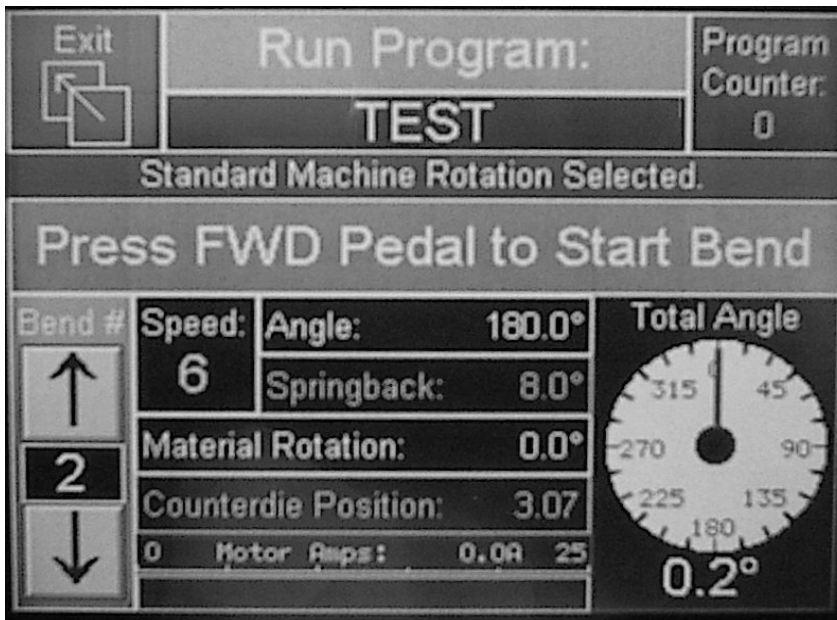


Figure 37 Start Bend #2 Screen

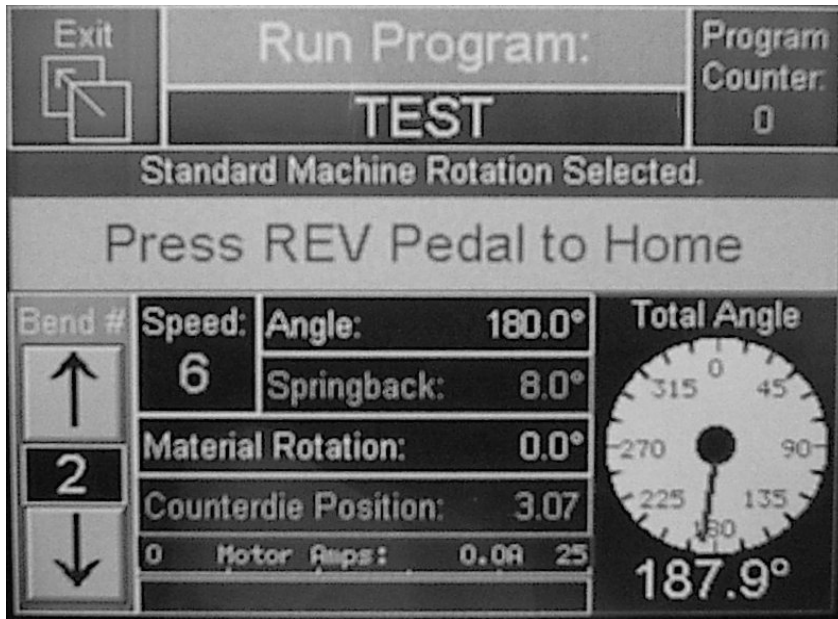


Figure 38 Finish Bend # 2 Screen

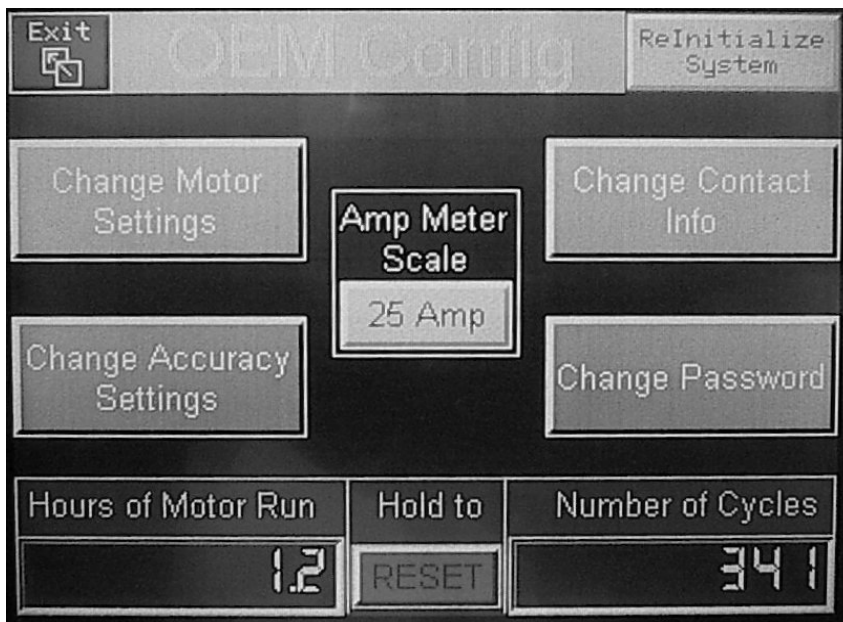


Figure 39 Motor Drive Configuration Settings



TOOLING REMOVAL

Before installing or removing tooling the die head must be rotated to approximately the 90° position. This is required to gain the clearance necessary to allow the die and hook arm to clear the clamp block assembly.

Follow the preceding steps to move the die head:

1. Remove all of the drag links by loosening nuts at the end of the long drag link rod and removing the socket head screw on the short drag link.

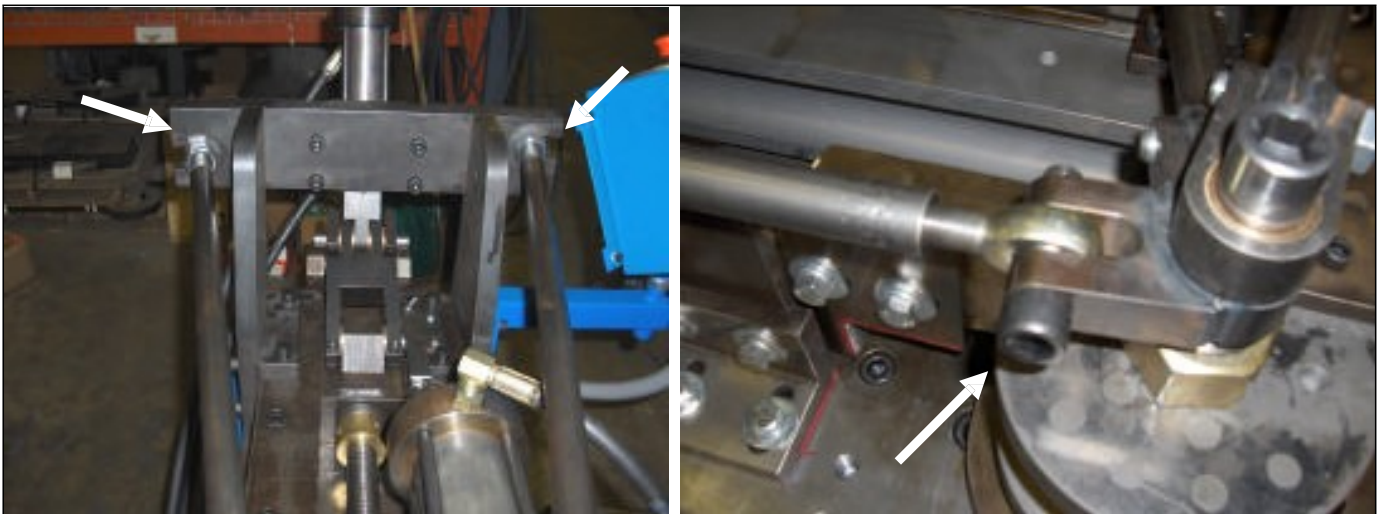


Figure 5 Drag Link Removal

2. Open the pressure die assembly using the supplied wrench.



Figure 6 Open Pressure Die Assembly



3. With the pressure die open; remove the pressure die by lifting straight up.



Figure 7 Removing Pressure Die

4. Remove the wiper die assembly documenting the position for future reference.

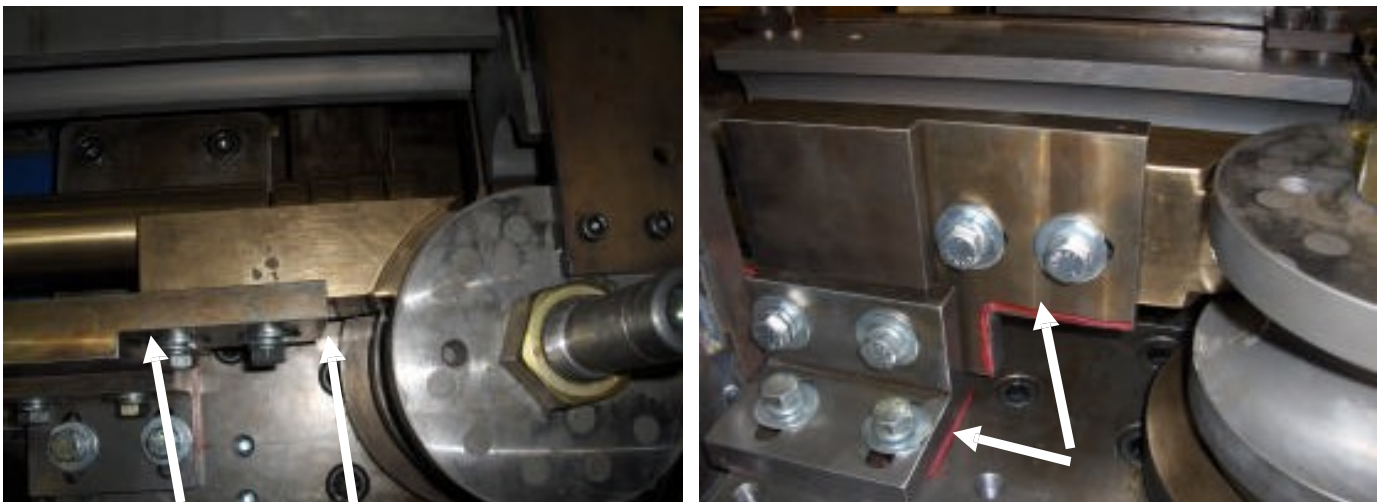


Figure 8 Removing Wiper Die Assembly and Documenting Position



5. With the wiper die removed, the mandrel can be removed. Document its position for future reference.

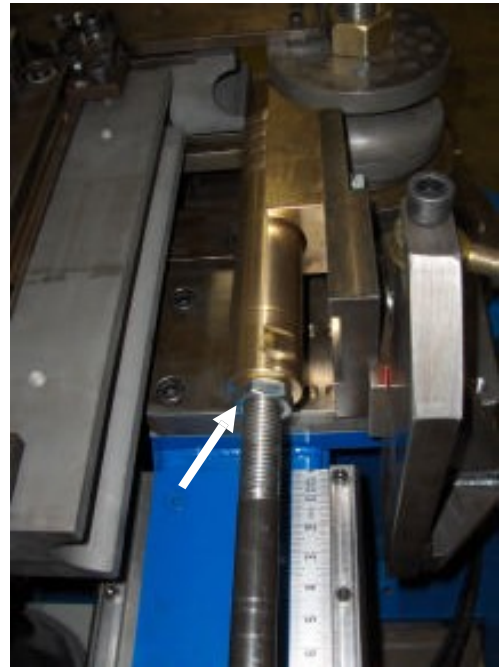
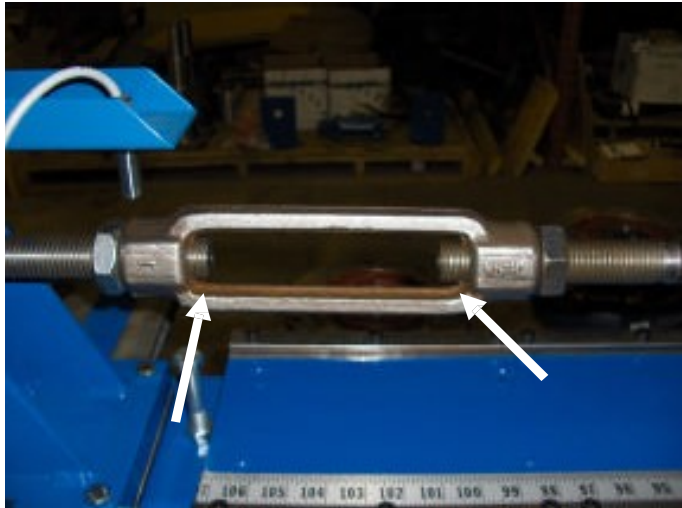


Figure 9 Removing Mandrel and Documenting Position

6. At this point, turn on the hydraulic pump (F3) and extend all axis (F4) in this order:
 - a. Extend the mandrel making sure it will not catch on anything as it moves forward.



Figure 10 Mandrel Fully Extended

- b. Extend clamp die.
 - c. Extend pressure die. All of the indication lights should be green. Now press (F5) and choose manual bend. Press the forward pedal until the die head reaches approximately 90°.



7. With the die head at 90° open all of the axes until red lights are illuminated. Turn off the hydraulics (F3).



Figure 11 Clamp die Carriage in Home Position



Figure 12 Bend Die At 90°

- a. Remove the main spindle locknut.
- b. Rotate the clamp die carriage to its home position.
- c. Remove the clamp die by lifting off its base.



Figure 13 Removing Clamp Die

- d. With a helper, lift the bend die assembly (with hook plates) straight off of the center pin.
- e. The machine is now bare of tooling and ready for another set of tooling.



TOOLING SET-UP

1. With the machine bare of tooling, and spindle at approximately 90°, the next set of tooling can be installed.
2. Select the next size tooling, making sure all of the components match the required tube size i.e.: bend die, clamp die, pressure die, wiper die, and mandrel.

Aligning Index Table

1. Set the mandrel extract bracket to match the die CLR. Make sure lock bolts are tight on both the mandrel extraction bracket and the index carriage.

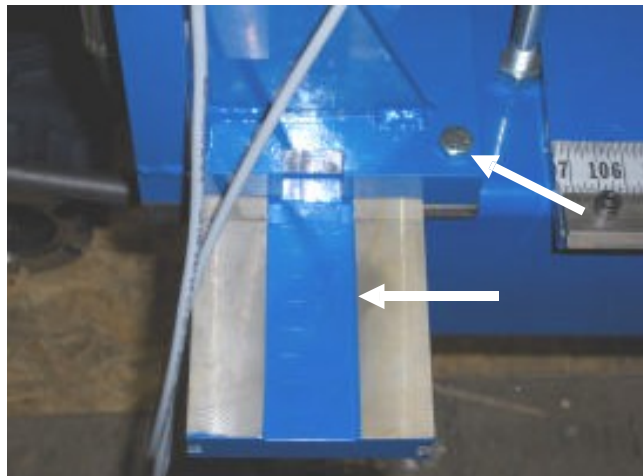


Figure 14 Aligning Extraction Bracket

2. Set the IDX carriage to match the die CLR.

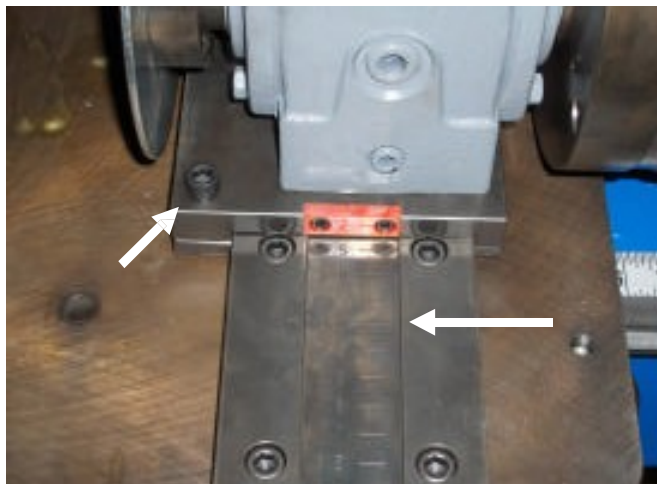


Figure 15 Aligning Index Carriage



Installing Tooling

First slide the bend die onto the center pin, the drive key will engage the bend die, be sure it is fully seated down to the spindle. Install the spindle locknut and torque to 125 ft. lbs.

1. The clamp die can be latched onto its holder making sure it is fully seated, with half round key in slot in back of the clamp die.



Figure 16 Clamp Die Holder is fully Seated



Figure 17 Clamp Die is not seated properly

2. Install guide sleeve onto mandrel shaft to fit material being bent.



3. Install the mandrel onto the mandrel extract shaft; we will set the distance later.
4. Clamp Die Alignment. The next step is VERY IMPORTANT! The clamp die hook position needs to line up with the hook plates.

 **IMPORTANT:** SERIOUS MACHINE DAMAGE WILL OCCUR IF THE HOOK PLATE DOES NOT ALIGN WITH THE HOOK PINS.

The first picture shows the correct position; the second picture shows the clamp die hook out of position

Right



Wrong

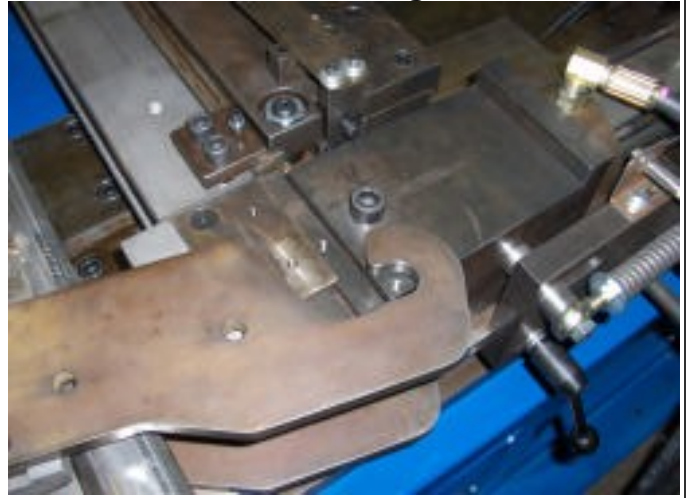


Figure 18 Clamp Die Hook Position

- a. Loosen the clamp die lock lever.



Figure 19 Clamp Die Lock Lever



- b. Press (F4) All of the indicator lights should indicate red, if so press (F5).
- c. Select manual mode.
- d. Momentarily press the reverse foot pedal until the hook plates get close to the clamp die hook pins. The hook pins should fall approximately centered with the hook plate opening.
- e. Continue to reverse only when you are sure the hook pins will align in the hook plate opening.
- f. With the spindle at the 0° position, center the slide assembly and tighten the lock lever.

Wiper Die Set-up

1. To set up the wiper die the machine needs to be at 0°.
2. Insert a piece of tubing matching the die size.
3. Activate the clamp die; the hook plates should engage and the material should be clamped firmly.
4. Select the proper wiper die and slide it along the tube toward the die until snug between material and bend die.
5. Fasten the correct mounting brackets and align holes and gradually snug up all bolts.



Figure 20 Installing Mounting Brackets

6. On stainless steel, the wiper die is set to 0° Rake, on steel 2-5° is a good place to start. (For stainless steel the wiper die should be set parallel with the pressure die. For steel it should be approximately 92° to 95° degrees off of the edge of the wiper die.)
7. More on wiper dies in the trouble shooting section.



Pressure Die Set-up

1. Set the pressure die in place making sure it sits properly.
2. Make sure the pressure die is at least 3" away from the tubing before extending
3. With the tubing still installed from the last step, extend the pressure die.
4. With the pressure die fully extended, turn the main lead screw until the pressure die engages the tube, Linkage should be parallel with the side rails of the machine. For now, just tighten snug (2-4 thousandths on the dial indicator). Remove the wrench

Mandrel Set-up

1. Open the clamp die and remove the tube from the previous step.
2. On the hydraulics screen, extend the mandrel, make sure the mandrel will not catch anything as it advances.
3. With the mandrel fully extended the distance can be set with the turnbuckle.

The distance can be set by aligning the edge of the clamp die with the edge of the solid part of the mandrel.

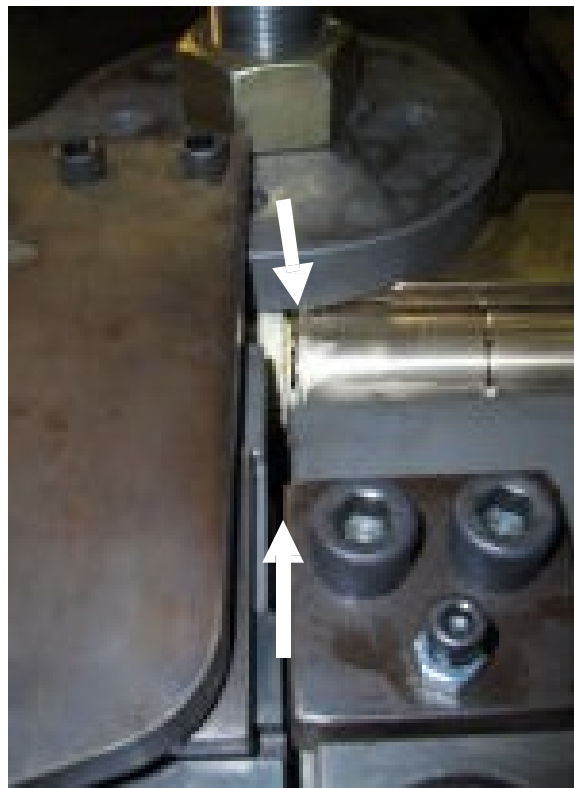


Figure 21 Mandrel Setup



4) Adjust the mandrel support rod by loosening clamp collars and bolt. Adjust to support the mandrel just below centerline to allow tubing to slip over easily.

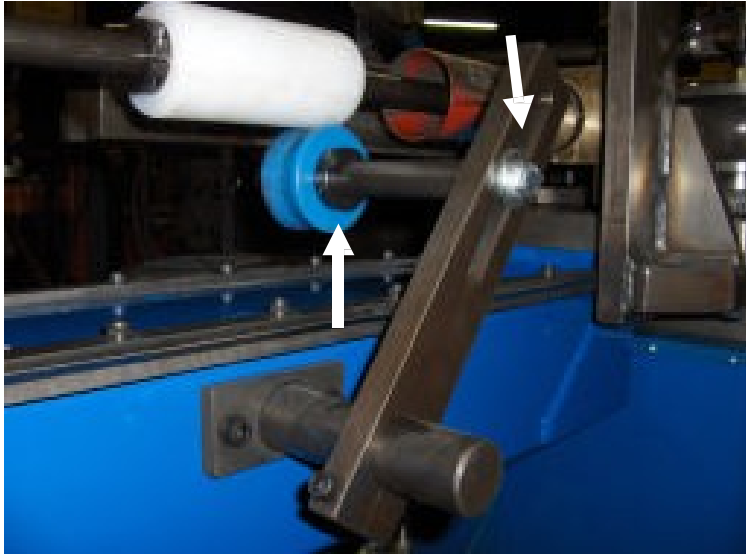


Figure 22 Adjusting the Mandrel Support

Finalize Set-up

1. Re-install all of the drag links applying light preload.
2. It is very important that the drag links are always installed.



INITIAL BENDING

⚠ CAUTION: Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges. When handling large heavy materials make sure they are properly supported. Keep hands and fingers clear of the machine when activating the hydraulics. Stand off to the side of the machine to avoid getting hit with the bending apron as it swings to bend the material.

It is recommended to use Tower Draw Lubrication (part # TC-86) for mild steel and stainless steel applications. For direct purchased contact Tower Oil and Technology (1-800-654-9588).

1. Double-check that all of the tooling set-up and verify it is correct.
2. Apply a liberal amount of lube to the mandrel.

The first picture shows how much lubrication to apply to the mandrel; the second picture shows not enough lubrication and could result in the mandrel being locked in the tube during the bend.



Figure 23 Lubrication of Mandrel

⚠ IMPORTANT: VERY IMPORTANT! NOT ENOUGH LUBE COULD LOCK THE MANDREL INSIDE OF THE TUBE.



3. Apply a small amount of lube to the tip of the wiper die. Too much lube on the wiper die will cause wrinkles.



Figure 24 Applying Lubrication to the Wiper Die

4. Slip the material over the mandrel.
5. On the hydraulic screen (F4) extend the clamp die. Note the clamp die's pressure and make sure it is right for the application.

⚠ IMPORTANT: TOO MUCH PRESSURE ON SMALLER DIE SIZES MAY CAUSE DAMAGE TO THE CYLINDER ROD.

6. Extend the mandrel the green light will illuminate.
7. Extend the pressure die making sure it is engaging the tubing.
8. Press (F5) and select manual mode.
9. Grease the mandrel using the grease zerk (10 pumps min.).



Figure 25 Greasing Mandrel via Zerk Fitting



10. Select a bend angle; 90° is best for initial set-up.


11. Select speed #1.

12. Bending

- a. Press the forward foot pedal. Watch the amp draw; it should not be more than 20 amps.
- b. Watch for clamp die slippage.
- c. Pay Attention.
- d. Machine will stop at programmed degree

13. Reversing

- a. Go to hydraulic screen press (F4).
- b. Always retract mandrel first.
- c. Retract Pressure die.
- d. Open clamp die.
- e. Return clamp die carriage to home position.
- f. Advance Material

 **IMPORTANT:** IF THE MATERIAL DOES NOT GET ADVANCED BEFORE THE BENDER IS REVERSED, THE DIE WILL WEDGE THE MATERIAL BETWEEN THE DIE AND THE CLAMP.

- g. With the material advanced go to manual mode (F5).
- h. Press the reverse pedal until the bender reaches 0°. Always pay attention when the die is reversing.
- i. Inspect the bend / Go to troubleshooting.



PARAMETER GUIDELINES

Clamp Die Pressures

The following table lists the recommended pressures to use when setting up new tooling on the machine.



Important: Only increase pressure on clamp die if clamp die is slipping over the material. Stainless steel tubing will always require more pressure than mild steel.

CLAMP DIE PRESSURE GUIDELINES	
TUBE OD	PSI
3	2500
2.875	2500
2.75	2500
2.625	2500
2.5	2500
2.375	2000
2.25	2000
2.125	2000
2	2000
1.875	2000
1.75	2000
1.625	1500
1.5	1500
1.375	1500
1.25	1500
1.125	1500
1	1500

Table 1 Clamp Die Pressure Guidelines



Maximum Bend Speed

The following table lists the maximum bend speeds.

MAXIMUM BEND SPEEDS		
TUBING OD	STAINLESS STEEL	MILD STEEL
3	2	4
2.875	2	4
2.75	2	4
2.625	2	4
2.5	2	4
2.375	3	5
2.25	3	5
2.125	3	5
2	4	5
1.875	4	5
1.75	5	6
1.625	5	6
1.5	6	6
1.375	6	6
1.25	6	6
1.125	6	6
1	6	6

Table 2 Maximum Bend Speeds

Capacity Chart

Maximum Bending Strength Capacity		
	OD	Wall
Round Mild Steel -	3	0.125
Round Aluminum -	3	0.188
Round Stainless -	3	0.065
Square Mild Steel -	2 x 2	0.125
Solid Bar Mild Steel -	1.181	

Table 3 Capacity Chart



UNDERSTANDING SPRINGBACK

Springback can be difficult to understand. As material is bent, the materials yield strength resists being formed. As a final degree is reached, the machine will have enough power to hold the bend at a set degree, but as the pressure of the machine is released, the material has a resistance built in, so it “springs back”

Springback will vary with every size, type and wall thickness, so it will never be consistent from size to size.

The best way to determine a materials springback is to do sample bends to 90 degrees until a perfect 90 is obtained.

- At that point document the actual machine degrees.
- Full manual mode is the best place to do these tests.
- Use the overbend amount and enter that value into the springback field.

MATERIAL SELECTION

 **CAUTION:** It must be determined by the customer that materials being processed through the machine are **NOT** potentially hazardous to operator or personnel working nearby.

When selecting materials keep these instructions in mind:

- Material must be clean and dry. (without oil)
- Material should have a smooth surface so it processes easily.
- Dimensional properties of material must be consistent and not exceed the machine capacity values.
- Chemical structure of material must be consistent.
- Buy certificated steel from the same vendor when possible.



NOTES



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