

WARRANTY CARD

1. KH Trading machines and tools are covered by 6/24 months warranty, starting on the date of purchase, as described in the Civil Code (proof of purchase or invoice receipt must be enclosed with the warranty card when making a claim).
2. This warranty does not cover defects caused by unprofessional handling, machine overloads, not complying with instructions contained in this manual, using accessories that are not approved, unauthorized repair, regular wear and tear and damages occurred during transport. Further, this warranty does not cover parts and accessories such as the motor, carbon brushes, seals and hot-air operated parts and parts that need to be changed regularly.
3. If the repair is to be found as not covered by the warranty policy, all costs including the repair and shipping to and from the repair centre will be paid by the customer, according to valid price list. See www.
4. When making a claim, you must present the warranty card, showing the date of the purchase, the serial number of the machine, vendor stamp and signature of sales clerk, as well as the proof of purchase receipt.
5. Warranty claim shall be made at the vendor shop where you bought your machine or you may mail it to a service centre. The vendor is obligated to fill out the warranty card (date of sale, serial number, vendor stamp and signature). All these information must be filled in at the time of sale.
6. The warranty period will be extended for the period of time for which the machine has been in the service centre possession. If the repair or defect is not covered by the warranty policy, all costs including the repair and shipping will be paid by the owner of the machine / tool. We recommend sending the machine in its original packaging. Please, also enclose brief description of the defect with the packaging.
7. Before sending the machine for repair, clean it thoroughly. If the received machine is dirty, it may be rejected by the service shop or you may be charged a cleaning fee.

SERVICE

Logistic centre Klecany

Topolová 483

250 67 Klecany

Czech Republic

Claim department phone number: 266 190 156

266 190 111

Fax:

260 190 100

T-mobile: 603 414 975

O2: 601 218 255

Vodafone: 608 227 255

<http://www.KHnet.cz>

Email: servis@KHnet.cz

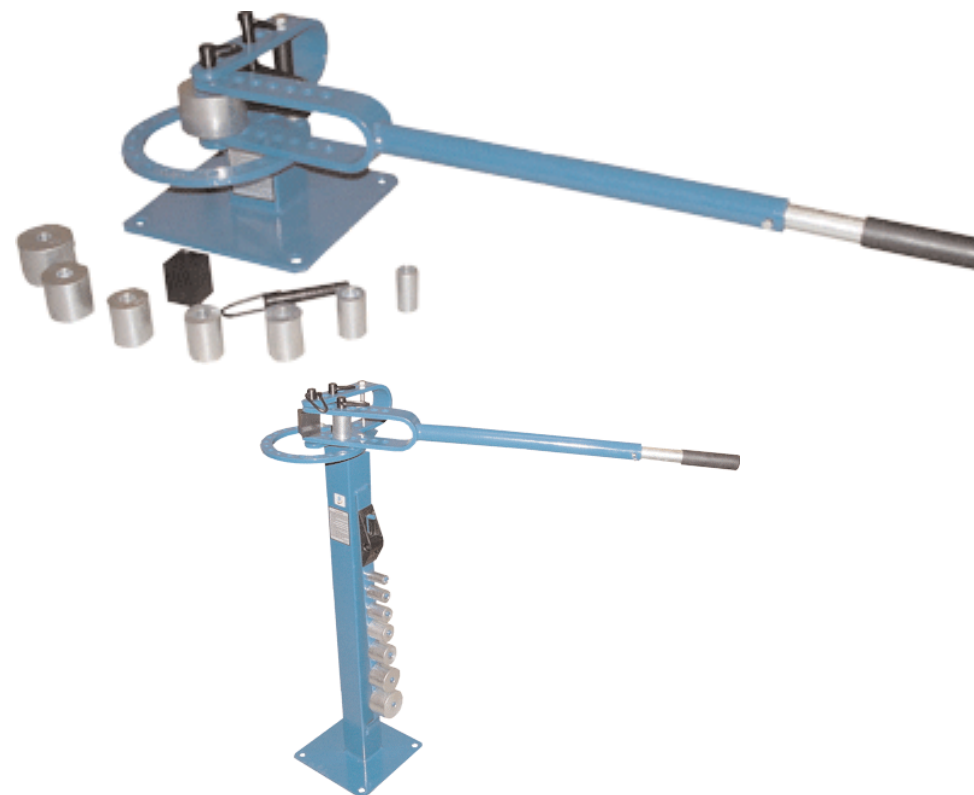
Product: UNIVERSAL BENDING MACHINE WITH STAND OR TABLE MOUNT	
Type: CB 200/200-T	Serial number (product series):
Date of manufacture:	Repair centre notes:
Date of sale, stamp, signature:	

Without the correctly filled warranty card or without proof of purchase receipt, including the product type (invoice, purchase receipt) no warranty claim will be processed.

uni-max

USER'S MANUAL

UNIVERSAL BENDING MACHINE WITH FLOOR STAND OR TABLE MOUNT



CB200 / CB200-T

Dear customer. Thank you for purchasing equipment from KH Trading, s.r.o.
 Our company is ready to offer you our services - before, during and after you buy our product.
 If you have any question, comment or idea, please contact our business centre. We will do our best to address your comment or question in timely matter.

Before first use, please read this manual carefully. It is your responsibility to study all instructions, necessary for safe use and operation and to understand all risks that may be involved during the use of power machines.

WARNING! Do not try to use this machine before reading this entire manual and before you know how to handle it. Keep this manual for future reference.

Pay special attention to safety instructions. Not complying with safety rules may cause injury to the operating person or to people standing by or it may cause damage to the machine or to the work piece. Pay special attention to safety notes and safety labels on the machine.

Never remove or damage them.

Please, write information such as the invoice number and the number of the sale receipt here in this box.

DESCRIPTION

This universal bending machine with a massive steel stand that also serves as a storage place for bending accessories, enables you to perform professional bending work of various type of metal struts and poles with various cross cut sections (flat, square and circular). Equipped with a telescopic arm - length up to 90 cm ensures enough power to perform your bending works. Machine is available in two options - a model with a table mount and model with its own stand.

Accessories:

Radius bending accessories: 1", 1 1/4", 1 1/2", 1 3/4", 2", 2 1/2", 3".

TECHNICAL SPECIFICATION

Material suitable for bending:

Hot rolled steel (steel with low carbon content)

You may bend steel with diameter up to 6.5 cm around the centre stud.

To bend large diameters, place the master die on the centre stud.2"

Maximum dimensions of the work piece

Flat steel straps8 × 50 mm

Round or square steel poles16 × 16 mm

EXCEPTION

Rib-reinforced pole with diameter of 12.7 mm may be bent only around the centre stud with the 3" master die installed.

Dimension of round or square steel rod - sharp bending5 × 50 mm

or6 × 32 mm

A pole with diameter of 12 mm may be bent around the3" master die.

Packaging dimensions900 × 250 × 270 mm

Gross weight26 kg

The accuracy of instructions, graphs and information contained herein, depends on the printing date. Due to continuous product improvement, the manufacturer reserves the right to change technical parameters of the product, without prior customer notification.

REPAIR AND MAINTENANCE REPORT

Report and maintenance report:

DATE	REPAIR AND MAINTENANCE REPORT	SERVICE SHOP

PART LISTING

Position	Description	Number of pieces
1	Bracket middle piece	1
2	Screw 9.5 x 120.7 mm	1
3	Flat washer 9.5 mm	4
4	Ring assembly	1
5	Flat head screw 9.5 mm	2
6	Ring middl piece	3
7	Safety washer 9.5 mm	4
8	Nut 9.5 mm	4
9	Long connecting stud	2
10	Stopper cube	1
11	Cube support	1
12	Screw 9.5 x 28.6 mm	1
13	Moveable stopper	1
14	Non-moveable stopper	1
15	Short connecting stud	1
16	Handle extension arm	1
17	Handle stud with clamp	1
18	Handle	1
19	Sharp-angle die	1
20	Stand (only for model CB200)	1
21	Die 25.4 mm (1")	1
22	Die 31.8 mm (1 1/8")	1
23	Die 38.1 mm (1 1/2")	2
24	Die 44.5 mm (1 3/4")	1
25	Die 50.8 mm (2")	1
26	Die 63.5 mm (2 1/2")	1
27	Die 76.2 mm (3")	1

SAFETY PRECAUTIONS

Symbols used in this manual



Warning!

This symbol informs you about the risk of personal injury or damage to the machine or materials.



Danger of being caught by moving machine parts!

Caution! Loose clothing or body parts may get caught by moving machine parts.



Caution!

Danger of damages!



Note:

Additional information.



Use personal protective gear.



General instructions

- Make sure you know how to control your tool or machine and that you are familiar with its operating procedure. Know the hazards that may occur, if not used correctly.
- If other person is using this machine make sure that he knows how to safely operate this equipment and that he is familiar with hazards and risk that may occur, if not used correctly.
- Always pay attention to safety instructions on the safety labels. Do not remove or damage them. If the warning label becomes unreadable, please contact your vendor.
- Disorganized and dirty work shop may cause accidents.
- Never work in narrow or poorly lit rooms. Always keep stable posture.
- Maintain your tools clean.
- Handles must be kept free of grease and dirt.
- Make sure no children, unauthorized persons or animals have access to your workshop.
- Do not put legs or hands inside the working space.
- Never leave your machine unattended during operation.
- Use only for purposes for which it has been designed.
- Use personal protective gear such as safety goggles, ear protection, respirator, safe working shoes etc.
- Do not overreach, use both hands.
- Never work under the influence of alcohol or other drugs.
- Do not use the machine/tool if you feel dizzy or weak.
- Any modifications or improvements to the machine are strictly prohibited. DO NOT USE if you discover bent part, crack or other damage.
- Never perform any maintenance during operation.
- If you see any unusual sign or hear any strange sound, switch off the machine immediately.
- Always remove wrenches and screwdrivers from your machine after use.
- Before use, make sure all screws are tightened securely.
- Perform maintenance regularly. Before use make sure the machine is in good working conditions and without any damage.
- Use only original spare parts during repairs.
- Using extension pieces or accessories not approved by the manufacturer may cause injuries to the operating personnel.

- Use suitable tool for particular type of work. Do not overload your machine or accessories. Do not attempt to use machine with insufficient power to perform heavy duty work.
- Do not overload your device. Measure the work load in such way, so it could be done with comfortable speed.
- Do not expose to extremely high temperature or direct sunlight.
- This machine is not designed for use in humid environments or under water.

⚠ Assembly

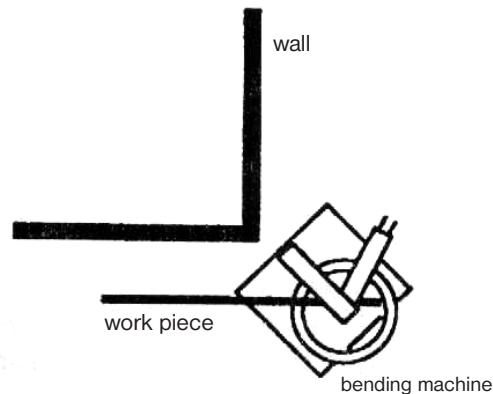
- Do not use the machine unless completely assembled.

⚠ Bending and cutting operations

- Mount your machine to a work table or to the floor to ensure stability during bending process.
- Before bending, mark the location of the fold/bend and securely fasten the work piece with the fastening jaws.
- Always remove all obstacles from the working area.
- Make sure that enough material extends beyond the stopper cube and shaping die. That way you prevent sudden release of the work piece and subsequently the bending handle.
- Before bending always push the connecting studs all the way in.
- Never try to attempt to bend thermally hardened materials. Only hot-rolled steel may be bent on your machine.
- NEVER attempt to modify or use other tools besides the supplied accessories. Do not use different of extension pole for the bending handle.
- Do not use your machine for metal sheet cutting with thickness, width and strength higher than the maximum allowed values as described in the technical parameters. Do not use for thermally processed or hardened materials.
- To prevent injuries do not touch the gear mechanism during work.
- Do not put your hands inside the bending or cutting area.

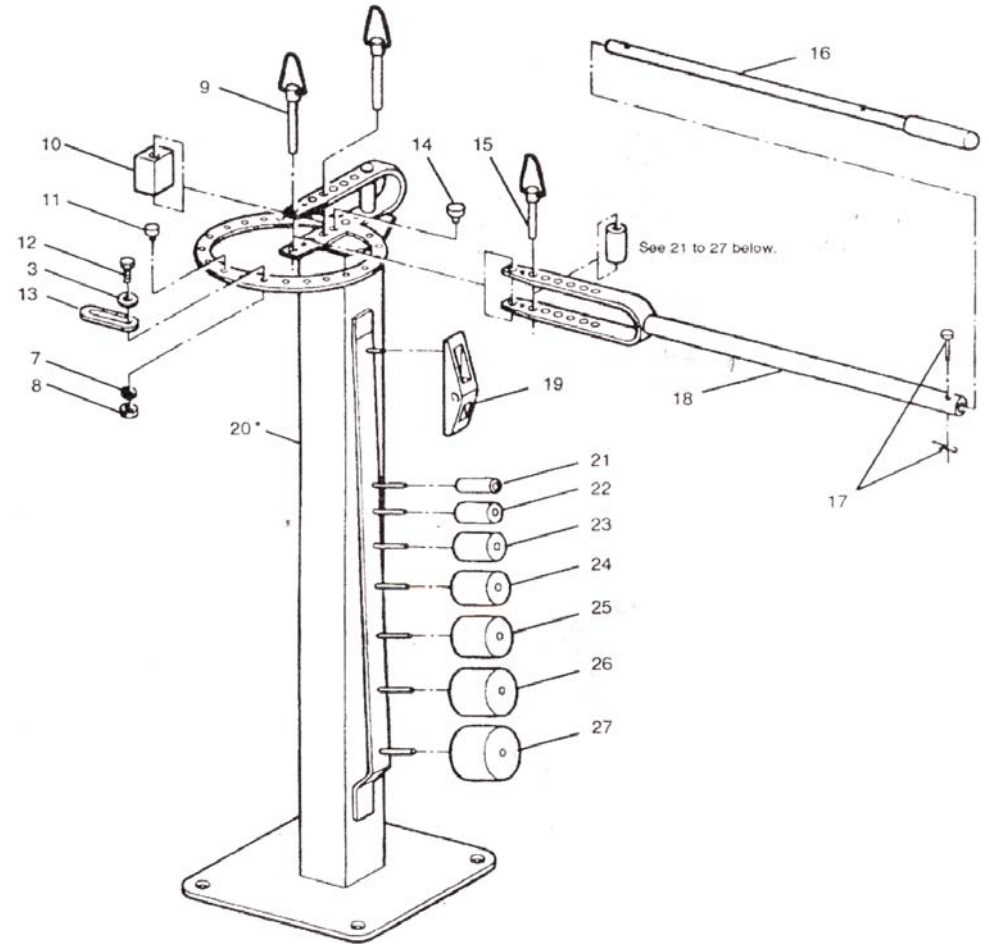
ASSEMBLY

- Make sure your machine is securely fastened to work table or to the floor. The mount of the machine must be able to withstand the high bending forces during work.
- Example of proper installation of your machine may be seen on the picture.
- Do not install you machine in corner or close to a wall.



DETAILED PART DRAWING

Stand bending machine



MAINTENANCE

- Keep your tools clean. Dirt may enter the inner mechanism of your machine and cause damage.
- Do not use aggressive cleaning solution or paint thinners to clean the machine.
- Clean plastic parts with cloth dipped in soap water.
- Clean and lubricate metal surfaces with a cloth dipped in paraffin oil.
- If you are not using your machine, lubricate it with suitable grease and store it in a dry place to prevent corrosion.

Lubrication

Lubricate working surfaces with suitable grease regularly.

DISPOSAL

When the operational life of your device is over, dispose off it in accordance with valid rules and regulations. Your product is made of metal and plastic parts that may be recycled when separated.

1. Disassemble all parts.
 2. Separate all parts according to the material they are made of (e.g. metals, rubber, plastics, etc.).
- Take the separated parts to the recycling facility near you.

Information about the locations of recycling centres may be found at your local City office or throughout an Internet search.

CAUTION

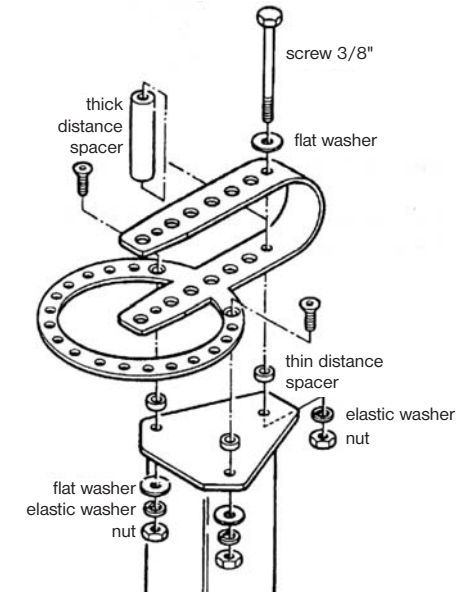
If the machine breaks down, send it back to the vendor for quick repair. Please, enclose brief description of the defect. That makes repair easier. If the machine is still covered by warranty, enclose the warranty card and proof of purchase receipt. After the warranty period expires, we repair your machine for a special price.

To prevent possible damages during shipping, packed the machine carefully or use the original packaging material. We are not liable for shipping damages due to incorrect packaging of your machine. If making a claim at the shipping company the level and method of packaging plays a major role during claim evaluation process.

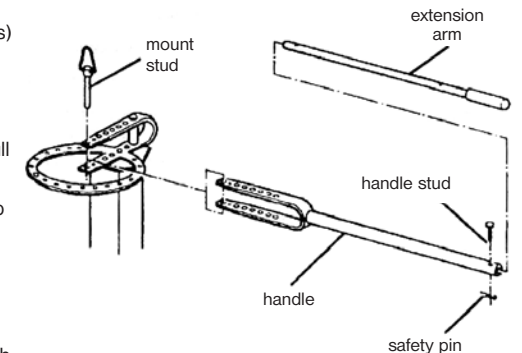
Note: Pictures and contents in this manual may slightly differ from the actual product or accessories. It is due to continuous improvement of our products. Such small differences have no effect on the product functionality.

Assembling procedure

- Connect the bent part with the round base, using screw 3/8", flat washer, thick distance washer (that is placed on the screws inside the fold), thin distance washers, spring washers and nuts.



- Place the bent part of the handle (with the holes) inside the base fold and secure in place with one or both long connecting studs.
- Remove the clamp from the handle stud and pull the stud out. Pull the extension arm out, push the stud in the inner hole and replace the clamp back.
- Put the machine in final position, where it will be used. Turn the handle in both directions, to make sure that no obstacles are within the reach of the handle.



- Make sure that there is enough space behind the machine to handle long work pieces. If you need to place the machine close to a wall, try to place it according to the drawing on the picture.

CAUTION: Do not use the machine if it is not securely mounted to a work table or to the floor. Severe injuries may occur.

OPERATION

Basic operation

- The most part of this manual describes procedures how to perform common work piece bending operations. Besides information you will learn from this manual you must gain experience from trial and error methods to become efficient in all and special bending operations.
- You will discover differences when performing various type of bending procedures such as arch bends, sharp angle bends or if you shape material using a die.

Most common procedures

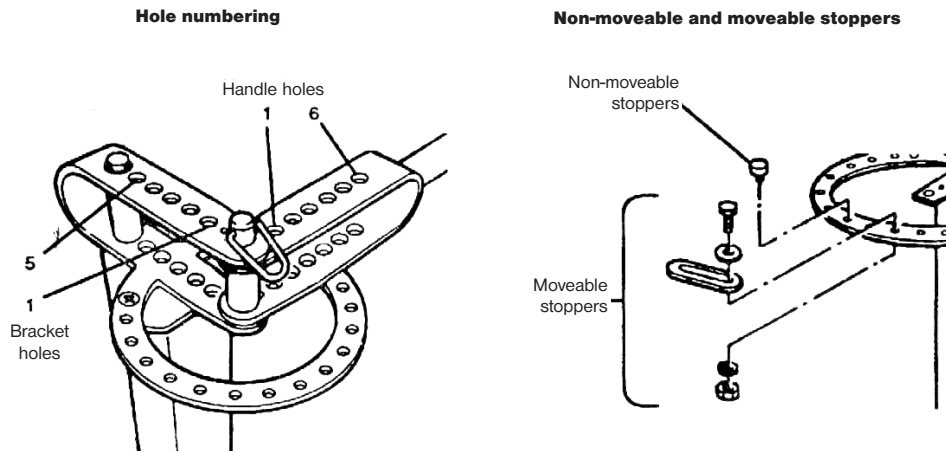
- Never try to bend material that is thicker than 6 mm around the centre stud, without the installed die, size at least 1".
- When performing various bending operations, proceeds according to procedures depicted on the following pictures.

General information

- Select material and its dimension according to the drawing or design.
- Select the appropriate dies (for the centre stud or the handle) that will be needed to produce the work piece. Choose the applicable hole to fasten the handle to the bracket assembly.
- Install the stopper cube or sharp-angle die. Mount the cube support. Make sure you install the stopper cube correctly.
- Place the work piece in the machine and secure it in place.
- Perform first bend. Check the angle and the position of the bend and proceed.
- Perform other bends and follow the same steps. Sometimes you will have to take the work piece from the machine, turn it around or put it back backwards.

Hole identification in the moveable and non-moveable parts of the machine.

The samples included in this manual have the bracket and handle holes numbered.

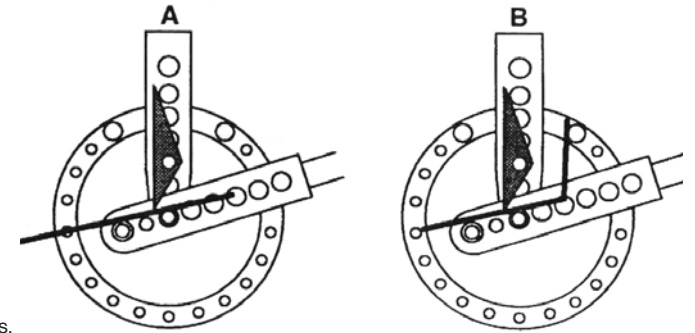


Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 80° angle bend. Check the angle.

Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 80° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

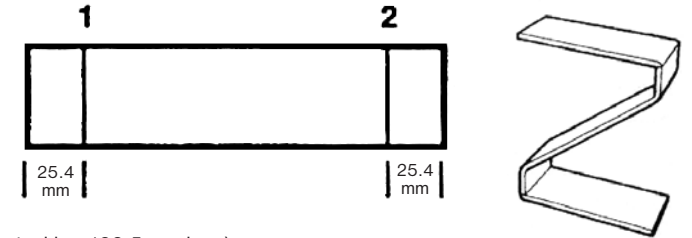


Final steps

Stitch weld both parts together. Grind and sandblast all sharp edges.

REQUIRED MATERIAL

- Flat steel bar 4.8 mm, max. width 50.8 mm.
- 1 flat steel bar 190.5 mm long
- 1 flat steel bar 114.3 mm long



BENDING PROCEDURE (flat steel bar 190.5 mm long)

Mark the locations of the bends on the 190.5 mm long bar, as shown on the picture.

Bend No. 1

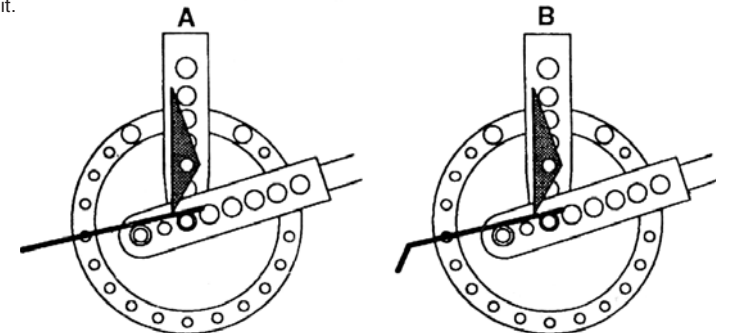
Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 50° angle bend. Check the angle.

Bend No. 2

Turn the work piece around and slide it to the mark No. 2 (pic. B) and perform 50° angle bend. Remove the stud from the sharp-angle die and remove it.

Final steps

Stitch weld the arch part to both parts (114.3 mm long). The upper and the lower "Z" arm must be parallel to each other and the distance between them must be 152.4 mm. Grind and sandblast all sharp edges.

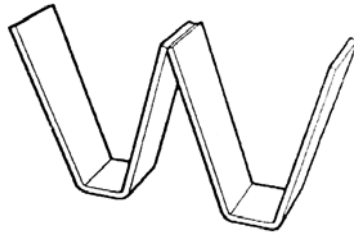


REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
2 flat steel bar 342.9 mm long

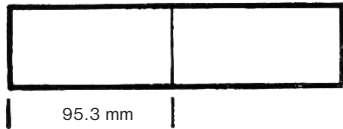
BENDING PROCEDURE

The letter "W" is made from two letters "V", welded together, similarly as the letter "M".



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
2 flat steel bar 190.5 mm long



Setting

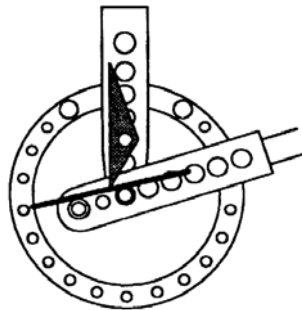
Mark the locations of the bends. See the picture.

Bend

Slide the work piece in the machine all the way to the mark No. A) and bend it to achieve the outer measurement of 6" = 152.4 mm (see the pic.).

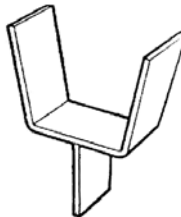
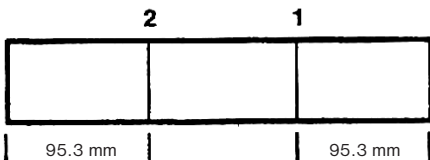
Final steps

Stitch weld both pieces together and make sure they are parallel to each other. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel bar 241.3 mm long
1 flat steel bar 95.3 mm long



BENDING PROCEDURE (flat steel bar 241.3 mm long)

Mark the locations of the bends. See the picture.

Setting the bending angle

- Depending on the desired precision, use the appropriated angle-measuring gauge.
- If you want to perform identical bends on identical work pieces (the same angle and bend position) you may use the moveable and the non-moveable stoppers on the circle of the bracket.
- The non-moveable stopper is used if higher precision is required.
- Therefore, if you need higher precision of the angle setting, use the non-moveable stopper.
- Tighten the nut only slightly and test the bend angle.
- If everything is ok, tighten the nut firmly.
- Test the final angle on an identical piece of material. Due to the resiliency of the material the bend has tendency to come back a little.
- After you test the angle and the bend, write all the information about the used dies, diameters and stud positions and so on, to make setting in the future easier.

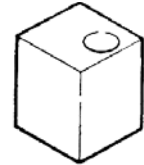
Using the stopper cube

Purpose of the stopper cube

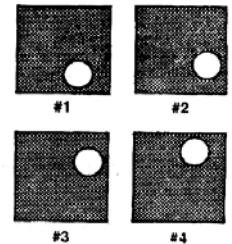
- The cube prevents the material / work piece from turning during die-bending around the centre stud or if another die has been placed on the centre stud.
- Before you start bending, place and fix the stopper cube (use the connection stud) in one of the five large holes in the middle of the ring assembly. (The large hole in the middle of the bracket is for the centre stud). The hole you should use, shall be determined based on the material thickness, nut size, centre stud and on the position of the stopper cube.
- You may use the cube stopper in various positions based on the angular tilt. The cube together with the stud can be used in 5 different holes of the rotating part of the tool.
- The cube may be placed in various positions based on the stud angular tilt. The positions of the stopper cube are determined and described in the manual with numbers. See picture on the right.
- For bending purposes you may use only four positions though. Used options in this manual are shown on the picture.

Warning: place the stopper always to the right, away from the centre - regardless what surface will be touching the work piece. If you place the cube on the left, away from the centre, the work piece and the cube will move during the bending process.

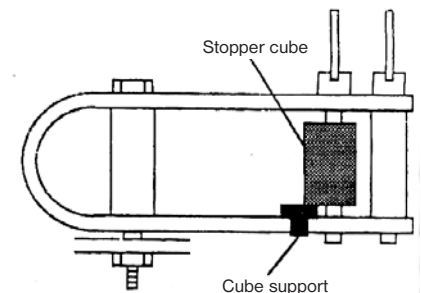
stopper cube



stopper cube positions



Cube support placement



Setting the position of the stopper cube (the correct orientation of the cube and selection of the correct hole in the bracket):

- Connect the handle to the centre bracket stud, using the appropriate die, placed on the centre stud.
- Mount the correct die in the applicable handle hole.
- Place the work piece inside the machine. Set the handle all the way to the rear (counter-clockwise) and place the stopper cube as close as possible to the centre stud.

IMPORTANT: Always use the hole in the bracket that will ensure that the position of the stopper cube is as close as possible to the centre stud or to the die and at the same time allowing you to slide the work piece inside the machine.

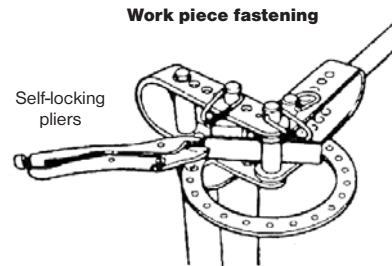
- If there is too much room between the stopper cube and the centre stud or the die, turn the cube to a different position or use hole that is closer to the centre.

Cube support placement

- The support must be placed under the stopper cube (see the picture) to be able to hold it in the centre and in vertical position.
- Place the support in the appropriate bracket hole, to ensure the cube support and at the same time it must not obstruct the connecting stud when pushing it in the cube hole and in the lower bracket hole.

Fastening the work piece / material

If the stopper cube is in correct position, you may not need to fasten the work piece. But if you are performing special bending work or need to bend with high precision, it is good idea to fasten the work piece to the stopper cube, using self-locking pliers (see picture on the right).



Using sharp-angle bending accessories

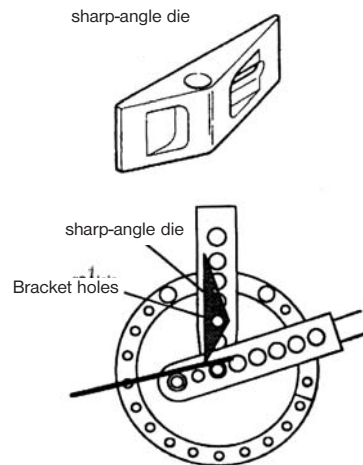
The sharp-angle die is used instead of the stopper cube when bending flat materials into right angle or other acute angles.

Position of the die

Unlike the stopper cube this die has only one correct position when the connecting stud is placed in the bracket hole 3.

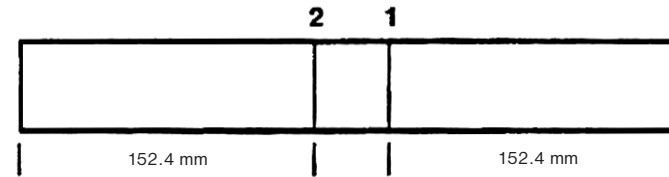
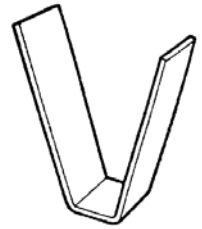
Cube support position

The cube support must be placed under the sharp-angle die to be able to hold it inside the bracket and in vertical and centred position. (Compare with picture showing the position of the stopper cube). Place the support in the hole number 3 inside the bracket so it supports the device but so it does not obstruct the connecting stud when pushing it inside the device hole and inside the lower bracket hole.



REQUIRED MATERIAL

- Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
- 1 flat steel bar 342.9 mm long



BENDING PROCEDURE

Mark the locations of the bends. See the picture.

Bend No. 1

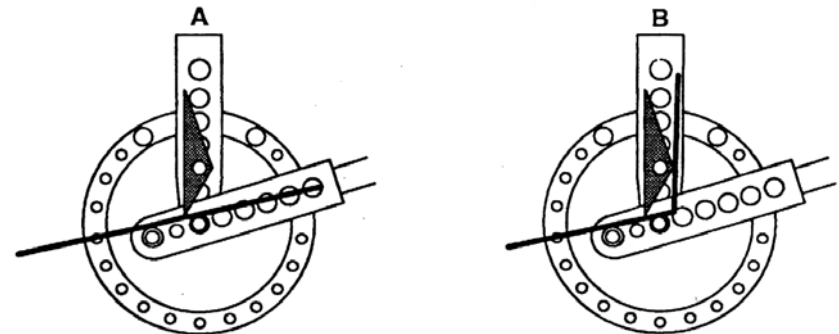
Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 75° angle bend.

Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 75° angle bend. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

Final steps

Grind and sandblast all sharp edges.



Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.

Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 45° angle bend. Check the angle.

Bend No. 3

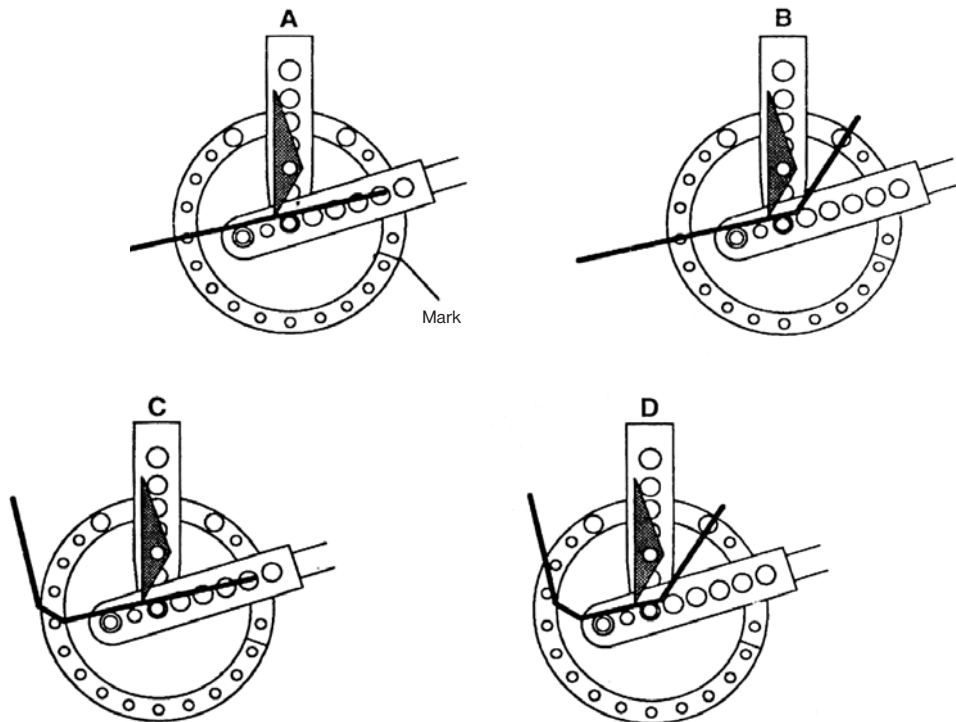
Turn the work piece (pic. C) and slide it to the mark No. 3 and perform 45° angle bend. Check the angle.

Bend No. 4

Slide the work piece to the mark No. 4 (pic. D) and perform 45° angle bend. Inspect the angle and make sure that both arms of the "U" letter are parallel to each other.

Final steps

Grind and sandblast all sharp edges.



Fastening the work piece / material

If you use the sharp-angle die, you do not need to fasten the work piece.

Bending process

- On the work piece, mark the location of the bend with a thin chalk.
- Place the work piece inside the machine so you can see half of the mark and the other half is covered with the edge of the sharp-angle die.
- If you are making two right angle bends on the same side of the work piece, the distance between the marks must be about 3 mm bigger than the inner measurement of the finished bend.

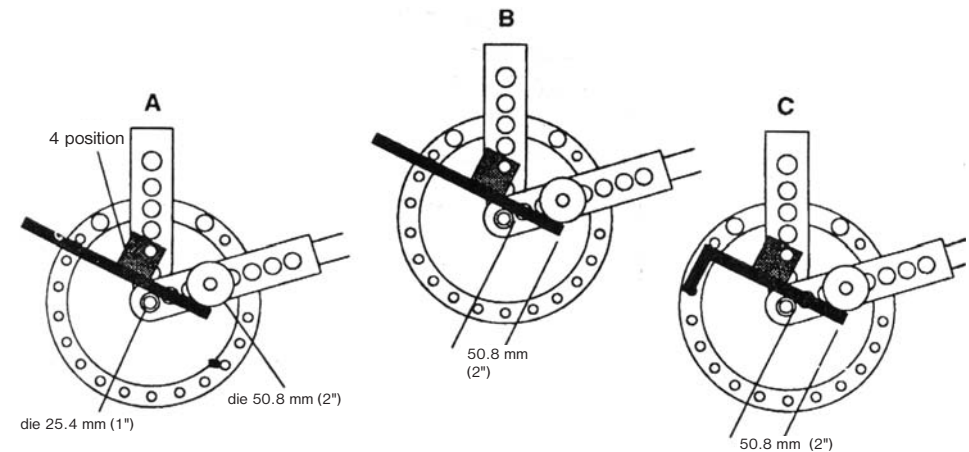
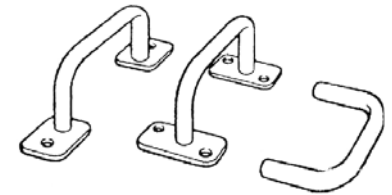
Round pole bending

REQUIRED MATERIAL (only for this sample)

One piece of pole rod with length 228.6 mm and diameter of 15.9 mm.

Two flat pieces with desired dimensions.

TYPICAL HANDLE MADE FROM POLE ROD AND TWO FLAT ANCHORING MOUNTS



NOTE: if you are to make similar handles with different dimensions, you must first test, which die size and what position of the cube best fits your design.

- Using the long connection stud, connect the handle brackets and rings through their centre hole (for the centre stud). Place 25.4 mm (1") die on the stud.
- Using the short connecting stud mount the 50.8 mm (2") die in the handle hole 2).
- Mount the stopper cube on the long connecting stud in position as shown on the picture A).
- Place the pole rod inside the machine, so it is protruding 50.8 mm (2") beyond the die on the centre stud (see picture B) and perform 90° angle bend.
- Turn the work piece around according to picture C and make the second 90° bend. Then remove the work piece from the machine.
- Drill holes with diameter 15.9 mm in the base mounts and place the handle inside the holes halfway.

NOTE: always drill holes with diameter equal to the diameter of the rod pole handle.

- Weld the anchoring mount to the handle at the back. Grind and finish the finished weld joint flat.

Flat steel handle

REQUIRED MATERIAL

One piece of flat, hot-rolled steel bar.
length 228.6 mm,
cross section 25.4 x 4.8 mm.

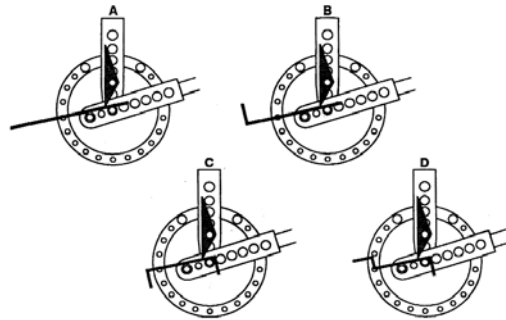
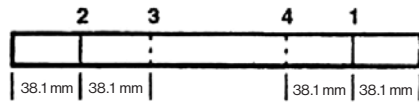
NOTE: If you are to make similar handles with different dimensions, you must first find the location of the bends.

- Mount the sharp-angle die.
- Mark the location of the bend on the work piece with a chalk according to the bending procedure. Markings 1 and 2 are placed on one side of the work piece and markings 3 and 4 on the other side of the work piece.
- Place the flat rod in the machine all the way to the marking 1 (in accordance with the picture A and make 90° bend. Before continuing to work, check the bend for accuracy.
- Set the moveable stopper so every bend produces 90° angle.
- Turn the work piece around, according to the picture. B and slide it to the marking 2 and perform 90° angle bend.
- Turn the work piece around according to picture C and slide it towards the marking 3 and perform 90° angle bend.
- Place the work piece in accordance with picture D and slide it to the marking 4 and perform 90° angle bend.
- Grind and sandblast all sharp edges.

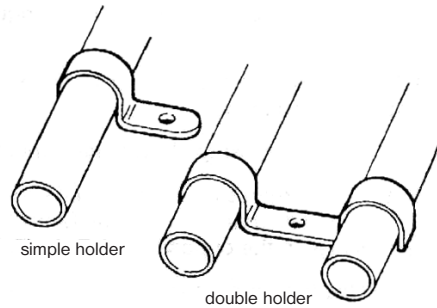
TYPICAL HANDLE MADE FROM FLAT STEEL BAR



BENDING PROCEDURE



TYPICAL PIPE HOLDERS



Making various pipe holders

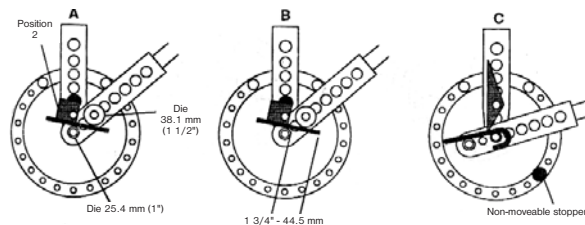
Simple pipe holder

REQUIRED MATERIAL

To manufacture a pipe holder with inner diameter of 25.4 mm (to hold a pipe with outer diameter of 25.4 mm) use flat, hot-rolled steel bar with length 114.3 mm and with cross-section 25.4 x 4.8 mm.

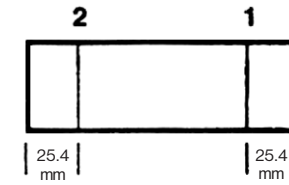
NOTE: if you are to make similar holder with different dimensions, you must first test, which die size and what position of the cube best fits your design.

Using the long connection stud, connect the handle brackets and rings through their centre hole (for the centre stud). Place 25.4 mm (1") die on the stud.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max.
width 50.8 mm.
1 flat steel bar 152.4 mm long
1 flat steel bar 147.6 mm long



BENDING PROCEDURE (flat steel bar 147.6 mm long)

Mark the locations of the bends on the 147.6 mm long bar, as shown on the picture.

Bend No. 1

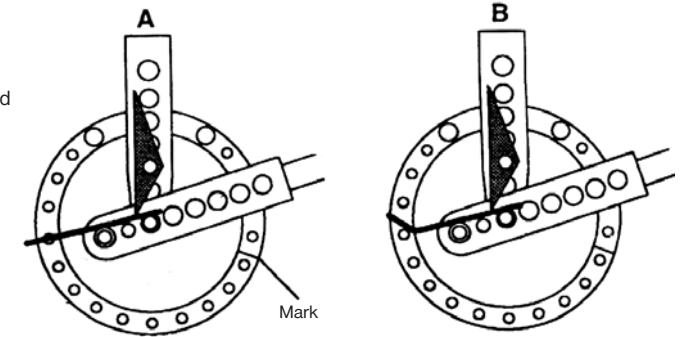
Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.

Bend No. 2

Turn the piece around (see picture. B) and slide it toward the mark No. 2 and perform 45° angle bend. Check the angle.

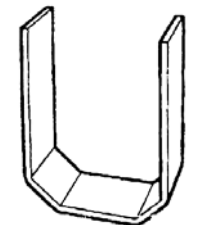
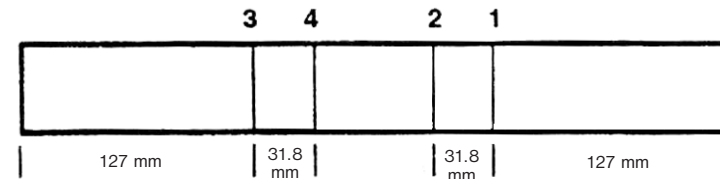
Final steps

Stitch weld both parts together.
Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel bar 374.6 mm long



BENDING PROCEDURE

Mark the locations of the bends. See the picture.

Bend No. 7

Slide the work piece to the mark No. 7 (pic. G) and perform 41° angle bend. Check the angle.

Bend No. 8

Slide the work piece to the mark No. 8 (pic. H) and perform 45° angle bend.

Bend No. 9

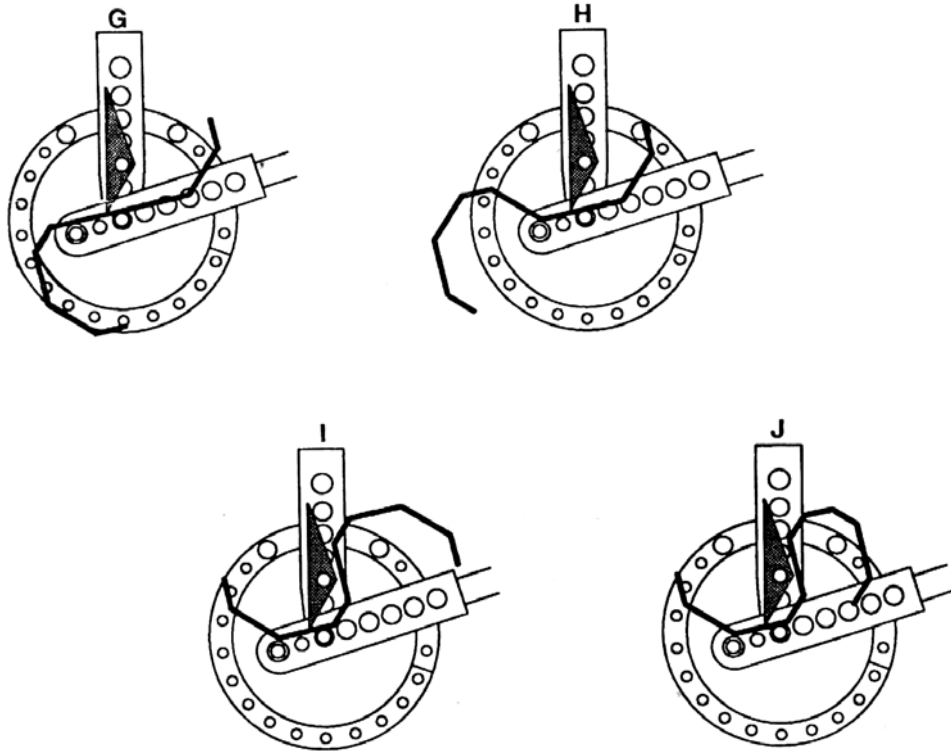
Turn the piece around (see picture. I).

Remove the sharp-angle die stud to make room for the work piece, slide the work piece in the machine and place the stud back again.

Slide the work piece to the mark No. 9 and perform 45° angle bend. Check the angle.

Bend No. 10

Turn the work piece around again (pic. J) and move it to the mark No. 10 and perform 45° angle bend. Inspect the angle. Also make sure that the lower and the upper part of the letter "S" are parallel to each other.



- Using the short connecting stud mount the 38.1 mm (1 1/2") die in the handle hole 2).
- Using the long connecting stud, mount the stopper cube (as shown on picture A).
- Place the flat steel in your machine so the end of the work piece extends 44.5 mm beyond the die on the centre stud (see picture B).
- Fasten the work piece to the stopper cube with self-locking pliers.
- Perform the first bend. Turn the handle till the handle die leaves the end of the material.
- Remove the stopper cube and both dies. Change the handle connection and fix the sharp-angle die (see picture C).
- Slide the work piece as far as possible (against the centre stud).
- Place the stopper stud in the sixth hole of the ring (counting from the closed ring end clockwise).
- Turn the handle and perform the second bend at a distance of around 3.2 mm from the stopper stud.

Double holder

REQUIRED MATERIAL

To manufacture a pipe holder with inner diameter of 25.4 mm (to hold a pipe with outer diameter of 25.4 mm) use flat, hot-rolled steel bar with length 165.1 mm and with cross-section 25.4 x 4.8 mm.

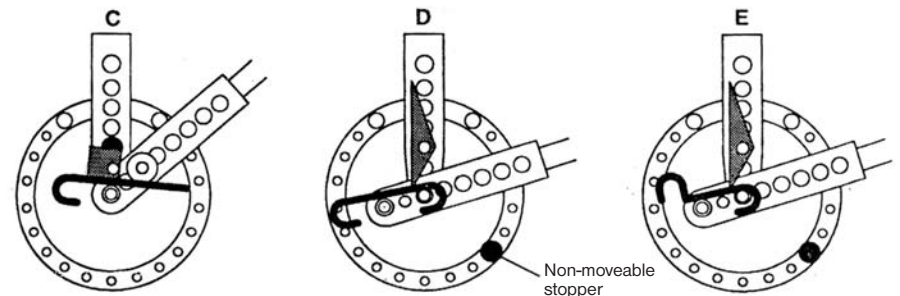
NOTE: if you are to make similar holder with different dimensions, you must first test, which die size and what position of the cube best fits your design.

Using the long connection stud, connect the handle brackets and rings through their centre hole (for the centre stud).

Place 25.4 mm (1") die on the centre stud.

- Using the short connecting stud mount the 38.1 mm (1 1/2") die in the handle hole 2).
- Using the long connecting stud, mount the stopper cube (as shown on picture. A).
- Place the flat steel in your machine so the end of the work piece extends 44.5 mm beyond the die on the centre stud (see picture. B).
- Perform the first bend. Turn the handle till the handle die leaves the end of the material.

Turn the work piece around according to picture C and place it in the machine so the other end is extending beyond the die on the centre stud by 44.5 mm.



- Perform the second bend. Turn the handle till the handle die leaves the end of the material.
- Remove the stopper cube and fix the sharp-angel die.
- Temporarily remove the centre stud and place the work piece in the machine and slide it as far as possible (against the centre stud) see picture D).
- Place the stopper stud in the sixth hole of the ring (counting from the closed ring end clockwise).
- Turn the handle and perform the third bend at a distance of around 3.2 mm form the stopper stud.
- Turn the work piece around around (picture E) and move it as far as possible to the left, against the centre stud. Temporarily remove the centre stud, so you can slide the work piece in the machine.
- Turn the handle and perform the fourth bend at a distance of around 3.2 mm form the non-moveable stopper stud.

Anchoring bolts bending

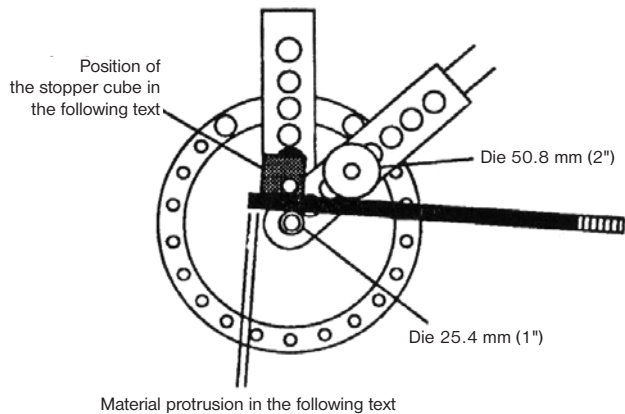
REQUIRED MATERIAL

Anchoring bolt manufacture with length of 254 mm from pole 311.2 mm long.

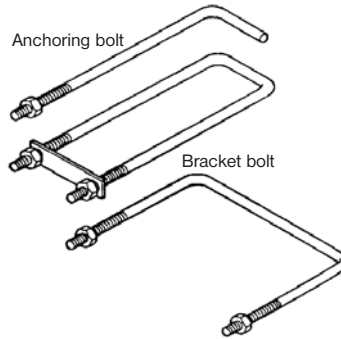
NOTE: To manufacture bolt of different length, use shorter or longer pole (the pole must be long enough so the cube can grip it firmly).

Use the long connecting stud to fasten the handle brackets and the rings through the centre stud hole. Place 25.4 mm (1") die on the centre stud.

- Using the short connecting stud mount the 50.8 mm (2") die in the handle hole (2).
- Mount the stopper cube with the connecting rod and place and turn it according to the work piece diameter: position 2 for 9.5 mm screws or 12.7; position 4 for screws 15.9 mm.
- Slide the work piece in the machine so the end of the thread extends the stopper cube: 12.7 mm for screws 9.5 mm, 15.9 mm for screws 12.7 mm and 6.4 mm for screws 15.9 mm.
- Turn the handle till you reach 90° angle between the shank of the screw and the anchoring part.



TYPICAL BRACKET AND ANCHORING BOLTS



Bend No. 3

Slide the work piece to the mark No. 3 (pic. C) and perform 41° angle bend. Check the angle.

Bend No. 4

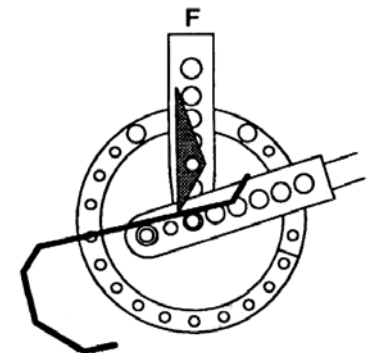
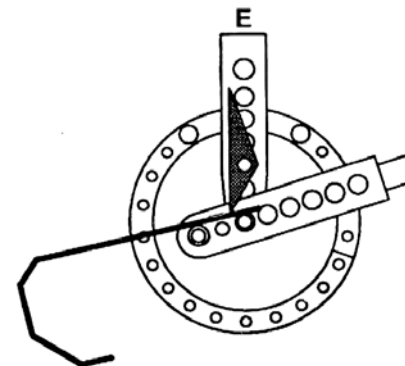
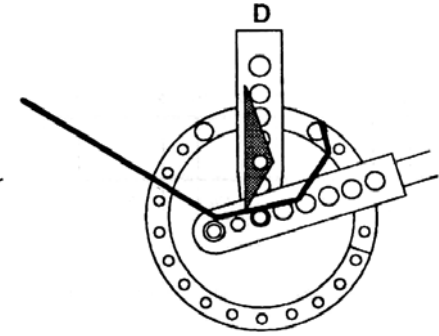
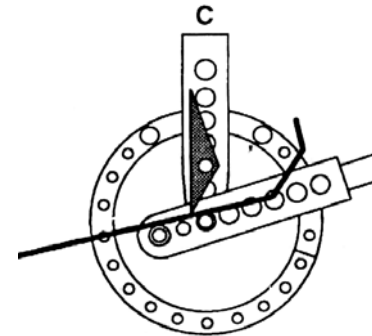
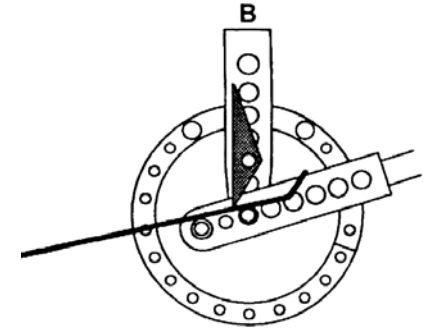
Slide the work piece all the way to the mark No. 4 (pic. D) and perform 45° angle bend.

Bend No. 5

Turn the work piece around (pic. E) and move it to the mark No. 5 and perform 45° angle bend. Check the angle.

Bend No. 6

Slide the work piece to the mark No. 6 (pic. F) and perform 45° angle bend. Check the angle.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.

1 flat steel bar 225.4 mm long

1 flat steel bar 152.4 mm long

1 flat steel bar 79.4 mm long

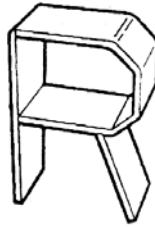
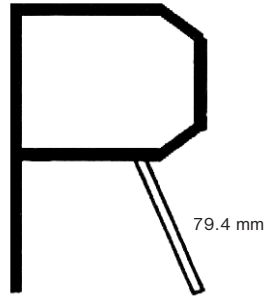
BENDING PROCEDURE

Make the letter "P" part according to the steps described earlier.

Final steps

Stitch weld the 79.4 mm long piece to the letter "P" as shown on the picture.

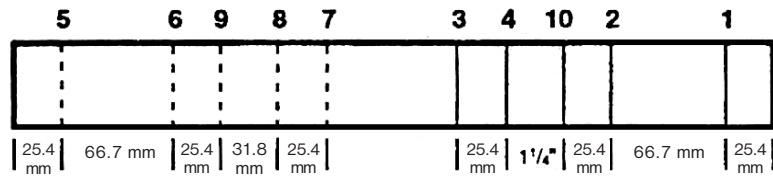
Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.

1 flat steel bar 419.1 mm long



CAUTION: due to the high number of bends required to produce the letter "S", make sure to inspect all angles before going any further.

BENDING PROCEDURE

Mark the locations of the bends. See the picture.

Caution. Five marks must be done on side of the work piece and the remaining five on the other side of the work piece.

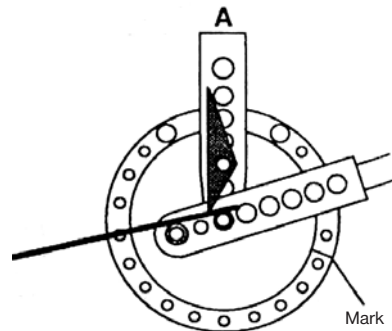
Observe the picture.

Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark. (On marks 3 and 7 you must produce an angle 3 of 41°).

Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 45° angle bend.



Bracket screw bending

The following charts show the applicable settings for bracket screw manufacture with typical end length and bent radius manufactured from steel poles of common diameters.

The lower picture shows the settings for bracket screw manufacture with length of 88.9 mm and inner measurement of 50.8 mm, from steel pole with diameter of 15.9 mm. To manufacture different sizes, set the die size and the position of the stopper cube according to the charts.

Length

To manufacture long bracket screws add double the required length to the specified pole length (for example; to make bracket screws that is 25.4 mm longer, add 50.8 mm to the pole length).

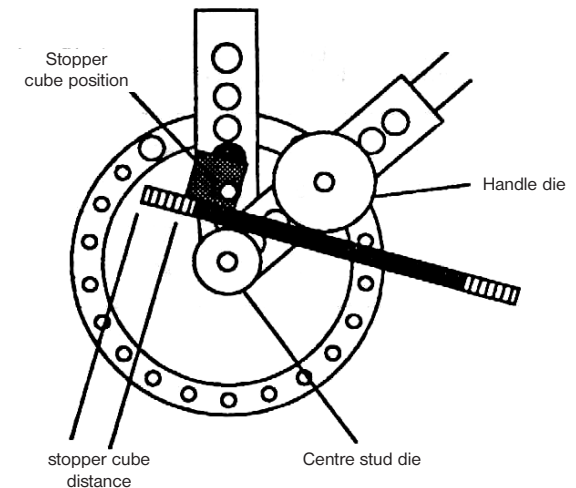
Bending radius

You may choose from 8 different radiuses, by choosing from seven different dies or you may use the centre stud with no die. To prevent damage or bending of the centre stud, always use shaping die if you are shaping material with diameter above 9.5 mm.

Notes

- Because the metallurgical structure and the dimensions of the pole may slightly change throughout its length, we recommend performing test bend before making large amount of bracket screws.
- Write down the die sizes and the positions of the stoppers you already used to manufacture a certain product to make future setting easier.

Typical settings to manufacture bracket screws from pole rods (for detailed information see the following charts)



Bracket screws manufacture from pole rod with diameter 6.4 mm

FINAL DIMENSION		BENDING SETTINGS						
Length (mm)	Inner diameter (mm)	Pole rode length before bending (mm)	Machine bracket hole number	Stopper cube position	Dimension of the stopper cube (mm)	Centre stud die (mm/°)	Handle die (mm/°)	Handle hole number
50.8	25.4	127	1	No. 2	aligned	25.4/1°	50.8/2°	2
57.2	31.8	146.1	1	No. 2	6.4	31.8/1 1/4°	50.8/2°	2
63.5	38.1	161.9	1	No. 1	9.5	38.1/1 1/2°	50.8/2°	2
76.2	44.5	190.5	2	No. 4	6.4	44.5/1 3/4°	50.8/2°	2
88.9	50.8	219.1	2	No. 4	22.3	50.8/2°	44.5/1 °	2

Bracket screws manufactured from pole rod with diameter 7.9 mm

FINAL DIMENSION		BENDING SETTINGS						
Length (mm)	Inner diameter (mm)	Pole rode length before bending (mm)	Machine bracket hole number	Stopper cube position	Dimension of the stopper cube (mm)	Centre stud die (mm/°)	Handle die (mm/°)	Handle hole number
63.5	31.8	158.8	1	No. 1	4.8	31.8/1 1/4°	50.8/2°	2
76.2	38.1	187.3	2	No. 4	6.4	38.1/1 1/2°	50.8/2°	2
76.2	44.5	193.7	2	No. 4	9.5	44.5/1 3/4°	50.8/2°	2
88.9	50.8	222.3	2	No. 4	23.8	50.8/2°	50.8/2°	2

Bracket screws manufactured from pole rod with diameter 9.5 mm

FINAL DIMENSION		BENDING SETTINGS						
Length (mm)	Inner diameter (mm)	Pole rode length before bending (mm)	Machine bracket hole number	Stopper cube position	Dimension of the stopper cube (mm)	Centre stud die (mm/°)	Handle die (mm/°)	Handle hole number
63.5	31.8	165.1	1	No. 1	15.9	31.8/1 1/4°	2°/50.8	3
76.2	38.1	190.5	2	No. 4	11.1	38.1/1 1/2°	3°/76.2	3
76.2	44.5	196.9	2	No. 4	14.3	44.5/1 3/4°	3°/76.2	3
76.2	50.8	203.2	2	No. 3	3.2	50.8/2°	3°/76.2	3

Bracket screws manufactured from pole rod with diameter 12.7 mm

FINAL DIMENSION		BENDING SETTINGS						
Length (mm)	Inner diameter (mm)	Pole rode length before bending (mm)	Machine bracket hole number	Stopper cube position	Dimension of the stopper cube (mm)	Centre stud die (mm/°)	Handle die (mm/°)	Handle hole number
69.9	38.1	184.2	2	No. 4	11.1	38.1/1 1/2°	76.2/3°	3
76.2	44.5	203.2	2	No. 4	23.8	44.5/1 3/4°	76.2/3°	3
82.6	50.8	222.3	2	No. 3	19.1	50.8/2°	63.5/2 1/2°	3
101.6	63.5	257.2	2	No. 2	25.4	63.5/2 1/2°	50.8/2°	3
114.3	76.2	295.3	3	No. 4	25.4	76.2/3°	50.8/2°	3

Bracket screws manufactured from pole rod with diameter 15.9 mm

FINAL DIMENSION		BENDING SETTINGS						
Length (mm)	Inner diameter (mm)	Pole rode length before bending (mm)	Machine bracket hole number	Stopper cube position	Dimension of the stopper cube (mm)	Centre stud die (mm/°)	Handle die (mm/°)	Handle hole number
88.9	50.8	235.0	2	No. 2	25.4	50.8/2°	76.2/3°	3
114.3	63.5	292.1	2	No. 1	41.3	63.5/2 1/2°	50.8/2°	3
127.0	76.2	323.9	3	No. 4	47.6	76.2/3°	50.8/2°	3

REQUIRED MATERIAL

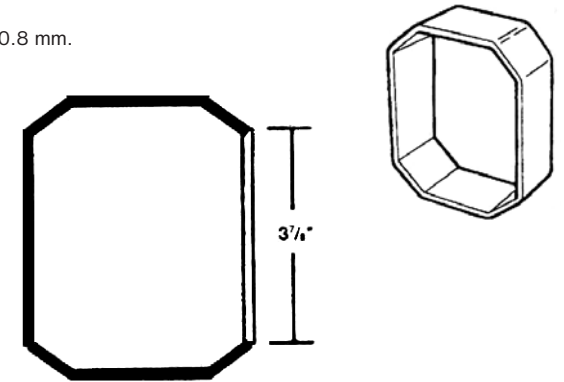
Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
 1 flat steel bar 355.6 mm long
 1 flat steel bar 98.4 mm long

BENDING PROCEDURE

Make the letter "C" from the 355.6 mm long piece according to the procedure described earlier.

Final steps

Stitch weld both parts together.
 Grind and sandblast all sharp edges.



REQUIRED MATERIAL

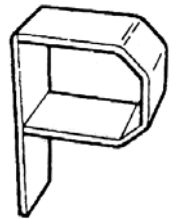
Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
 1 flat steel bar 225.4 mm long
 1 flat steel bar 152.4 mm long

BENDING PROCEDURE

Make the letter "B" parts - the straight and the arch piece.

Final steps

Stitch weld both parts together.
 Grind and sandblast all sharp edges.



REQUIRED MATERIAL

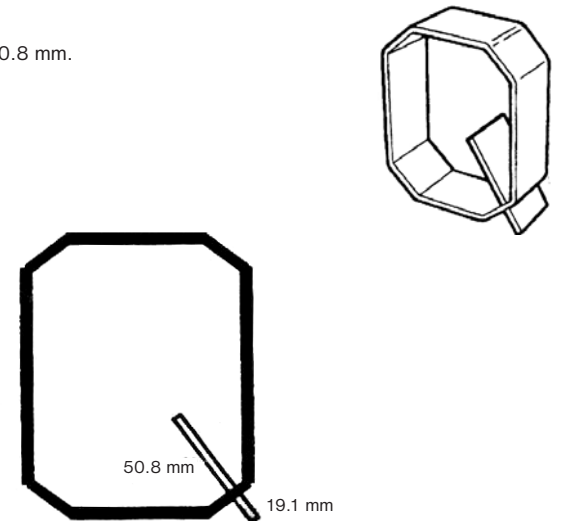
Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
 1 flat steel bar 355.6 mm long
 1 flat steel bar 98.4 mm long
 1 flat steel bar 50.8 mm long
 1 flat steel bar 19.1 mm long

BENDING PROCEDURE

Make the letter "O"
 (see the procedure described above).

Final steps

Stitch weld the short pieces to the letter "O" as shown on the picture. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

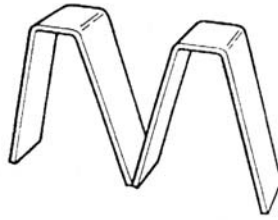
Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
2 flat steel bar 342.9 mm long

BENDING PROCEDURE

Make two letters "V" according to steps described on page 36.

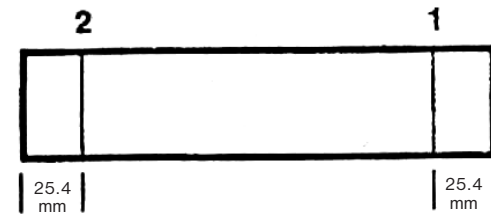
Final steps

Place both "V" parts together according to the picture and stitch weld them together. Make sure all three lower ends are properly aligned. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel bar 204.8 mm long
1 flat steel bar 152.4 mm long



BENDING PROCEDURE (flat steel bar 204.8 mm long)

Mark the locations of the bends on the 204.8 mm long bar, as seen on the picture.

Bend No. 1

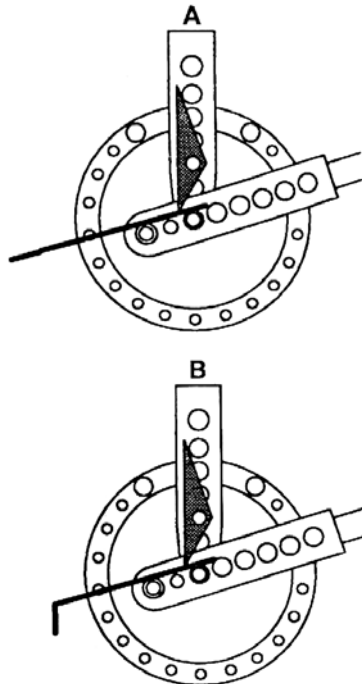
Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 73° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

Bend No. 2

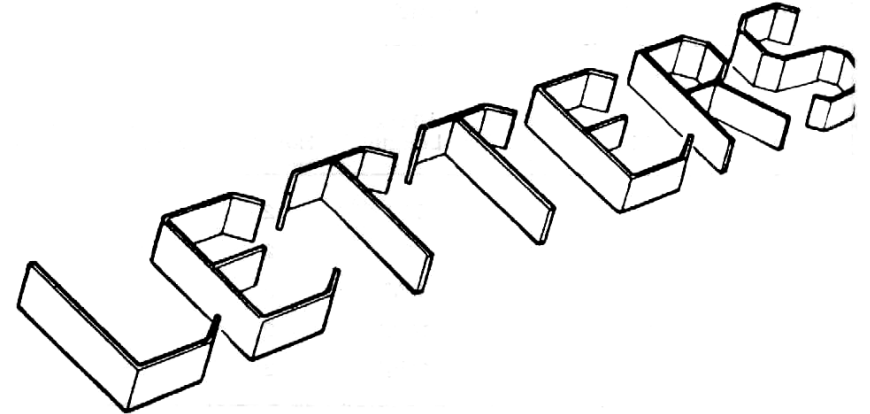
Turn the piece (see picture. B) and slide it toward the mark No. 2 and perform 73° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

Final steps

Stitch weld both parts together. Make sure the vertical arms are parallel to each other. Grind and sandblast all sharp edges.



Letter manufacturing / bending (for headings and signs)



On these following pages you will find instructions how to make all 26 letters of the Alphabet (typical font):

- flat steel bar, thickness 4.8 mm
- height 152.4 mm
- width (depth) 50.8 mm

Notes:

- To manufacture letters, use hot-rolled steel - not thermally hardened.
- Follow these steps exactly and in the same sequence. Pay extra attention when making the letter "S", the most difficult to shape.
- To gain experience and not to waste material, try to manufacture few letters from a flat steel bar with thickness of 4.8 mm and width 12.7 mm.
- If you have to manufacture two or more identical letters, make them first and then move on to manufacture others.

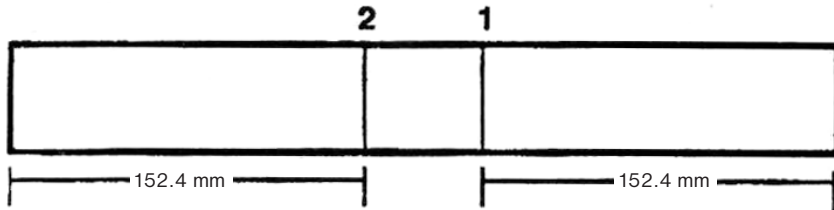
REQUIRED MATERIAL

- Flat steel bar thickness 4.8 mm, max. width 50,8 mm.
- 1 bar length 355.6 mm
- 1 bar length 88.9 mm.



BENDING PROCEDURE

- Mark the locations of the bends on the bar along its entire length, as seen on the picture.



Bend No. 1

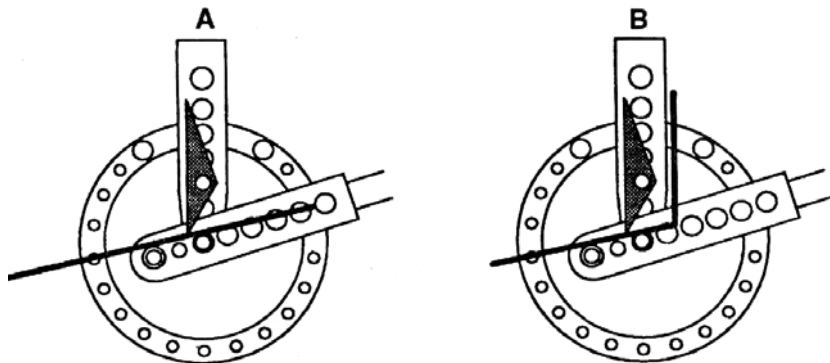
- Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 76° angle bend. Check the angle and move on to make the other bend.

Bend No. 2

- Slide the work piece in the machine all the way to the mark No. 2 (pic. B) and perform 76° angle bend. Inspect the angle.
- Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

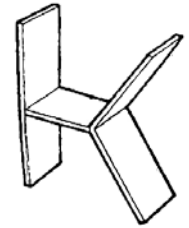
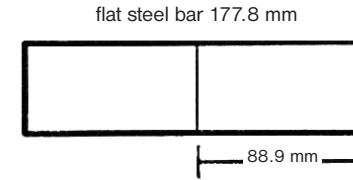
Final steps

- Place a piece 88.9 mm long between the arms of the letter "A" and make sure it is parallel with the upper edge and stitch weld it together.
- Grind and sandblast all sharp edges.



REQUIRED MATERIAL

- Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
- 1 flat steel bar 177.8 mm long
- 1 flat steel bar 152.4 mm long
- 1 flat steel bar 63.5 mm long



BENDING PROCEDURE (flat steel bar 177.8 mm long)

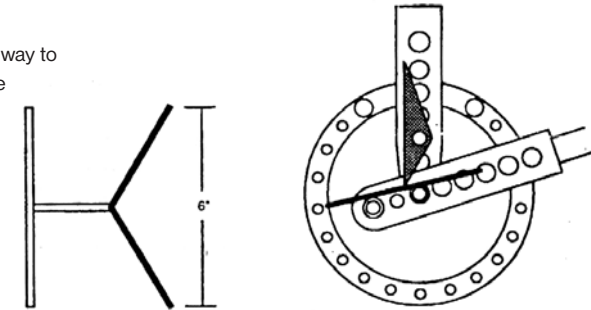
Mark the locations of the bends. See the picture.

Bend

Slide the work piece to the machine all the way to the mark. Perform bend to achieve distance of 152.4 mm. Observe the picture.

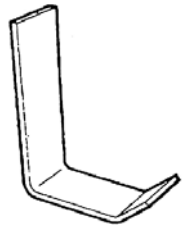
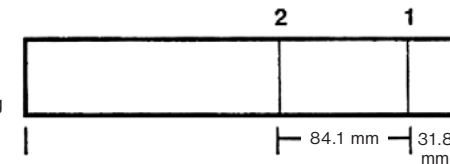
Final steps

Stitch weld both pieces together as seen on the picture. Make sure that the outer ends of the bent piece have the same distance from the straight arm. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

- Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
- 1 flat steel bar 263.5 mm long



BENDING PROCEDURE

Mark the locations of the bends. See the picture.

Bend No. 1

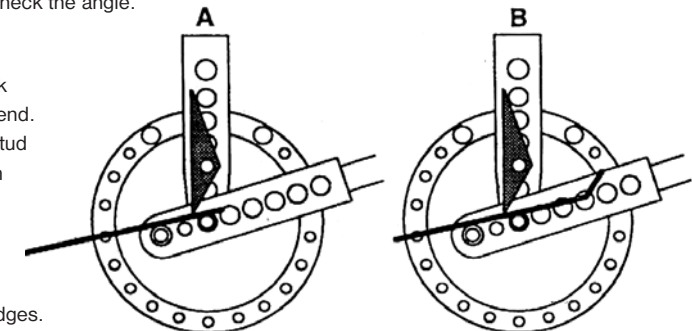
Slide the work piece in the machine all the way to the mark No. 1 and perform 45° angle bend. Check the angle.

Bend No. 2

Slide the work piece to the mark No. 2 and perform 90° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

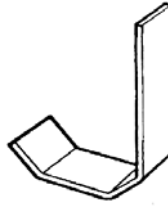
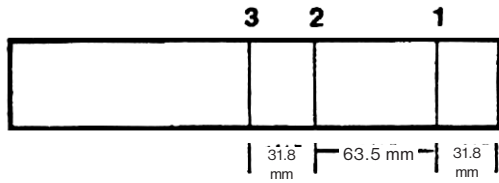
Final steps

Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel bar 254.0 mm long



BENDING PROCEDURE

Mark the locations of the bends. See the picture.

Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle and move on to make the following bend. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.

Bend No. 2

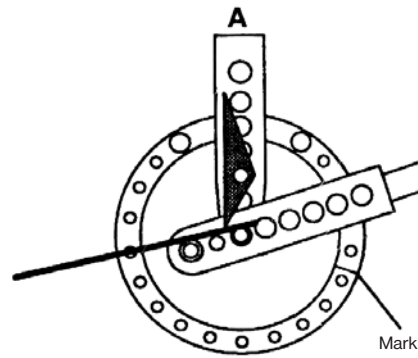
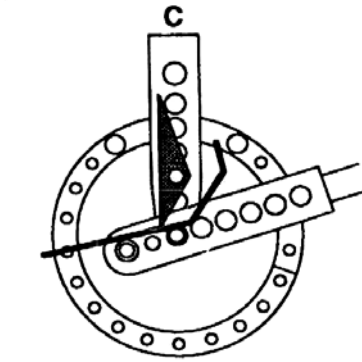
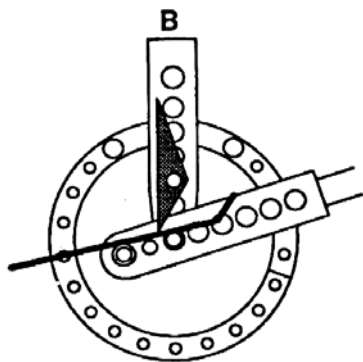
Slide the work piece in the machine all the way to the mark No. 2 (pic. B) and perform 45° angle bend. Check the angle.

Bend No. 3

Slide the work piece to the mark No. 3 (pic. C) and perform 45° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

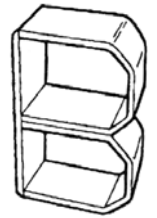
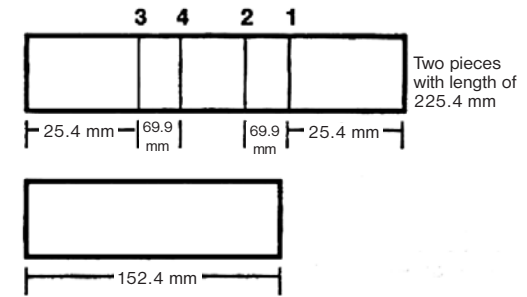
Final steps

Grind and sandblast all sharp edges.



REQUIRED MATERIAL

lat steel bar thickness 4.8 mm,
max. width 50.8 mm.
1 bar length 225.4 mm
1 bar length 152.4 mm



BENDING PROCEDURE

Using a chalk, mark the bend location on both flat rods (length 225.4 mm). See the picture.

Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle and move on to make the other bend. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.

Bend No. 2

Slide the work piece in the machine all the way to the mark No. 2 (pic. B) and perform 45° angle bend. Inspect the angle.

Bend No. 3

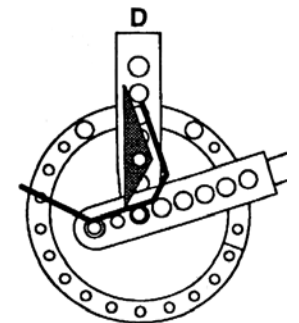
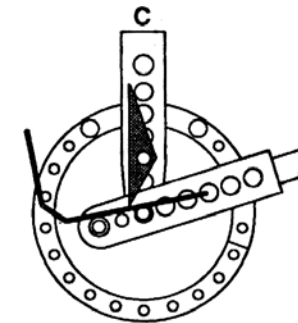
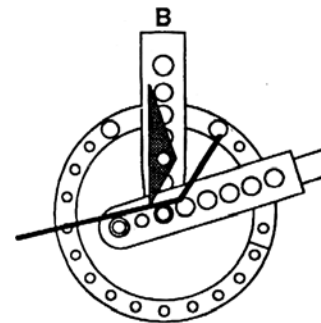
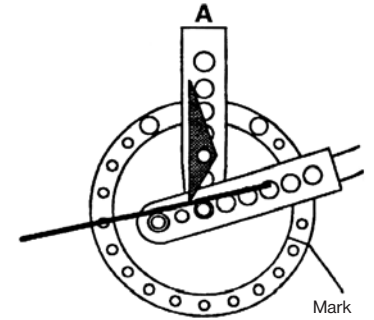
Turn the piece (see picture C) and slide it to the mark No. 3 and perform 45° angle bend. Check the angle.

Bend No. 4

Turn the work piece around according to picture D and move it to the mark No. 4 and perform 45° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

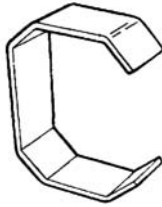
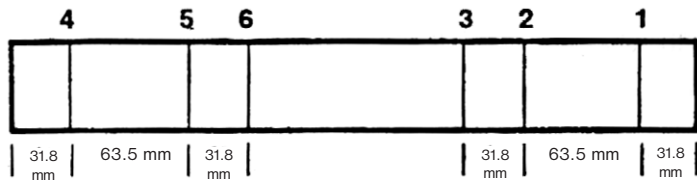
Final steps

Stitch weld both "U" pieces together. Then weld the 152.4 mm long part (the back side of the letter "B") to the welded pieces. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar 4.8 mm,
max. width 50.8 mm.
1 bar length 355.6 mm

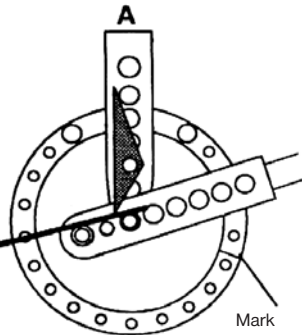


BENDING PROCEDURE

On the long piece (length 355.6 mm), make the bend markings as seen on the picture.

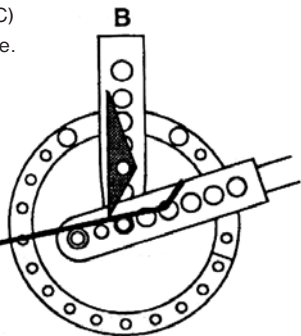
Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle and move on to make the following bend. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.



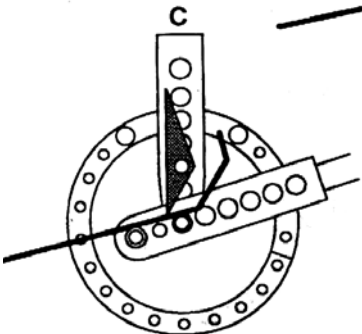
Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 45° angle bend. Check the angle.



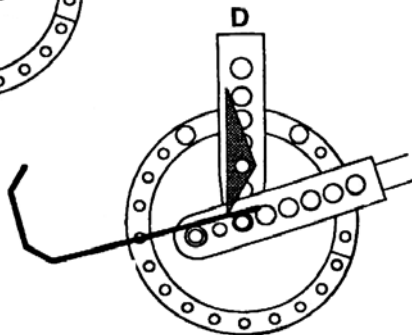
Bend No. 3

Slide the work piece to the mark No. 3 (pic. C) and perform 45° angle bend. Check the angle.



Bend No. 4

Turn the piece (see picture D and move it to the mark No. 4 and perform 45° angle bend. Check the angle.

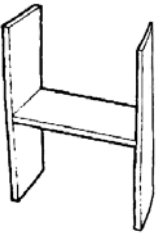
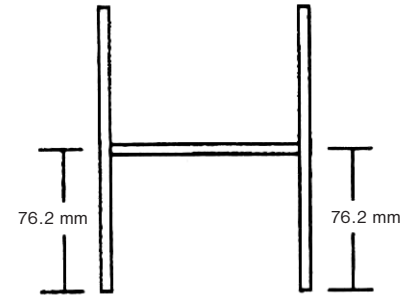


REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
2 flat steel bar 152.4 mm long
1 flat steel rod 95.3 mm long

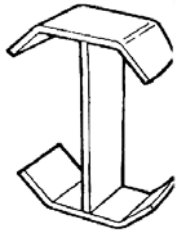
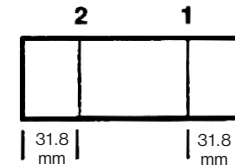
Final steps

Weld it together as seen on the picture. Make sure to check the 90° angle between both arms. Grind and sandblast all sharp edges.
76.2 mm



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm,
max. width 50.8 mm.
2 flat steel bar 127 mm long
1 flat steel bar 142.9 mm long



BENDING PROCEDURE (flat steel bar 127 mm long)

Mark the locations of the bends on both bars (127 mm), as seen on the picture.

Bend No. 1

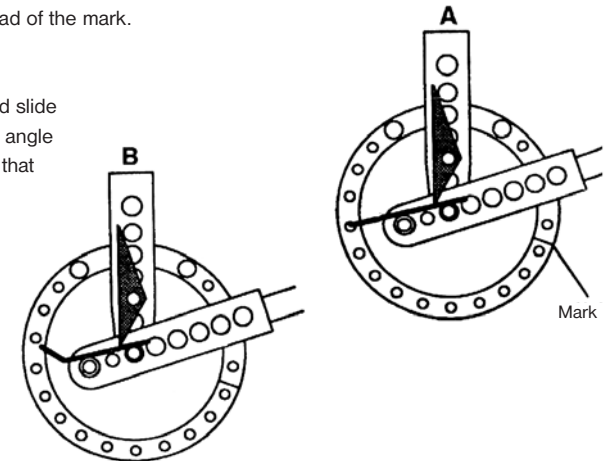
Slide the work piece in the machine all the way to the mark No. 1 and perform 45° angle bend. Check the angle. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.

Bend No. 2

Turn the work piece around (picture B) and slide it toward the mark No. 2 and perform 45° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

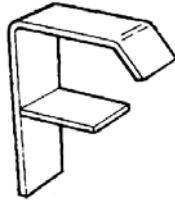
Final steps

Stitch weld the 142.9 mm long piece between the arches (see the picture). Make sure that 90° angle is correctly set between both pieces. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel rod 263.5 mm long
1 flat steel rod 63.5 mm long

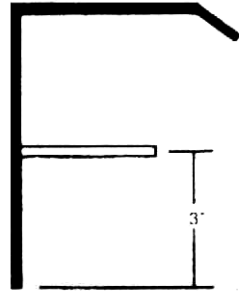


BENDING PROCEDURE

Make the letter "L" according to instructions below.

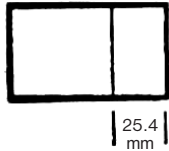
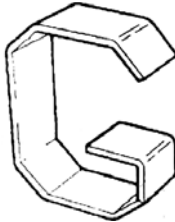
Final steps

Place the long piece (3" = 63.5 mm long) to a position as shown on the picture and stitch weld it in place.
Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel bar 355.6 mm
1 flat steel bar 76.2 mm



BENDING PROCEDURE

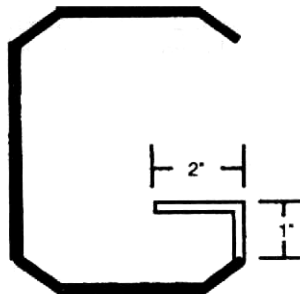
Make the letter "C" according to the procedure described earlier.

Bend

Slide the long piece (76.2 mm) to the machine all the way to the chalk mark and perform 90° angle bend. Check the angle. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

Final steps

Place the long piece (76.2 mm long) to a position as shown on the picture and stitch weld it in place.
Grind and sandblast all sharp edges.



Bend No. 5

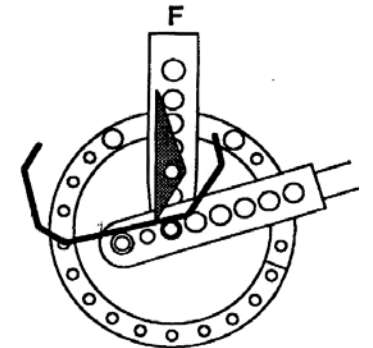
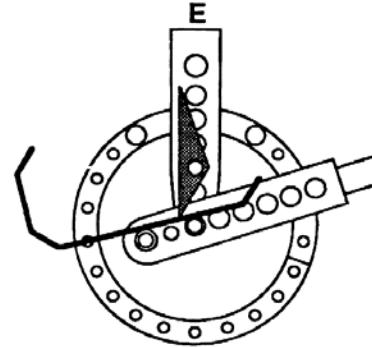
Slide the work piece to the mark No. 5 (pic. E) and perform 45° angle bend. Check the angle.

Bend No. 6

Slide the work piece to the mark No. 6 (pic. F) and perform 45° angle bend. Check the angle.
Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

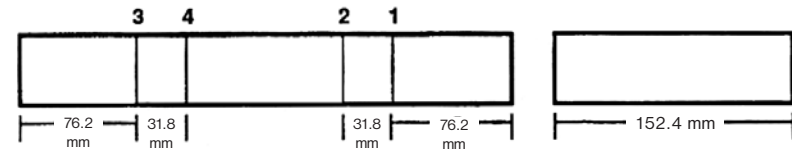
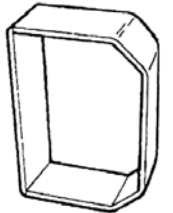
Final steps

Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel rod 317.5 mm long.
1 flat steel rod 152.4 mm long

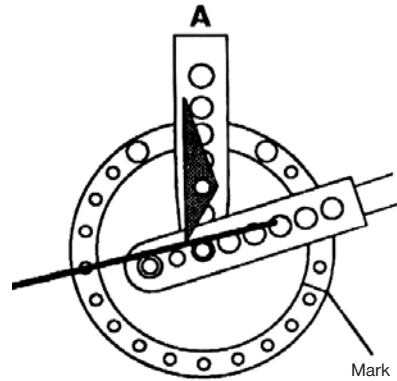


BENDING PROCEDURE

On the long piece (length 317.5 mm), make the bend markings as seen on the picture.

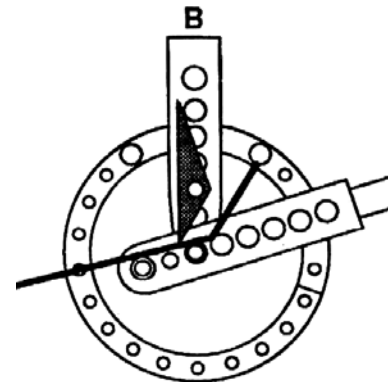
Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle and move on to make the following bend. To make the second 45° angle bend easier, make a mark on the ring or place a stopper there, instead of the mark.



Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 45° angle bend. Check the angle. Remove the work piece from the machine and check the 90° angle between the bent arm and the front side of the letter.



Bend No. 3

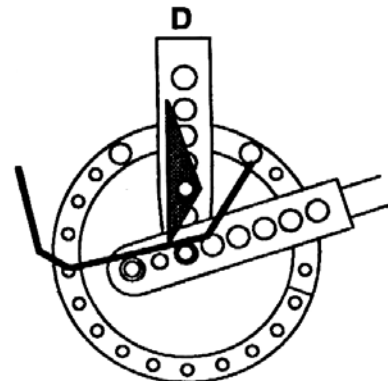
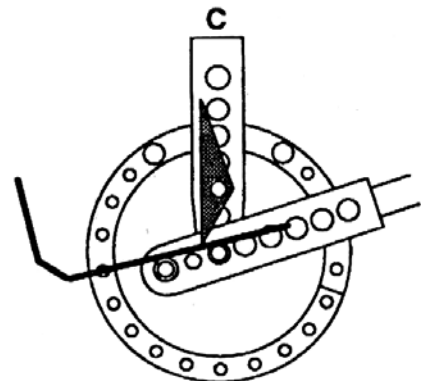
Turn the piece (see picture. C) and slide it to the mark No. 3 and perform 45° angle bend. Check the angle.

Bend No. 4

Slide the work piece to the mark No. 4 (pic. D) and perform 45° angle bend. Inspect the angle and make sure that both arms are parallel to each other. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

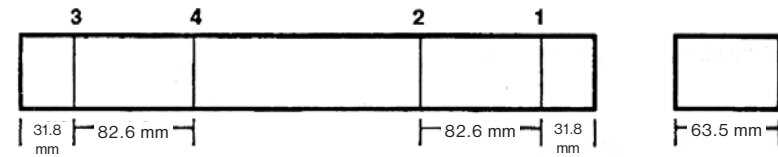
Final steps

Stitch weld the long piece, (the back side of the letter "D", 152.4 mm long) to the finished arch. Grind and sandblast all sharp edges.



REQUIRED MATERIAL

Flat steel bar thickness 4.8 mm, max. width 50.8 mm.
1 flat steel rod 369.9 mm long
1 flat steel rod 63.5 mm long



BENDING PROCEDURE

On the long piece (length 369.9 mm), make the bend markings as seen on the picture.

Bend No. 1

Slide the work piece in the machine all the way to the mark No. 1 (pic. A) and perform 45° angle bend. Check the angle and move on to make the following bend.

Bend No. 2

Slide the work piece to the mark No. 2 (pic. B) and perform 90° angle bend. Check the angle.

Bend No. 3

Turn the piece (see picture. C) and slide it to the mark No. 3 and perform 45° angle bend. Check the angle.

Bend No. 4

Slide the work piece to the mark No. 4 (pic. D) and perform 90° angle bend. Inspect the angle and make sure that the upper and the lower arm of the letter "E" are parallel to each other. Remove the stud that holds the sharp-angle die in place. Remove it from the machine.

Final steps

Stitch weld the middle piece (63.5 mm long) to the middle of the letter "E". Grind and sandblast all sharp edges.

