

OPERATING INSTRUCTIONS

for

Plastic Bending Bar and Sword



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Industrial Plastic Working Equipment & Precision Instruments

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Bending Bars can be successfully used on a wide range of plastic sheets including (but not limited to) the following materials:

- Polyethylene
- PVC (Type I and Type II)
- Acrylics
- Polypropylene
- Kydex
- ABS
- Polycarbonates

Each material has its own inherent differences which will require slightly different procedures. Basically, these differences will be in *temperature required* and *length of time* needed to reach optimum conditions for bending. Refer to the charts in these instructions for general procedure, but bear in mind that some experience and experimentation will also be necessary to secure best results consistently.

Bending is a simple two-step process: The material is heated to allow easy bending and the bending itself follows. The material must be held in place until it has cooled enough to maintain its new shape. The Laramy Bending Bars are an inexpensive, simple and precise means to uniformly heat the sheets prior to bending.

These instructions should make it possible to do a creditable job with no prior experience. However, truly professional results will come with a modest amount of practice and it is recommended that one or two "dry runs" be made with scrap pieces before actually starting in. It is also recommended that different types of plastics be used in these practice sessions so you can get a feeling for the slightly different heating times and workability of each plastic type.

GETTING STARTED

Your Bending Bars kit consists of the following parts:

1. Control Box
2. Two Bending Bars with insulated handles
3. Two bar base mounts

In addition to this, you should have available various pieces of wood or metal to support the plastic sheets while they are heated and a simple form or guide to assure the correct degree of bend. This form can also be wood or metal. C clamps can be helpful to hold the base mounts when working with large sheets. Finally, a grease crayon or marking pen is used to indicate where the bend is to be made. This will be helpful in positioning the bars on the sheet. Gloves should be worn when handling the bars as the handles get hot.

THE CONTROL BOX

This serves two purposes: (1) It acts as a junction box from which all

electrical connections are made and (2) it provides temperature control of the bars.

The first step is to connect each bar to the control box with the cable attached to each bar. It makes no difference which outlet is used with each cable. If you are using only one bar, the other should NOT be plugged in. The bars should be placed on the mounts during the heating. The single knob control acts as an "on-off" switch and provides stepless control of temperature. The box should, of course, be placed conveniently but away from area covered by the sheet you are working with. The main cable from the control box is plugged into a standard 115 VAC outlet. The current drawn is 500 watts for each 4 foot bar and 1000 watts for each 8 foot bar being used. (A total of 1000 and 2000 watts when both bars are used.)

You are now ready to pre-heat the bars. Set the control knob to the required setting for the material and thickness (see table). Let the bars heat for about ten minutes.

TEMPERATURE CONTROL

Successful bending depends greatly upon proper temperature and correct heating time. Read this section carefully before you start work.

Temperature Settings:

POLYPROPYLENE and **POLYCARBONATES** require a relatively high temperature setting.

Other common **THERMOPLASTICS** (Polyethylene, PVC, etc.) will require lower temperatures. Some experimentation will be needed, but you can use the table as a starting point.

Heating Times:

The time required to get the sheet flexible enough to bend will vary from as little as 30 seconds to as much as 12 minutes. Two factors affect setting and timing: (1) the type of material you are working with affects setting and (2) the thickness of the sheet at any given temperature affects required heating time.

In addition, the width of the bar surface will have an impact. Each bar is rectangular in configuration. One face is 5/8" wide, the other one inch. Usually, you will use the narrow face for thin materials and the wide for thick sheets. A single bar can be used for materials up to 1/8" thick. Double bars are necessary above this. The narrow (5/8") cross-section may be used for materials up to 1/4" thick. The 1" section must be used for thicker materials.

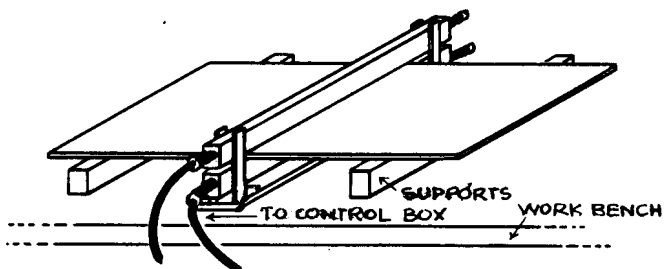
These factors are taken into account in the table below. Use this as a guide. You may want to experiment with other settings and times as you gain more experience.

MATERIAL	CONTROL BOX SETTING	TEMPERATURE	HEATING TIME		
			1/8"	1/4"	1/2"
ABS, PVC & KYDEX ACRYLICS	4	275° to 300°F.	2 bars 30 Sec. 1 bar 1 Min.	2 bars 4 Min.	2 bars 8 Min.
POLYETHYLENE	3½	240° to 260°F.	2 bars 30 Sec. 1 bar 1 Min.	2 bars 4 Min.	2 bars 8 Min.
POLYPROPYLENE	5	340° to 360°F.	2 bars 1 Min. 1 bar 4 Min.	2 bars 2 Min.	2 bars 8 Min.
POLYCARBONATES	6	380° to 400°F.	2 bars 1 Min. 1 bar 4 Min.	2 bars 2 Min.	2 bars 8 min.

MAKING YOUR FIRST BEND

We strongly urge that you try a few bends with scrap material before proceeding to any critical projects. Try to use as large a sheet as possible since this will give practice for your more difficult jobs. Here is a step by step practice run:

1. Connect both bar cables to control box and connect main cable to electrical outlet.
2. Set control knob to the approximate setting indicated on the table. Let heat about 10 minutes. Be sure the bars are on the base mounts.
3. Draw a line on the material showing exactly where the bend will be made (a grease crayon works fine).
4. Be sure the correct bar surface is used (5/8" or 1").
5. Place the sheet on one of the bars (leaving bar on the base mount). You should place supports under the sheet to prevent it from bending down as it heats. Wood or metal is fine for this purpose. The bend marking should be centered directly over the bar.



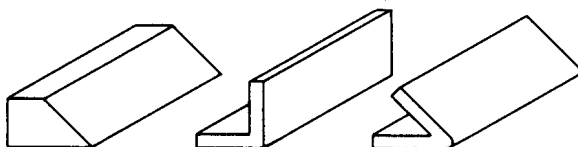
6. Place the second bar directly on the plastic sheet in the brackets holding the bottom bar.

7. Wait for the recommended heating time. You can test the sheet by holding one end and flexing. When it starts to “give” easily, it is ready for bending.

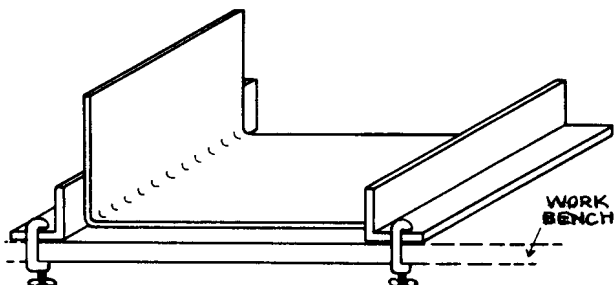
8. You should have ready a “bending guide”. This is simply a piece of wood or metal with the correct degree of bend wanted. For example, a common 90 degree bend can use a straight 2 by 4 length of wood or a piece of angle iron. Other degrees will have to be specially cut for the purpose. Metal has the advantage of speeding up cooling time.

WOODEN ANGLES

METAL ANGLES



9. Remove the top bar and place the sheet on a level surface. Place the bending guide exactly on the line where the bend is to be made. Hold the guide down firmly (some prefer to clamp the guide to the work table). Alternatively, sheet metal brakes and similar devices can be used to bend the sheets.

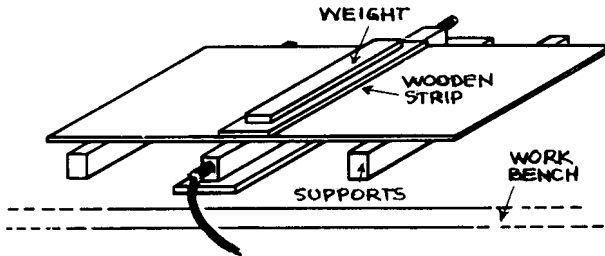


10. You can now lift the sheet and it should bend along the guide to the correct degree. Hold the sheet in position until it has cooled enough to hold its new shape.

11. Turn off the electricity and allow bars to cool. (15 minutes).
You've just made your first plastic bend!

SPECIAL INSTRUCTIONS for *Polypropylene and Polyethylene*

These materials tend to stretch and thin during bending unless special care is taken. The easiest way to bend these plastics is to place the sheet on a bar without immediately placing the top bar in position. The purpose is to heat one side more than the other. This side will be the *inside* of the radius. In normal work, that means you will turn the sheet over before bending upwards. Since these materials also tend to bow under heat, it is well to place a strip of wood over the area being heated and put a heavy weight on the wood. When the sheet shows signs of softening, remove the weight and wood and place the second bar over the sheet. Proceed as with regular bends except remember the bottom side of the sheet is to be the inner radius.



Another caution with these two types of plastics is the possibility that they may stick to the bars during the heating process. This can be prevented by applying a thin coating of vegetable oil to the bars (or use "non-stick frying pan" spray).

Because of the complicated special handling required, we recommend bending these materials with the optional exclusive Laramy "Sword" thereby making a stronger bend and avoiding all special procedures.

SPECIAL INSTRUCTIONS for the optional Laramy "SWORD"

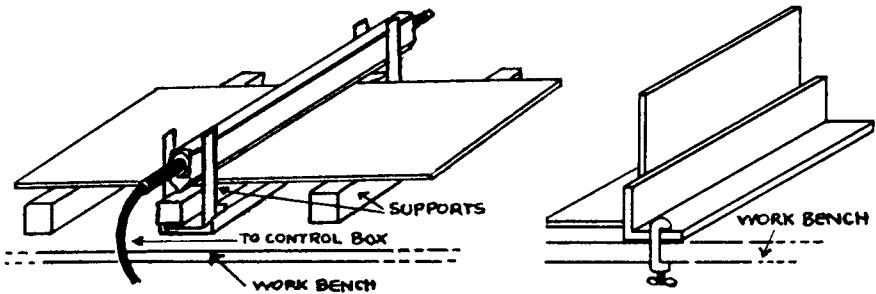
The Sword permits true, non-radius bends with a reinforcing bead on the inner radius. This also results in a bend which is significantly stronger than the sheet itself. Regular bends are always stronger than fabricated corners but these are superior to both of them.

This unique device can ONLY be used with *Polypropylene* and *Polyethylene*. Except as noted below, the procedures are the same as with regular bends.

The Sword is slipped on one of the bending bars and secured with the set screws. Pre-heat the bar for 45 minutes on "High" setting for polypropylene and on "6" setting for polyethylene (respective temperatures of 380° and 250° F.). The Sword should be treated with oil as per special instructions for polyethylene.

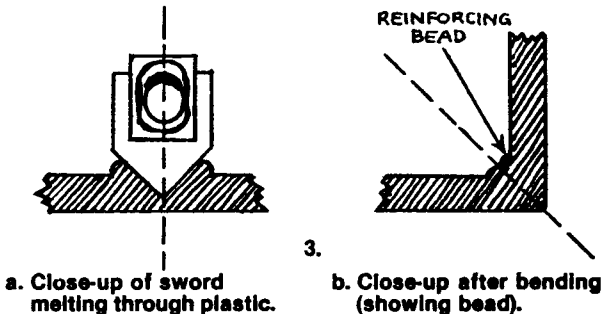
Placement of the Sword is more critical than for normal bends. The sharp knife edge must line up exactly with your bend line.

You will have to provide guides to keep sword in vertical position. Sword will start to melt through the material under its own weight. It may be desirable to place weights on the sword to speed up the operation. When it has gone through about 2/3rd of the thickness, remove the Sword and proceed as with regular bends. On extra thick stock (over 3/8") you may wish to melt 3/4 of the thickness. Then remove Sword and *promptly* bend sheet before it cools. The Sword is only usable for 90° bends.



1. Drawing of typical heating set-up.

2. Making a typical bend.



a. Close-up of sword melting through plastic.

b. Close-up after bending (showing bead).