

# What Is The Best Way To Bending Angle Iron?

How to reduce the flat part in Rolling Angle Iron?

Five Factors That Influence the Bending Angle Iron Process.

Greatest Load Bearing Aspects of angle iron.

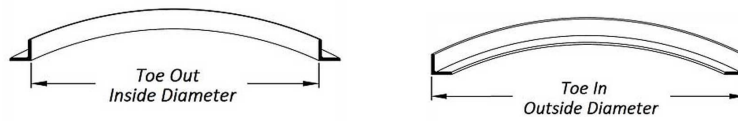
This article solves the above question for you. And provide more knowledge about angle iron roll bending.

## What Is The Difference Between Angle Rolling And Angle Bending?

- **What is angle bending?** Angle iron bending is a metal forming process used to form angle iron to a specific degree or angle. It can sometimes be used as another word for angle rolling. Both refer to the metal-forming processes in which angle irons are formed to a specific degree, radius or curve.
- **What is angle iron rolling?** Also called [angle rolling](#) or angle ring rolling, it may be used to form or roll angle iron into curves at specific radiuses, to form arcs and or rings.

## Two Bending Methods of Angle Bending

**Hot and cold bending processes:** Angle iron has high strength, stiffness, toughness, and ductile properties. However, it does not actually bend very easily, it can be curved by hot and cold bending processes, but cold roll bending is the simplest and produces a quality, uniform product.



angle rolling leg out (hard-way) angle rolling leg out

**Angle rolling leg-out:** rolling can be done with the leg out which is commonly referred to as rolling the “**easy way**” of angle bending.

**Angle rolling leg-in:** rolling process of angle iron can be done with the leg in, which is often times referred to as rolling the “**hard-way**” of angle bending.

#### Notes:

The angle rolling process may also be done with both legs in, and may also be done with both legs out. The bending process can be done on unequal leg angle iron as well, the end-user should specify what leg needs to be in or out after rolling.

**Easy-way and hard way to cold bend the angle iron:** The most natural way to bend an angle iron is the apex in or out but most angle rings are rolled in or out. What happens is that the bending causes the angle to twist. The reason is that the vertical leg of the angle is being bent the “easy-way” or like a belt, while the horizontal leg is being bent the “hard-way” like a washer. The twist is caused because the neutral axis is somewhere between the two legs. All the material inside the neutral axis compresses while all material outside the axis stretches.

PBH **angle iron rolling machine** can also bend all types of angles as well; including aluminum, stainless, and carbon steel. Carbon angle (mill produced) is classified as ASTM A36 resulting in a yield point (PSI) of 36,000 minimum.

## Angle Iron Rolling

Roll-bending is a process whereby we obtain cold process deformation with a wider bend radius that theoretically can range from 5 times the cross-section to infinity. To achieve this process, the equipment used consists of [angle roll machines](https://www.angleroller.com/what_is_angle_rollers.html).



The steel angle is made to pass through a set of three rollers that, after one or more passages (depending on the difficulty of bending), will form an arch with the required radius of curvature. Roll-bending is, generally speaking, a simpler process than bending.

## working principle of Angle Bending

It works by pushing the angle iron through, normally, three rollers – two on one side of the angle iron and one, between them, on the other. If the rollers are lightly resting on the angle iron then it will clearly just pass through them without bending, but as the roller pressure is increased the angle iron will begin to deform, becoming concave on the side of the single roller as the two outer rollers try to push it around the inner roller. The greater the pressure the tighter the bend.

## advantage & disadvantage

- The particular feature of this type of mechanical process is that a single machine can produce different bend radii on the same angle iron, permitting the creation of complex geometrical shapes.
- The disadvantage of roll-bending is the fact that in order to achieve a valid grip and begin the roll-bending process, the machine requires a portion of additional material at the beginning and end of the angle iron. This necessitates an increase in the total quantity of metal needed to roll-bend the angle iron. We called it the **unbent flat** or **flat part** of a roll bending angle iron.

### unbent flat of roll bending angle iron

Again, typically a roll shop that bends a small workpiece on a large section bending machine must factor in a long flat section, which increases material costs.

After bending due to the position of the rollers on the angle steel inevitably remains a flat angle at the ends of the angle iron. This flat part is approximately half the length of the gap between the centers of the lower rollers.

Although the appearance of a straight part is considered to be a flaw of symmetrical roller with 3 roll section bending machine, their simple structure, comfortable use, and low price still make them the most wanted model of roll profile metal section bending machines.

## How To Reduce The Flat Part In Bending?

In addition, there are methods which we can use in order to easily eliminate this problem. You can find some of them below:



**Pre-bending:** this solution involves bending the edges of the workpiece on a press brake before the roll bending process.

**:: READ MORE:** [PRE-BENDING AND BENDING PROCESS](#)

**Adding a “base” for the workpiece during the pre-bending:** this method involves the installation of a “base” together with a workpiece designed for bending and performing the edge pre-bending process on the circular bending machine itself. The application of this method should take into account the possibilities of the circular bending machine and calculate the strength of the applied force on the “base” and the workpiece.

BIT’s section bending machines have independent motion of the two side rolls allowing the operator to minimize the sacrificial unbent flat sections on the workpiece.

But because the BIT [angle rolls](#) ([profile bending machines](#)) move the way they do, an operator can move a joystick or push a few buttons on the control to reconfigure them into a smaller-machine orientation. Beyond this, operators can fine-tune the roll position to minimize the unbent flat even further.

## What is Pre-Bending in Angle Bending Process?



Pre-bending refers to holding an angle iron firmly between multiple rolls and pushing it to create the initial bend. With the rotation of the rolls on the [angle roll machine](#) (aka [section bending machine](#), angle roll, angle roller), the material is fed through the rolls and once the 360-degree rolling process is completed, the pre-bent end of the angle iron makes it very easy to connect the 2 ends, thanks to the pre-bending process.

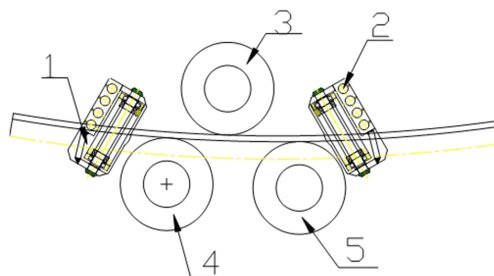
### 4 Reasons Pre-Bending is Crucial When Selecting an Angle Roll Machine

- **Reasons 1#: Eliminates Waste** – The pre-bending process helps minimize waste by creating an optimum geometrical formation so that both ends of the angle iron can get in touch after rolling as perfectly as possible. Practicing the pre-bending process while having an experienced and skilled angle roll machine operator plays a very critical role in eliminating waste.
- **Reasons 2#: Eliminates the Need for Extra Trimming** – The resources used on extra material trimming in angle iron rolling are nothing to be ignored for any efficiently and effectively functioning fabrication shops or operations. The need for extra trimming can easily be avoided through pre-bending by forming an optimum alignment of both ends of an angle iron after rolling the material.
- **Reasons 3#: Saves Time** – Especially for high-volume production shops, wasting a minute out of the production time means wasting money and can add up quickly over time. Since pre-bending helps an operator to form the desired shapes faster, the operating time per angle iron on an angle roll machine([angle iron roller](#)) diminishes, which means rolling more parts with less time.
- **Reasons 4#: Smooth Bending Surface and Uniform Curvature / Thickness** – The pre-bending process is one of the most important practices in angle iron rolling when it comes to being able to get the results that were initially intended to get, which is simply roll bending the material correctly. The properly rolled angle iron will inevitably result in a smooth material surface and uniformity in material curvature and thickness.

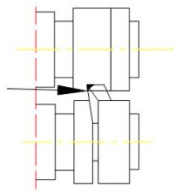
## Use The PBH angle Roller to Bend the angle iron

Angle iron roll bending process may also be done with both legs in, and may also be done with both legs out.

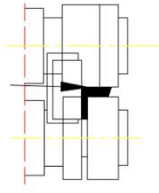
Bending angle iron leg-out method of PBH angle iron roller



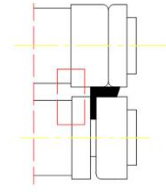
1 - 3D guide roller 2 - Small guide roller 3 - Main roller 4 - Left roller 5 - Right roller



bending angle iron method of angle iron roller



angle rolling method of angle iron roller



angle rolling method of angle roller

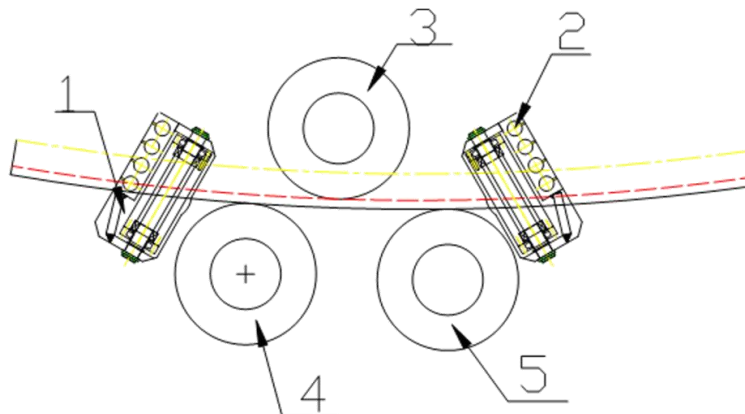
## Angle Rolling Leg-Out Method Of Angle Iron Roller

Angle rolling leg-out process for section rolling machine

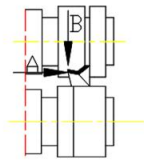
The angle iron is an asymmetric profile, and it is often twisted during rolling, so the guide roller needs to give the angle steel an external force against deformation during rolling so that it can be corrected and reduced deformation.

The 3D guide rollers must be adjusted slowly to prevent the angle from twisting outwards. The mold combination is shown in the picture above. The pre-bending is asymmetrical, the rolling is symmetrical, and the friction clutch should be loosened.

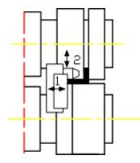
## Bending angle iron leg-in method OF Angle roller



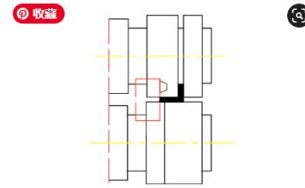
1 - 3D guide roller 2 - Small guide roller 3 - Main roller 4 - Left roller 5 - Right roller



angle iron roll bending method of angle rolls



angle iron rolling method of angle iron roller



angle iron roll bending method of angle rolls

The inward bending process of the angle steel is similar to the outward rolling of the angle steel flange workpiece. As shown in Figures 3-19, there will be two directions of distortion during the bending process. Therefore, 3D guide rollers (1) (Figure 3-18) and small guide rollers (2) are used. To provide the force, the small guide roller (2) is adjusted by twisting the idler.

Since the angle steel is easily deformed when it is bent inward, the diameter of the bent workpiece is larger than that of other profiles when the angle steel is bent inward.

## Angle rolling process

- Symmetrical adjustment
- Start bending the workpiece with one end of the 3D guide roller, adjust the side roller and feed the workpiece to the end of the small guide roller, adjust the guide roller so that the workpiece can be rolled back normally, the 3D guide roller will touch the flange end of the workpiece, which guides the workpiece to be rolled out from the machine.
- If the adjustment of the small guide roller is too large, the workpiece will be twisted inward.
- When rolling the workpiece, stop immediately when the other end reaches the middle of the 3D guide roller, and repeat the rolling of the other side in the opposite direction. Be sure to adjust the guide to the correct position, then bend as above until it forms a circle of the desired diameter.

Generally, angle steel bending differs from angle iron roll bending in that it is more concerned with forming the angle steel to a specific angle or degree, rather than a curve or radius.



## How to choose the right angle roll?

Whether operators are bending angle iron, tool choice is critical. The tools need to fit the profile yet not be so tight as to negatively affect workpiece shrinkage and growth. A tool that's too tight can cause localized distortion and, at worst, actually gouge the material surface.

When operators need to bend an open profile like an angle, they have fewer distortion-mitigating tools at their disposal. Beyond tool choice and fit-up, an angle bending machine must choose a correctly sized machine, one with sufficient forming tonnage and adequate grip lengths—enough to provide the needed leverage to reduce distortion, but not so long that they will require an excessively long sacrificial straight section, a long sacrificial flat section becomes expensive scrap, reducing the roll shop's competitiveness.

## What do you need to know before bending an angle iron?

### Six parameters

The basics of bending are the same for all materials in that certain information is required to produce an accurate part:

- Degree of bend
- The radius of the bent section
- Chord of the bent section
- Arc length
- The slope of the bent section
- Tangent lengths

It isn't necessary to know all six parameters. However, at least three must be known to produce a bent section.





## Five Factors That Influence the Bending Angle Iron Process

Several tips can help to ease the bending of square or rectangular material and reduce the amount of distortion in bent sections.

- **Method of Bending.** This is a key factor in controlling distortion. A correctly chosen procedure can help to produce consistent tolerances and accurate parts. Design distortion and material size are important factors in determining the bending method.
- In many cases, there is no better factor than experience. Many trained bending artisans know what is required to produce an acceptable product.
- **Size of Material.** Larger material bent to a smaller radius has a greater chance to distort than smaller material bent to a larger radius. Design and planning are necessary to help solve bending problems before they arise.
- **Tooling.** After the parts have been designed, the method of bending has been chosen, and procedures to bend to proper tolerances are established, the machine must be set up with the proper tooling.
- Decrease the friction between the tooling and the material to be bent. When friction is reduced, material flows smoothly through the bending equipment, allowing the machinery to perform its designed operation efficiently.

## Basic Knowledge of Angle Iron



Construction, aerospace, automotive, railroad, furniture, HVAC, hardware, and storage operations all make use of angle irons.

Materials that are used in [angle](#) irons include iron, steel, brass, and aluminum.

Iron and steel angle irons are the most common, but brass and aluminum are also used in angle iron fabrication. Brass, for example, is used as a light load-bearing element when the element will be highly visible.

### Greatest Load Bearing Aspects Of Angle Iron

angle iron is stronger than non-structural steel because the two perpendicular flanges work in conjunction to give angle iron cross-sectional structural integrity, and resistance to bending from pressure applied from the top or bottom, left or right.



The two flanges that make up the angle create a compound area. A compound area is the location of the axis of a piece of structural steel that is most resistant to the moment of inertia. The moment of inertia is when a static body begins moving around an axis.

The compound area is the most resistant load-bearing area of a piece of structural steel — the area most resistant to the moment of inertia. In angle iron, the compound area is located in the trough between the two flanges.

But the physics of angle iron is not as important as the end results.

## **Layman's Explanation Of Angle Iron's Strengths And Weaknesses**

Angle iron is relatively resistant to the moment of inertia when the load is applied to the top, bottom, or either side. However, when pressure is applied in a manner that rotates the angle iron around the axis of the compound area, it will fail with the application of less pressure than when the pressure is applied around the cross-section.

In other words, when angle iron is twisted from one end or the other, that is when its structural integrity is most vulnerable. Simply, angle iron is hard to bend but easy to twist.

## **Implications Of Angle Iron's Strengths And Weaknesses**

Angle iron works extremely well when used conjunctively. By welding pieces together at 90-degree angles and bracing the angles of the welds with short pieces at 45-degree angles, angle iron's susceptibility to twisting is greatly reduced.

**That means angle iron is a sound and solid material to use for the framing of:**

- crates and boxes
- cages
- load-bearing support structures
- free-standing, load-bearing frames

Angle iron is not good to use to span large distances, to support heavy loads as individual units, or in any manner that twists the iron such as:

- Fence posts
- Light poles



- Lean-to supports
- Home-made ladders

## Steel Angle Rings/Angle Ring Flange in Fan Housings

**What is Angle Ring Flange?** Steel Angle Flanges are pressed or rolled and used widely in joining ductwork together in dust and fume control work.

Fans are installed to provide exhaust, intake, or circulation. A common application for angle rings and other curved steel sections is in fan housings. The metal rings serve as structural supports as well as mating flanges to connect to round ductwork.

Metal angle rings can be supplied in both standard sizes (with standard diameters, bolt circles, number of holes, and hole diameter) and special sizes (with any variety of diameters and punched hole specifications as well as angle sizes). Angle rings can be welded on the outside only, on the inside only, all around, or not welded at all (OBJ, open butt joint). The welds can also be ground smooth.

Metal rings for fan housings can be made of virtually every steel section: angles, bars, beams, channels, pipe, and tubes. The rings can be made of stainless steel, mild steel, aluminum, or other alloys. In addition to full rings, ring segments can be provided. Rings can be galvanized, plated, or painted.

Fans with metal rings are commonly part of a system that includes ductwork. Round ductwork can be made from lock seam pipe or welded pipe and is often connected by angle flanges.

## Standard angle rings/Angle Ring Flange

Standard angle rings are often carried in stock or, if not, can be produced within a day or two. Same-day delivery is often an option. Custom rings can be made in a day or two.



One of the most common applications of angle bending is to form complete rings which are called rolled angle rings, angle flanges, or companion angle rings. Such rings are made of angles as small as  $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{8}$  and as large as  $8 \times 8 \times 1$ . These rings are used as flanges to connect pipe, as stiffeners on cylinders, and as housing frames among other applications.

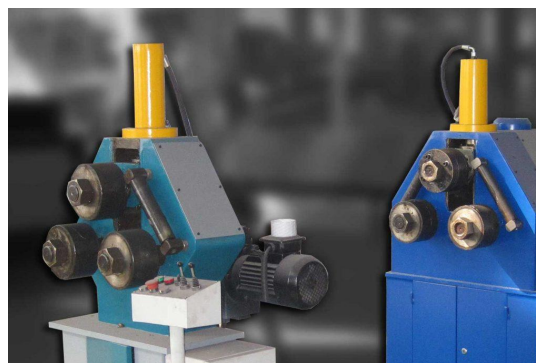
Over the decades, two types of angle rings were developed as stock items: standard angle rings and blowpipe rings. The two types of rings differ in their inside diameter, the angle size used, the bolt circles, the number of holes and hole sizes, and the weight of a ring.

For example, a 16in standard angle ring has an inside diameter of 16-1/4in, and is made of  $1\text{-}3/4 \times 1\text{-}3/4 \times 3/16$  angle with an 18-1/8 bolt circle for 16 ea. 13/32 holes, and weighs 9.50 lbs. A 16in blowpipe angle ring has an inside diameter of 16-1/8in, is made of  $1\text{-}1/2 \times 1\text{-}1/2 \times 3/16$  angle with an 18in bolt circle for 8 ea. 7/16 holes, and weighs 8 lbs.

Standard angle rings tend to be a little heavier with a larger angle and more bolt holes. Standard angle rings are used in heavier applications, for example, in conveying grain. Blowpipe rings are used in lighter applications, for example, in conveying air, dust, or another light particulate. Both types of rings work well in pneumatic conveying systems. They are welded to the outside of the pipe and therefore cause no interference to the flow inside the pipe.

## MS Angle Roll

Simple operation, small size, and complete functions. It is also a multi-functional section bending machine, which can roll various profiles by changing the mold.



**Max. Section (mm):** 30×4-80×10

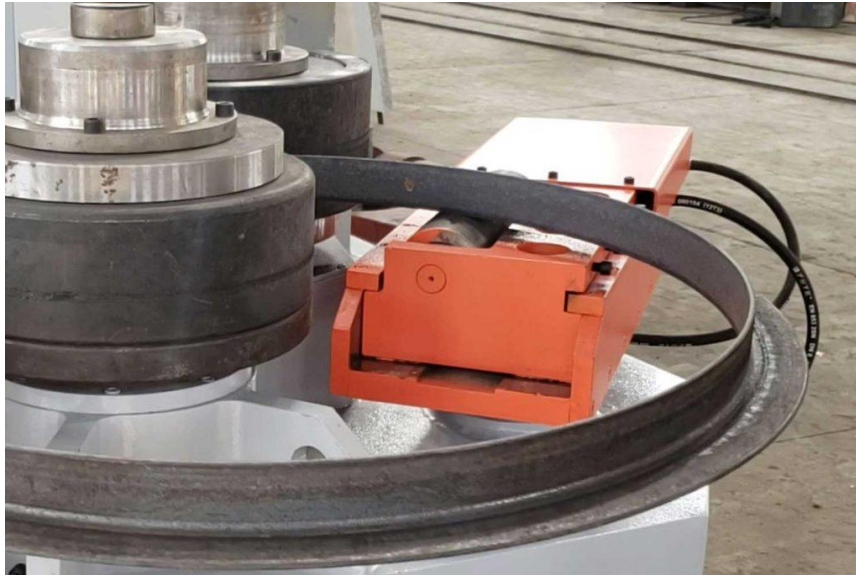
[https://www.angleroller.com/what\\_is\\_angle\\_rollers.html](https://www.angleroller.com/what_is_angle_rollers.html)



[MORE DETAILED PARAMETERS](#)

## **PBH Angle Iron Roller**

PBH angle roll bending machine can roll bend angle iron into a circle or arc.



**Max . Section (mm): 80×10-200×30**

**Min.bending DIA(mm):  $\Phi$ 1000- $\Phi$ 8000**

[MORE DETAILED PARAMETERS](#)