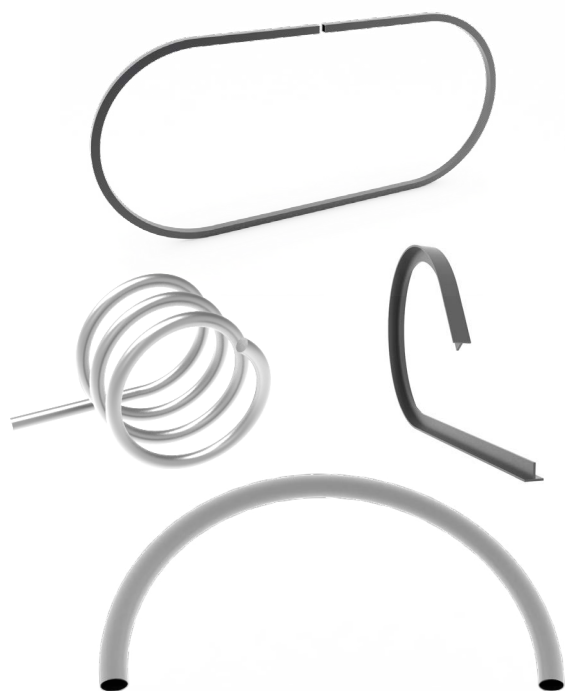


HOW TO CHOOSE THE MOST SUITABLE TYPE OF BENDING MACHINE TO BUY

One of the first issues that come up is the fact that not all types of bending machines are appropriate for the type of job that needs to be done. **There are two very different groups and they both do completely different work.** That's why it's important to know which type of bending machine you're looking for so there are no unwanted surprises after you buy. Some are 3-roller bending machines and others are fixed radius bending machines.



*3-roller bending machine
and examples of the work that can be done*



*Fixed radius bending machine
and examples of the work that can be done*

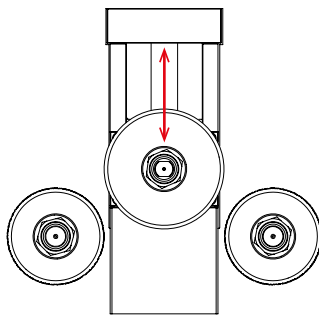


1 The first group are known as **bending machines or profile and pipe benders, also known as 3-roller or variable radius bending machines.** These pipe benders are the ones seen in the images with 3 rollers. One on the top and two rollers at the bottom.

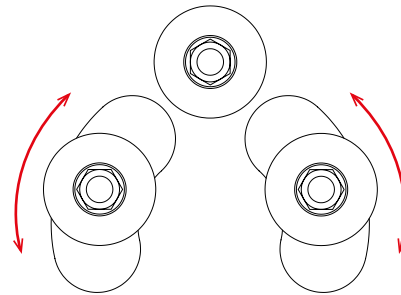


Pyramidal bending machines | *Asymmetric bending machines*

Within this group, there are **pyramidal** pipe benders on which the top roller only moves up and down to achieve the different radiuses, and **asymmetric** pipe benders on which the bottom rollers are the ones that move to get close to the top one.



Pyramidal bending machine



Asymmetric bending machine

What you can use these types of pipe and profile benders for

As the name suggests, they can bend round, square and rectangular pipes into T and U-profiles with the angles in different positions toward the inside or outside, solid round and square pipes, flat or edged plates and more.

The bends may have different radiuses; in other words, **variable radiuses.** Using the same machine and same tools you can bend the same pipe or profile at radiuses of 140 mm or 20,000 mm or more. You get the radius of the piece by bringing the upper roller closer to or further away from the bottom ones.

They are used to get a 360 degree bend; in other words, a complete bend to make the base for a table, a flange for coupling, a railing for a spiral staircase, spiral pipe rings for a heat diffuser, a spring, protectors for roundabouts, bike parking areas, tree protectors, etc. **They can also be used to bend sections of complete bends,** such as the beams for an industrial warehouse roof, greenhouse roofs, large structures used in construction such as circular beams for roofing, domes, buttresses for bridges, metal pergolas, curved door awnings, tunnel structures and more.



What you can't use a 3-roller bender for

IMPORTANT: You can't use these benders to do elbows or very tight bends at specific degrees. Fixed radius bending machines are used for this purpose.

What information you need to give pipe bender manufacturers to determine which 3-roller bender you need

Once you're sure you need this type of bending machine, there are different models. What makes them different is their capacity; in other words, the **diameter of the axles**. They can have axles between 28 mm and 300 mm or more. The machine capacity is determined by the diameter of the axles. **The larger the axle, the more capacity the machine has. In other words, the larger the pipes or profiles it can bend.**

You must remember that large bending machines cannot be used to make bends with a small radius on pipes with small diameters. That's why you must find a balance when deciding which bending machine you need. Many companies have a small machine for small tasks and a larger one to make large-sized parts.

This is the information a manufacturer needs for each order:

- **The largest profile or pipe diameter you wish to bend.**
- Whether the profile is irregular like on a rectangular pipe, and **the bend direction**; in other words, whether it's flat or edged.
- **The thickness of the pipe or profile.**
- **VERY IMPORTANTLY**, because it will determine which model is needed, **the minimum radius you wish to bend**. The maximum radius doesn't matter because the machine can always do it. But not all models can do the minimum radius.

Here is a diagram showing the different profiles with bending directions and the information needed when contacting a manufacturer.

SPECIFICATIONS OF TUBES TO BE BENT · SECTION BENDING MACHINES

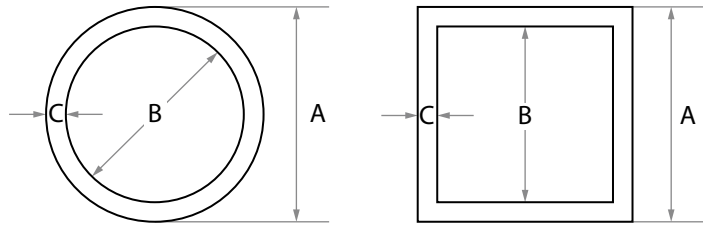
1. Tube sizes

Tube O.D. (A) mm.

Tube I.D (B) mm.

Tube Thickness (C) mm.

Round tube or Square tube



** Important: Dimensions will be indicated in millimeters as there are different types of inches and regulations.*

2. Mechanical strength. Hardness and type of material.

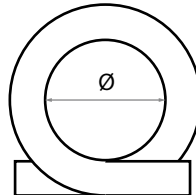
Consult your supplier for the details concerning hardness and material.

- Aluminum 30 Kg/mm (300 N/mm)
- Brass 25 Kg/mm (250 N/mm)
- Cupper 22 Kg/mm (220 N/mm)
- Mild Steel 45 Kg/mm (450 N/mm)
- Stainless Steel 65 Kg/mm (850 N/mm)

3. Minimum Diameter of the bent.

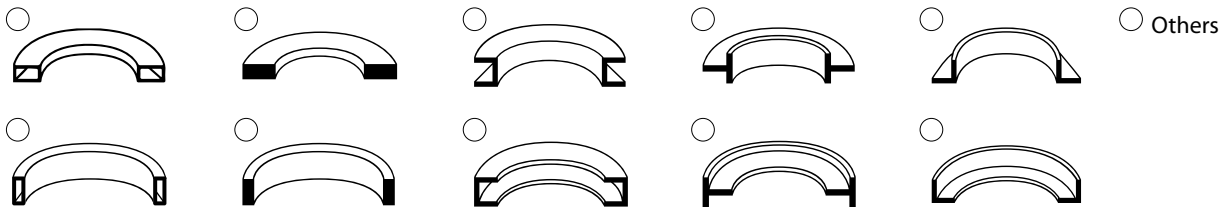
Minimum diameter is sized on the inner side of the bent, as shown in the following picture:

Diameter (Ø) mm.



4. Bending direction according to the type of profile

If the profile to be bent is not round or square, indicate the type of profile and the direction of bending



The model you should choose if you're unaware of the capacities you need and want to begin bending to diversify your business

The most common models to start up a business and be able to do all types of jobs would be a **bending machine with 40 mm axles**. It's a model that can make all types of bends with capacities ranging from 3 mm to 60 mm or a 2 inch Schedule pipe. For many years, the **Nargesa MC400 bending machine** has been considered the best on the market. The best thing about it is the robust construction as it can be used to make bends with small diameters as well as large diameters. It can handle pipes with a small outer diameter as well as up to 2 inch Schedule pipes.

2

Secondly, there are **elbow or fixed radius bending machines**. There are also essentially **two types of these, one with an inner spindle and another without an inner spindle**. This spindle or core is sort of like a worm that's inserted inside the pipe to prevent deformation when bending.

Bending machines without an inner spindle are used for a bit thicker pipes. It's all in proportion to the pipe diameter you wish to bend. A bending machine without a core or spindle has a die or matrix with the bend diameter you want to make and a counter-die that accompanies the pipe through the bending process.

Besides these two parts, a fixed radius bending machine with a core basically also needs an inner core to prevent pipe deformation.

What fixed radius bending machines are used for

As the name suggests, you can make bends with a specific radius at different degrees up to a maximum of 180 degrees. The bend radius is always the same. To switch it, you must switch the matrix or die. You can only change the degrees for the bend to 45, 90 or 180 degrees.

Normally, **the radius of the matrix is three times the pipe diameter** on bending machines without a core. For example, a pipe with a diameter of 30 mm has a matrix with an average radius of 90 mm. A 40 mm pipe has a matrix or die with an average radius of 120 mm. Bending machines with a spindle can reduce this constant up to 1.5 times the pipe diameter. In other words, a 30 mm pipe can have a 45 mm die matrix.

In short, **machines with a spindle** for smaller diameter bends and smaller pipe thicknesses,

and fixed radius bending machines without a spindle for thicker pipes with larger die diameters.



Fixed radius bending machines are used to make elbows at different degrees. For example, the legs on a chair or desk, the curves on a handrailing, pool ladders, piping for food services, pharmaceuticals and the oil industry, protectors for 4x4 cars, inner reinforcements for racecars, protections for walls and pillars, boat railings...

Normally the two types of bending machines are needed: you make large bends with 3-roller ones and small, closed bends with fixed radius ones. Customers often solve this problem by buying elbows and then welding and polishing them. They later realize once they buy the machine that it's much more profitable, faster and the finish is much nicer if the pipe is bent without any type of welding. The work becomes more practical and more professional.

What you can't use an elbow or fixed radius bending machine for

IMPORTANT: You can never use one to make a bend that's larger than 180 degrees. This is because the pipe would not come out of the mold. You also can't make large bends because the die or matrix would not fit in the machine.

The information you must give a pipe bender manufacturer to get advice

It's very important to know:

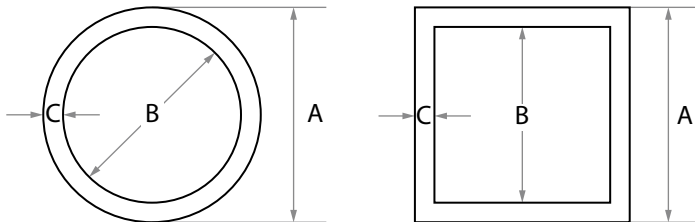
- **The type of material:** normal steel, stainless steel, aluminum, copper...
- **The diameter of the pipe and its thickness:** The thickness is key when determining which type of elbow bender to recommend.
- **The radius of the bend:** Remember that the minimum for a bending machine without a core is three times the diameter of the pipe; it can be less for a bending machine with a core.

Here's a template with the data to be provided:

SPECIFICATIONS OF TUBES TO BE BENT · NON-MANDREL TUBE BENDERS

1. Tube sizes

- Tube O.D. (A) mm.
- Tube I.D (B) mm.
- Tube Thickness (C) mm.
- Round tube or Square tube



** Important: Dimensions will be indicated in millimeters as there are different types of inches and regulations.*

2. Mechanical strength. Hardness and type of material. *Consult your supplier for the details concerning hardness and material.*

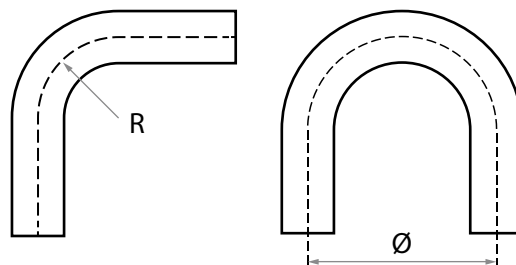
- Aluminum 30 Kg/mm (300 N/mm)
- Brass 25 Kg/mm (250 N/mm)
- Copper 22 Kg/mm (220 N/mm)
- Mild Steel 45 Kg/mm (450 N/mm)
- Stainless Steel 65 Kg/mm (850 N/mm)

3. Radius or bending diameter.

The radii and diameters of the bent are measured from the center of the bend to the center of the tube. Indicate the radius or diameter of the bent:

- Radius (R) mm.
- Diameter (Ø) mm.

Standard rollers are made with this size correspondence:
 Radius = 3 times the diameter of the tube.
 That is to say, for a 40mm tube there is a bent radius of 120mm.



4. Bending direction according to the type of profile

If the profile to be bent is not round or square, indicate the type of profile and the direction of bending

Others

Differences between pipe benders with a spindle and without

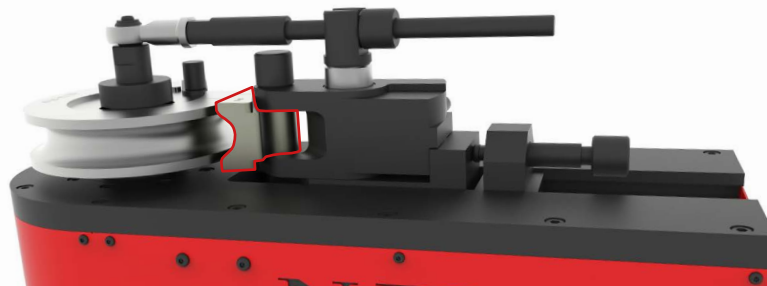
A bending machine without a core is much more affordable, faster to prepare for work and more versatile. A model such as the CC60 or CC90 is good enough for most jobs.

Bending machines with a core are more complicated to prepare and are used to make a series of much larger parts. The pipes must be very fine and the radiuses on the bends are usually smaller.

Things to keep in mind when purchasing a pipe bender without a spindle

One of the main things to consider is the minimum pipe thickness.

Whenever you can, buy bending machines with a counter-die (see the photo). Avoid buying one with two support rollers. The reason is quite simple. Bending machines with a counter-die can always bend finer thicknesses than those with two support rollers.



Counter-dies are normally produced in an aluminum bronze alloy which extends their duration against friction and creates less pipe deformation. Sustarin, Delrin and Pom-c counter-dies can be used for stainless steel or aluminum. It's like a sort of nylon which does not cause as much deformation on aluminum at the beginning and end of the bend on finer pipes. On aluminum, it leaves a better finish and creates a much smoother bend than any other type of material.

WHAT YOU SHOULD DO BEFORE PURCHASING A PIPE AND PROFILE BENDER



4.0 Technology

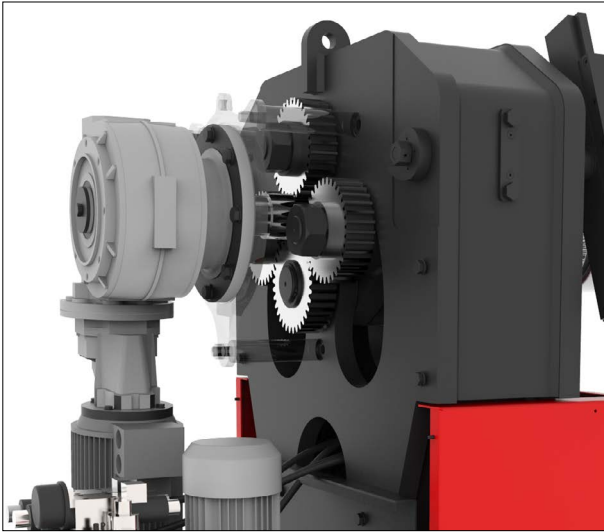
The advantages of having this technology in a machine are endless, so we're only going to mention the most relevant. Whenever a customer agrees, the manufacturer may remotely connect to their machine to do any software updates completely free of cost and detect any anomalies in the machine without needing to travel to the machine site. Customers are notified when preventive maintenance must be done on the machine along with many other advantageous features.



All-new EcoMode

We are well aware of the importance of saving energy nowadays. This is why our new machinery features an **EcoMode** which automatically disconnects the electric parts consuming the most energy if it detects any period of inactivity. Just press the movement button to restart production.

We believe this feature is of vital importance to our customers for their savings as well as for the sustainability of the planet. After all, we're a company that's highly committed to the environment.



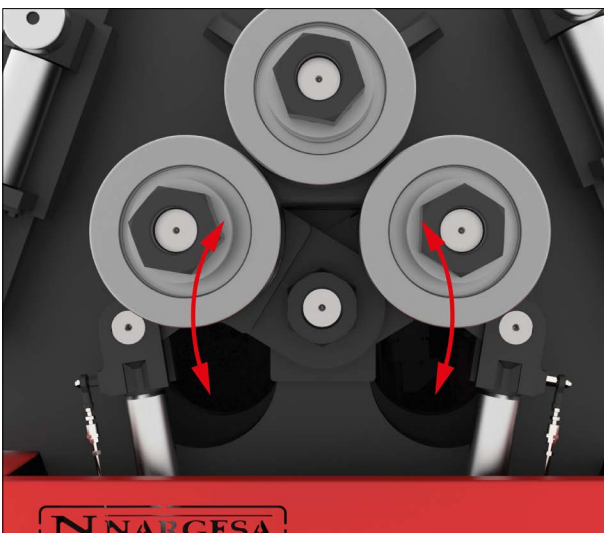
Robustness

The weight of the machine in comparison to other brands provides an idea of how it's built. Some models can double the others in weight. These are not DIY machines; they're pipe benders that can work 24 hours a day. Made of steel sheet, which is tempered in areas subject to wear, and activated with a pinion planetary gear system. We do not use chains or other weak devices that could affect how the machine operates in the future.



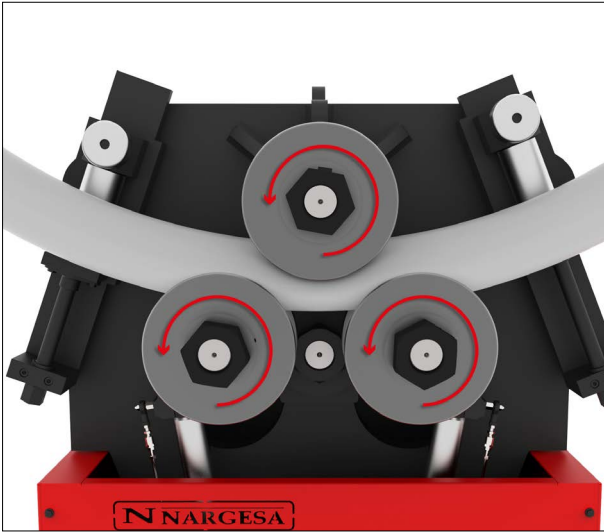
Vertical and horizontal position

It is important to note that when purchasing a bending machine, you need to be able to position it horizontally as well as vertically. If the piece to be manufactured has diameters less than 1500 mm, working in a vertical position is recommended. On the contrary, when the bend diameters are increased above this level, work should be done in a horizontal position. Due to the proper support, this prevents the weight of the piece from affecting the end results. Bending is also done in a horizontal position to overcome clearance issues at the customer's facilities. The MC650 bending machine can be operated in both positions (vertical and horizontal).



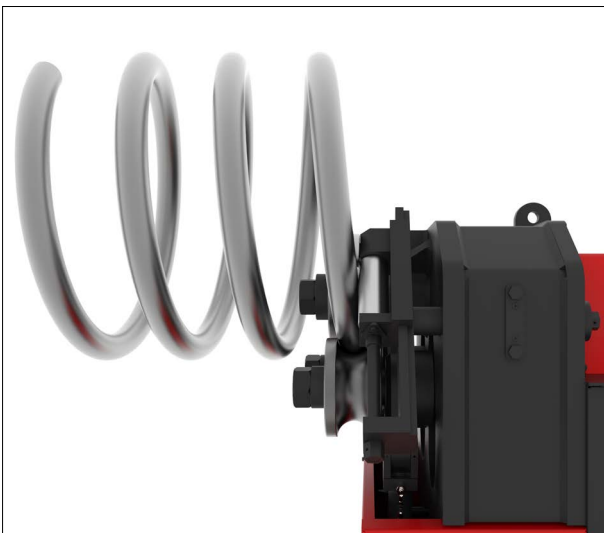
An electronically-controlled asymmetric roller position

Asymmetric bending machines offer certain advantages over pyramidal bending machines. The lower axles rise and drop in a kidney-shaped movement. This means the distances between centers are variable which saves materials and, as a result, provides for optimal use of the profile or pipe which can be bent almost to the end. Another advantage is that bends can be made with much smaller radiuses than with pyramidal bending machines as the rollers can be practically moved together.



3 power rollers

The 3-roller drag system makes the work easier, mainly when bending round or square pipes. This prevents possible marks on the material which is a significant improvement over 2-power axle bending machines which feature lower layer-cut rollers for good traction. All bending work is done faster with a 3-power axle bender.



Side hardeners

The side hardeners on the MC650 model can correct profile bends in up to 6 different planes: forward, backward, upward, downward, in a left rotation and in a right rotation over the same axis. Likewise, the hardeners can be adjusted to force the profile to create a spiral. It also features a rotary device that's essential to being able to bend the angle or establish the radius resulting from the mechanically-formed piece.

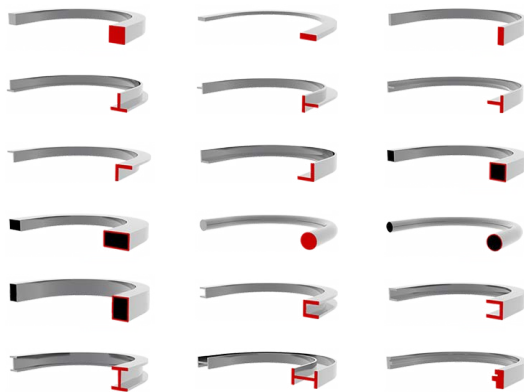


Rotation speed and programmable axle adjustment

In most cases, the production speed can be increased when the profile to be bent is small and the machine is programmed to do so. When the profile used is larger, you can also reduce the operating speed to adjust it appropriately for a proper bend. Likewise, the bend adjustment speed can be programmed on the first piece or only piece, facilitating and streamlining the most complex bending work. Unlike other brands, the Nargesa MC650 comes standard with this speed variator for roller rotation and position adjustment.

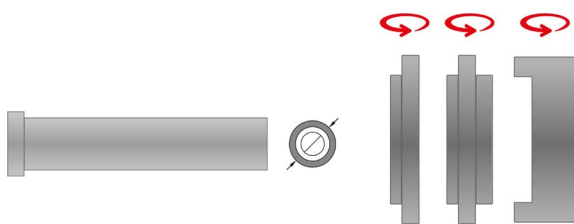
Times are changing very quickly and technology too. The most common dilemma is not buying a bending machine to do a single job but rather **finding the right operator to work with it.**

That's why at Nargesa months ago we began **designing and programming controls that are very easy to use and incredibly intuitive.**



The result is that, unlike others, the bending process is so easy that no professional bender is required to do quick and precise bending. Plus, productivity has increased and the same work and even very similar bends can be easily repeated in the future.

For this purpose, it has a complete profile library and extensive editable database with pre-defined radiuses.



If that were not enough, it has a useful tool that allows you to graphically position the rollers on screen as one of the other many advantages offered by the all-new MC650 bending machine control and management touchscreen.

Many months have gone into testing, programming and fine-tuning to achieve the perfect "assistant" for present and future generations of operators.



Visual roller position indication

The bending machine has a visual roller position indicator for each axle, which graphically shows which rollers have been installed, their direction and arrangement for a certain piece. The ultimate objective is to achieve exceptional production repetitiveness to save time and reduce errors with programming as the arrangement of the bending machine rollers can be known even months after their creation.



Profile library

The bending machine has an extensive library with all the profiles our machine can bend. Likewise, the dimensions and thicknesses can be defined in order to know what type of material was used to do the work upon later production.



A list of pre-defined radii

With the idea in mind of maximum savings for our customers, a sample bar based on the work to be done can be created. By bending said bar, an unequivocal ratio between the real roller position and radius achieved is entered into the bending machine database. This allows operators to know beforehand where the rollers must be positioned in order to make known radii or extrapolate the data to create new radii based on positions already known. Moreover, any radius will soon be possible without trial and error if new values can be entered as the work is done. In other words, this saves time and very valuable material.



ESA S625 CONTROL CHARACTERISTICS

Nargesa MC650 pipe benders are controlled with a very intuitive and easy-to-use 7" color touchscreen with the latest 4.0 technology. **You only need to do the first piece and save each step so that the control will repeat the same operations on the other pieces in the same series automatically without longitudinal positioning control.**

You can add the type and dimensions of the pipe or profile, the material and position of the rollers to the program so all of this is saved for the following series.

These are some of the most relevant features of this control system.

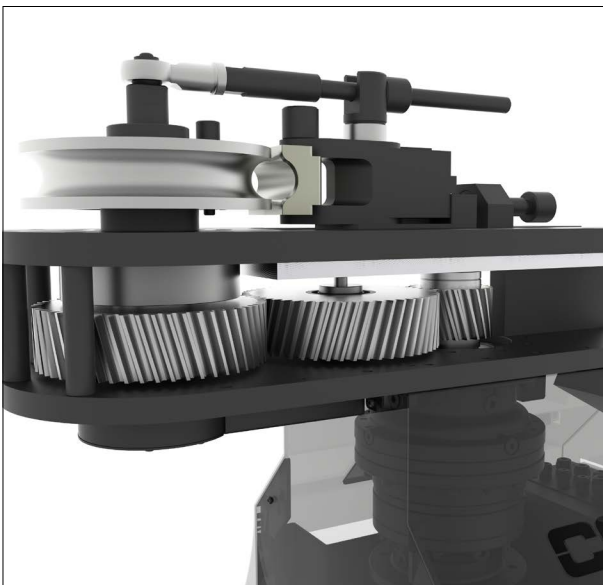
- > Stores up to 10,000 programs.
- > An endless number of different bends on the same piece can be programmed.
- > Dimensions may be programmed in inches or millimeters.
- > A library of available rollers with the possibility of programming new ones.
- > A library with different profiles, pipes and materials.
- > Can be programmed in more than 20 different languages.
- > Automatic or manual rotation speed adjustment from 3 to 7 rpm.
- > Manual or automatic operation.
- > 4.0 Technology
- > Joystick to activate the rotation and positioning movements.
- > On-screen alarm diagnostics.
- > Preventive maintenance warning.
- > Can be remotely connected by the manufacturer without having to travel to the machine site.
- > 7" color touchscreen with 800 x 480 resolution.
- > 128 MB silicon disk.
- > 2 analog inputs, 12 bit resolution.
- > 16 digital inputs (24 Vdc).
- > 16 digital outputs (24 Vcc, 0.7 A max.) Protected against overloads and short circuits.
- > 1 RS232 serial port, 1 CAN port with 9 D-Sub F connector contacts and 1 USB port.
- > 24 Vdc power source

WHAT YOU SHOULD KNOW BEFORE PURCHASING A PIPE BENDER



4.0 Technology

The advantages of having this technology in a machine are endless, so we're only going to mention the most relevant. Whenever a customer agrees, the manufacturer may remotely connect to their machine to do any software updates completely free of cost and detect any anomalies in the machine without needing to travel to the machine site. Customers are notified when preventive maintenance must be done on the machine along with many other advantageous features.



Robustness and speed

The weight of the machine in comparison to other brands provides an idea of how it's built. Some of our units are almost double in weight than our competitors. These are not DIY machines; they're pipe benders that can work 24 hours a day. Made of robust materials, which are tempered in areas subject to wear, and activated with a helical-cut pinion planetary gear system. The rotation speed is also something to be taken into account. It can reach 4.5 rpm for more aggressive production; in many cases, more than twice as much when compared to similar machines in today's market.



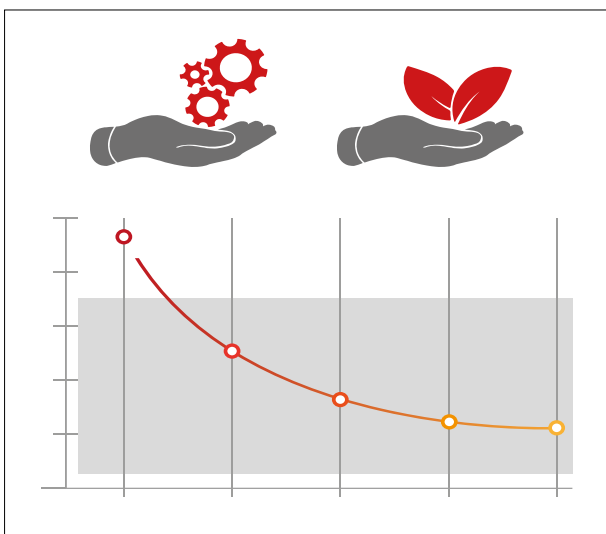
Curve thicknesses and finishes

Most tube and pipe benders can only bend very thick-walled pipes with a 10% minimum thickness of the diameter of the pipe normally calculated. For example, a good curve on a 40 mm pipe is usually guaranteed with a 3.5 or 4 mm wall thickness. The original counter-shape designed by Nargesa guarantee a good finish even with a thin-walled pipe. The minimum thickness for a 40 mm pipe can be 1.5 or 2 mm. This significantly lowers the cost of the raw material.



Offset head and two-directional bending

The offset head design allows for complex curves as the pipe goes underneath the head. Bending pipe below the head is not possible with some pipe bender models. The all-new CC60 and CC90 benders can curve to the right and left without needing to rotate the die, meaning any piece can be bent regardless its complexity.



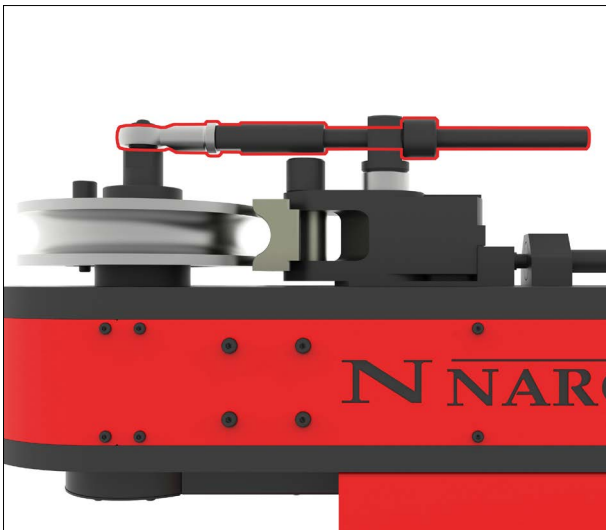
Enhanced energy efficiency

The CC60 elbow bender can be connected to 110 V or 220 V single phase voltage so it can be taken to a work site, if necessary, and be connected to a simple outlet. The consumption per machine working stroke has been significantly reduced to save energy. Only 1.1 Kw with a working stroke of up to 60.3 mm.



Automatic unlocking

The bending carriage moves automatically to the right or to the left depending on the direction of the curve to more easily release the piece without needing to re-adjust the grip. This original system can complete pieces in much less time.



Reinforcement tool post support included

The CC60 CNC pipe bender comes standard with a reinforcement arm. It's used to prevent machine chassis deformations. The Control indicates when this device is required or not required.



Bend 8 Lubricant included

With the purchase of the CC60 CNC pipe bender, you'll receive a 400 ml bottle of special bending lubricant: for a better finish on the outside of the curve, to prevent roughness and inner corrugation and reduce wear on the counter-shape die. Ideal for thin tubes and pipes. Lubricates to reduce friction. Prevents and dissolves corrosion. Polishes and protects. Cleans and removes dirt.



ESA S625 CONTROL PANEL

Nargesa tube and pipes benders are controlled with a very intuitive and easy-to-use 7" colour touch-screen with the latest 4.0 technology. Just enter the pipe dimensions, thickness, angle of the curve or curves and choose a die from the library and the control programs the rest of the parameters automatically; elastic recovery correction (springback), recommended rotation speed, whether a tool post support is necessary or not, and if the intended curve is possible... All of this may be modified by the end user based on their own needs. These are some of the most relevant features of this control system.

- > Stores up to 10,000 programs.
- > Up to 50 different angles on the same piece can be programmed.
- > Dimensions may be programmed in inches or millimetres.
- > A library of available dies with the possibility of programming new ones.
- > A library of differently shaped pipes with varying thicknesses.
- > The CNC can be supplied in more than 20 different languages.
- > Automatic or manual rotation speed adjustment from 0.7 to 4.5 rpm.
- > Manual or automatic operation.
- > Automatic elastic recovery correction (springback).
- > Piece counter.
- > Independent correction of the programmable final curve degree.
- > 4.0 Technology.
- > On-screen alarm diagnostics.
- > Preventive maintenance warning.
- > Can be remotely connected by the manufacturer without having to travel to the machine site.
- > Warning on screen if the tool post support needs to be used.
- > 128 MB silicon disk.
- > 2 analogue inputs, 12 bit resolution.
- > 16 digital inputs (24 Vdc).
- > 16 digital outputs (24 Vcc, 0.7 A max.) Protected against overloads and short circuits.
- > 1 RS232 serial port, 1 CAN port with 9 D-Sub F connector contacts and 1 USB port.
- > 24 Vdc power source.