

Manual Benders

PHI 410 Precision Bending Machine

PHI's draw bending machines let you bend pipe and tube at an extremely low cost. When you only need to make one or two bends per piece, you can save time and energy by using these efficient bench-mounted manual tube-bending machines.

Features of the PHI 410 Precision Bending Machine

The compact design permits a great deal of mobility, as well as flexibility of location. The machine is lightweight and requires less than four square feet of bench space (including the bend arm sweep).

The tube or pipe length capacity is unlimited, allowing you to use longer lengths with fewer joints. This capacity translates into additional labor saving and reduced material costs for joining sections.

It's the ideal bending machine for prototype departments, small machine shops and operations that need to save costs when only a few bends are needed per piece. Additional Features of the PHI 410 Precision Bending Machine

Reliable Performance

-Few moving parts, all mechanical operation

Highly Mobile

-These lightweight machines can be set up anywhere -- there is no electrical or hydraulic hook-up required

Compact Size

-Requires less than four sq. ft. (1.1 m²) of bench space 20"x13"

Precise Bends

-The DOB dial, with one-degree increments, permits accurate bends within one degree

Reversible Direction

-You can bend clockwise and counter-clockwise, permitting the production of complex parts (PHI model 410) PHI 411 Precision Bending Machine

The PHI 411 Manual Tube Bending Machine is a bench-mounted machine designed for economical bending of tubes up to 1" OD and pipe 1/2" IPS. PHI's draw bending machines let you bend pipe and tube at extremely low cost. When you only need to make one or two bends per piece, you can save time and energy by using these efficient bench-mounted manual machines.

Features of the PHI 411 Precision Bending Machine

The compact design of the PHI 411 Manual Tube Bending Machine permits a great deal of mobility, as well as flexibility of location. This machine is lightweight and requires less than four square feet of bench space (including the bend arm sweep).

The tube or pipe length capacity is unlimited, allowing you to use longer lengths with fewer joints. That means additional savings on the labor and material costs required to join sections.

Both the 410 and 411 models give you precision bends with minimal wall thinning and ovality, particularly when optional mandrels are used. These models are ideal for prototype departments, small machine shops and operations that need to save costs when only a few bends are needed per piece.

Additional Features of the PHI 411 Precision Bending Machine

Reliable Performance

-Few moving parts, all mechanical operation

Highly Mobile

-These lightweight machines can be set up anywhere -- there is no electrical or hydraulic hook-up required

Compact Size

-Requires less than four sq. ft. (1.1 m²) of bench space 24"x21"

Precise Bends

-The DOB dial, with one-degree increments, permits accurate bends within one degree Specifications for the 410/411

MODEL 410

MODEL 411 Capacity - Tube

- Pipe Material - Tube 3/4" (20mm) OD x .065" (1.65mm) WT maximum x 2D minimum CLR 3/8" (10mm) IPS X Sched 40 max. X 3D minimum CLR 35,000 psi (930 MPa) yield 1" (25mm) OD x .065" (1.65mm) WT maximum x 2D minimum CLR 1/2" (13mm) IPS X Sched 40 max. x 3D minimum CLR 35,000 psi (930 MPa) yield Direction of Bend Reversible (clockwise or counter-clockwise) Clockwise Standard (counter-clockwise if specified) Radius of Bend (CLR) Minimum 2D Maximum 6" (152mm) Minimum 2D Maximum 6" (152mm) Maximum Bend Arm Movement 195* 195* Tube Length Unlimited Unlimited Machine Bench Space (including bend arm sweep) 20" x 13" (508 mm x 330mm) 24" x 21" (610 mm x 533 mm) Shipping Weight 100 lb. (45kg) 175 lb. (79kg) Tooling Post 1/2" diameter (13mm) 1" diameter (25mm) Mandrel Rods Available Specify thread size Specify thread size Mandrel Rod Bracket Available Machine or bench mounted Bench mounted only

PHI 420 Precision Bending Machine

Our Model 420 is a totally flexible and precise manually operated "draw" or "rotary die" type machine. It has a special gear-operated bend arm that will increase leverage (four to one) when bending heavier tubes. The bender head is bolted to a base plate mounted on a tooling storage cabinet. The Model 420 is reversible and may be set up for either right or left hand bending. Since it requires no outside power source, your maintenance team can now make precise and accurate bends anywhere in the field.

We designed the PHI 420 Precision Bending Machine specifically for the needs of aircraft maintenance crews.

Specifications for the 420

Capacity - Tube

- PipeMaterial - Tube

- Pipe 1-1/2" (37.5mm) OD x .065" wall thickness x 2D minimum CLR

1" (25mm) OD x schedule 80 x 2D minimum CLR

35,000 psi (930 MPa) yield, 35% elongation

ASTM A-587 or equivalent

Direction of Bend Reversible (clockwise or counter clockwise) Center Line Radius (CLR) Maximum 8" (200mm) standard, 12" (300mm) optional Maximum Bend Arm Movement 195° Maximum Over-Mandrel Tube Length 10 feet (3.3m) Machine Floor Space 12 feet (3.6m) long x 40" (100cm) wide X 40" (100cm) high Shipping Weight 900 lb (409 kg) approximately