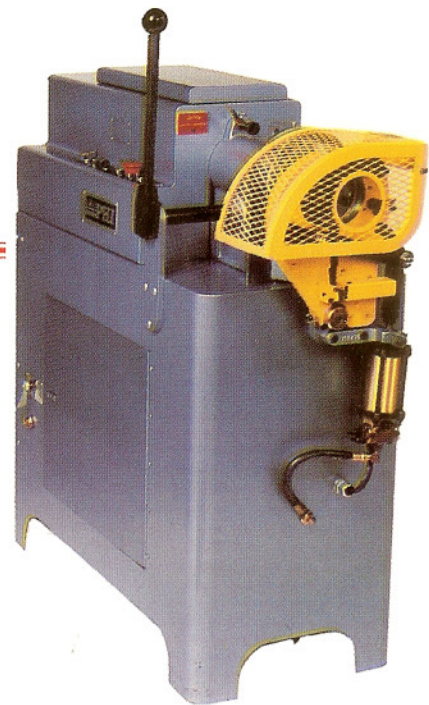


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**PHI**®

**TUBE AND PIPE END  
FINISHING MACHINES**





Models 2C, 2CP, 2CPV, 3CPV, and 8CPV form a family of machines for preparing the ends of tube or pipe for joining with other tube or pipe sections, valves, T-joints, or machinery.

The ends can be prepared with a bead or flare, or simply deburred and squared. Each machine is capable of performing all of these functions; a change of tooling is all that is required to switch from one function to another.

### SQUARING, DEBURRING, & FLARING

Flared joints form liquid-tight, air-tight connections at the ends of tubing or pipe.

To obtain an effective, long-lasting seal, each end of the tube or pipe must be formed to the exact shape of the matching flare fittings.

Tooling supplied by PHI meets this objective. And in almost every case, the same end-finishing machine can be used to perform the required squaring and deburring of the cut end--before the flare is formed.

**Typical Applications:** Hydraulic systems and fuel lines in the aircraft, automotive, heating, and cooling industries.

### BEADING

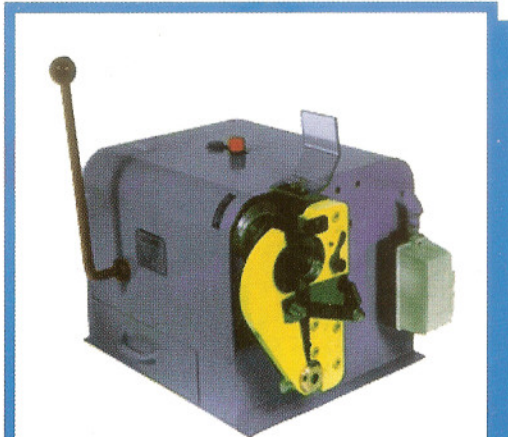
Beading is a versatile end-finishing technique that can be applied to a variety of industrial applications.

In conjunction with an O-ring, for example, beaded joints can be used to interconnect exhaust tubes or low-pressure fuel lines.

Beads can also be used to dampen vibration in solid lines or to increase the effectiveness of the seal when a rubber or fabric sleeve is clamped to a metal duct.

**Typical Applications:** Low-pressure air, exhaust, and liquid systems in the automotive, appliance, and boating fields.

## When precision tube end finishing is required ...



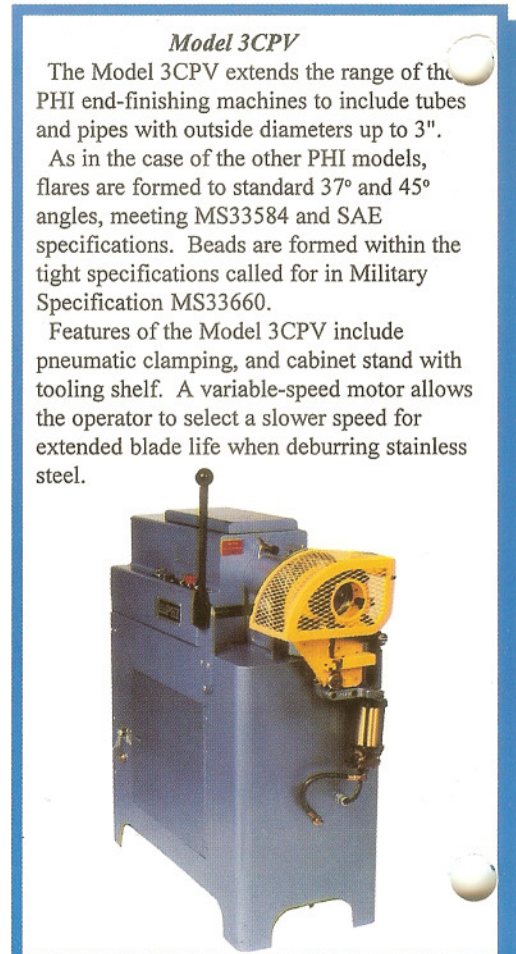
Model 2CP

### Models 2C, 2CP, & 2CPV

These models are designed for smaller-diameter tubes and pipes.

Model 2C features manual clamping for easy-to-form materials and low production requirements. Model 2CP has air-cylinder clamping for higher production rates and more difficult-to-form materials. Both models have two-speed spindles, allowing you to choose the most efficient speed for the function you are performing.

The 2CPV capacities are the same as the 2CP. In addition, the 2CPV has a variable-speed drive (0-2000 RPM) with a 3/4 HP motor and digital RPM readout.



### Model 3CPV

The Model 3CPV extends the range of the PHI end-finishing machines to include tubes and pipes with outside diameters up to 3".

As in the case of the other PHI models, flares are formed to standard 37° and 45° angles, meeting MS33584 and SAE specifications. Beads are formed within the tight specifications called for in Military Specification MS33660.

Features of the Model 3CPV include pneumatic clamping, and cabinet stand with tooling shelf. A variable-speed motor allows the operator to select a slower speed for extended blade life when deburring stainless steel.



### Model 8CPV

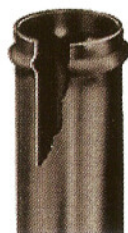
Model 8CPV is the largest in the family of PHI end-finishing machines and can be used to flare, bead, deburr, and square tubes or pipes with outside diameters up to 8 inches.

An air cylinder with heavy-duty linkage holds the tube or pipe firmly in place during each operation, preventing slippage and ensuring that all forming is done within appropriate specifications.

The Model 8CPV also features a variable-speed drive for efficient operation regardless of material or wall thickness. Hard materials such as stainless steel can be deburred at slower speeds, for example, without undue wear of the blades.



FLARING



BEADING



SQUARING



DOUBLE FLARING



FLANGING



## PHI END-FINISHING MACHINES AND TOOLING

PHI end-finishing machines are the end result of more than forty years experience in producing tube-processing equipment (as Leonard Precision until 1969 and as Conrac's Machine Tool Division until 1985).

There is a standard machine in the PHI line for almost any tube or pipe end-finishing requirement-- flaring, double flaring, beading, squaring, deburring, or flanging--for applications ranging from 1/8" light-wall tubing to heavy 8" pipe.

To increase efficiency, every PHI machine features simplified setup procedures with minimum time loss in small-lot production changeover. The PHI designs also permit new operators to run the machines at near top efficiency after a very short training period.

All of PHI's production machinery and tooling are manufactured on our own premises, assuring you that our rigid quality specifications are met on every item we ship.

### SPECIFICATIONS

	2C, 2CP, & 2CPV	3CPV	8CPV
<b>Flaring</b>	Annealed ferrous & stainless steel: 1/8"-2" OD x .049" max.WT Nonferrous: 1/8"-2" OD x .065" max.WT	Annealed ferrous & nonferrous: 1/8"-3" OD x .125" max.WT Stainless steel: 3/8"-3" OD x .125" max.WT	Annealed ferrous, non-ferrous, & stainless steel: 1-1/4" - 8" OD x .125" max. WT
<b>Beading</b>	Annealed ferrous&nonferrous: 1/4"-3/8" OD x .035" max.WT Annealed ferrous & stainless: 1/2"-1-1/2" OD x .049" max.WT Nonferrous: 1/2"-1-1/2" OD x .065" max.WT	Annealed ferrous & nonferrous: 1/4"-3/8" OD x .035" max.WT 1/2"-1-1/2" OD x .065" max.WT Stainless steel: 1/2"-1-1/2" OD x .065" max.WT	Annealed ferrous, non-ferrous, & stainless steel: 1-1/4"-8" OD x .065" max.WT Bead ht. adjustable 3/8" max Semi-automatic bead cycle 1-1/4" OD and up.
<b>Squaring &amp; Deburring</b>	Annealed ferrous, non-ferrous, & stainless steel: 1/8" - 2" OD	Annealed ferrous, non-ferrous, & stainless steel: 1/8" - 3" OD	Annealed ferrous, non-ferrous, & stainless steel: 1-1/4" - 8" OD
<b>Spindle Speed</b>	2C & 2CP: 2-speed spindle 500 and 1500 RPM 2CPV: Vari-speed motor 0-2000 RPM	Vari-speed motor 10-1750 RPM	Vari-speed drive 70-550 RPM
<b>Clamping</b>	2C: Manual lever 2CP & 2CPV: Semi-automatic air cylinder clamping with "PROTEC JAWS." Air supply 1-1/2 CFM at 75-100 PSI required.	Semi-automatic air cylinder clamping with "PROTEC JAWS." Air supply 1-1/2 CFM at 75-100 PSI required.	Pneumatic cylinder Heavy-duty overhead jaw linkage
<b>Electrical</b>	2C & 2CP: 1/2 HP motor 2CPV: 3/4 HP motor	3 HP motor	3 HP motor Magnetic starter Fused disconnect
<b>Dimensions</b>	28" x 18" x 15" (L x W x H)	39" x 28" x 45" (L x W x H)	68" x 35" x 54" (L x W x H) Floor-to-spindle C/L, 41"
<b>Shipping Weight</b>	2C: 300 pounds 2CP & 2CPV: 350 pounds	850 pounds	2200 pounds
<b>Options</b>	Cabinet stand	Semi-automatic powered beading cycle to 3" OD Manual beading cycle to 3" OD Digital display to read motor RPM	

**... PHI Precision Tube End-finishing  
Machines are the answer!**

### DOUBLE FLARING

Double-lap flares provide added-strength joints which are more resistant to fatigue and provide a better seal than single-thickness flares.

Double-lap flares formed by PHI machinery and tooling are free of cracks and pitmarks. The joint is also designed so that the inside surface of the flare has a larger diameter than the inside diameter of the tube or pipe and, therefore, does not interfere with flow characteristics of the system.

**Typical Applications:** Thin-wall tubing connections that are subject to shock, vibration, or high internal pressures such as automobile brake lines and critical aircraft hydraulic lines.

### FLANGING

Pipe-flanging machines permit the joining of pipe sections without the need for costly welded flanges and the associated temporary tack welding, slag removal, and X-ray inspection.

A prefabricated slip flange is placed against the assembly on an adjacent pipe section. A disc-shaped rubber seal placed between the two formed flanges prevents any leaks. Problems in lining up bolt holes are eliminated with the use of slip flanges which rotate freely on the pipe. Standard flanges can still be used.

**Typical Applications:** Chemical plants, petroleum refineries, power plants, and pipelines.





DF

The Model DF is a double-lap flaring machine which produces a double-thickness flare. It will also produce a single-thickness flare and an upset bead.

The machine forms double-lap flares to precise 37° and 45° dimensions within MS and SAE specifications. Single flares and beads are also done with precision and within specifications — every time.

Model DF	
CAPACITY	DOUBLE LAP FLARING: 1/8" to 1/2" OD, annealed ferrous or nonferrous tubing. SINGLE FLARING: 1/8" to 3/4" OD, annealed ferrous or nonferrous tubing. BEADING: 3/16" to 1/2" OD, annealed ferrous or nonferrous tubing.
OPERATION	Single lever operated, entirely pneumatically powered.
AIR SUPPLY	75/100 PSI air supply required. Air consumption approx. 1-1/2 CFM at 100 PSIG. No electrical connection.
STANDARD TOOLING	For MS and SAE Flare Specifications.
DIMENSIONS	Length 28" – Width 18" – Height 42"
SHIPPING WEIGHT	480 pounds



DF MACHINE

## M343 & M369

Models M343 and M369 Flanging Machines cold-form pipe ends to a 90° flange. The machines are simple in design and simple to operate. Skilled labor is not needed to operate the machine, nor to bolt the flanges together — entirely eliminating the need for skilled labor in joining pipe sections.

Model 343	
CAPACITY	Pipe Schedules 5, 10, and 40 from 1/2" to 4" IPS Schedule 80 from 1/2" to 2" IPS
POWER DRIVE & CONTROL	5HP, geared head motor with brake. Pneumatic operation, 3 CFM required.
OPERATION	Pipe is clamped in machine jaws and remains stationary while rotary spinner head forms flange.
DIMENSIONS	Length 60" – Width 30" – Height 58"
SHIPPING WEIGHT	2200 pounds

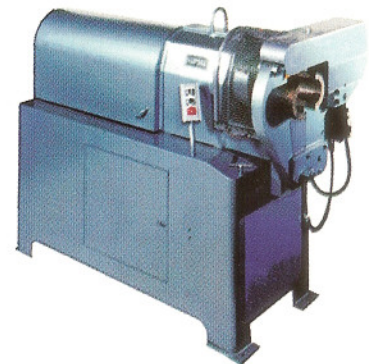
Model M369	
CAPACITY	Pipe Schedules 5, 10, and 40 from 1-1/2" to 8" IPS Schedule 80 from 1-1/2" to 4" IPS
POWER DRIVE & CONTROL	15HP, self-contained hydraulic system
OPERATION	Pipe is clamped in machine jaws and remains stationary while rotary spinner head forms flange.
DIMENSIONS	Length 102" – Width 44-1/2" – Height 67-1/2"
SHIPPING WEIGHT	4500 pounds

Specifications subject to change without notice.

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The Model DF is a high-production unit, allowing the production of up to 600 double flares per hour. The machine is operated by a single lever which activates the two steps required to form a double flare. No electricity is required. All operations are pneumatically powered.

A complete tooling change can be performed in just minutes. Once the pipe is in place, the flange is formed in minutes. The whole operation — install tooling (if required), insert pipe, form the flange, remove the pipe — requires a maximum of 5 minutes. This compares favorably to the approximately 45 minutes required to weld a flange onto the pipe.



M343 MACHINE  
1/2" TO 4" IPS



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