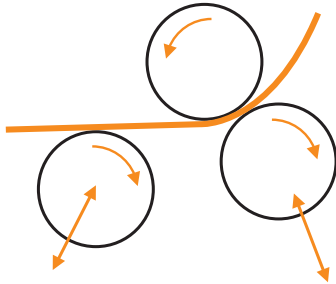


TECHNICAL DESCRIPTION

3 rolls bending machines
RCE/RCS



easyroll®



MACHINE STRUCTURE

TECHNICAL DESCRIPTION

RCE & RCS PICOT roll bending machines are symmetrical 3 hydraulic rolls pyramid type with pre-bending capacity.

- > **Flexibility and universality of use**
- > **Optimized pre-bending**
- > **Maximized service life & minimized maintenance**

GENERAL STRUCTURE

The chassis frame is made of strongly sized steel welded profiles. Its high stiffness makes the leveling and sealing of the machine very easy.

The design and assembly of the frames ensure the perfect geometry, without any deviation over time, regardless of the load of the machine.

The whole casing of the machine provides optimal protection for the users, as well as the machine parts.

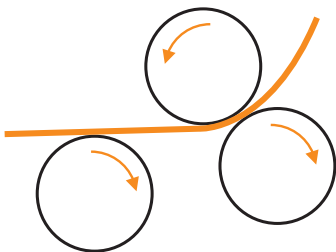
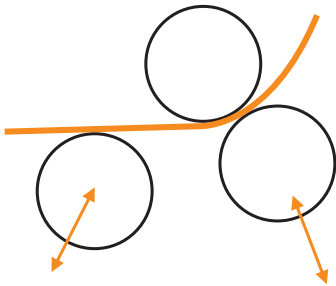
STRENGTH » RESISTANCE » SAFETY

ROLLS

- The rolls are made of high quality steel, with selected and identified characteristics.
- The profiling of the rolls is designed to fit user's special requirements and prevent any barrel or hourglass effect.
- A polished finish ensures a mar-free finish of the formed pieces, even when forming sensible material such as pre-lacquered aluminum, composites, ...
- Optional tempering of the rolls provides an excellent service life, even when working on stainless steel or high spring back steel. The selected hardening processes bring the surface hardness up to 50 and 60 HRC.

OPTIMISED CROWNING » CAREFUL FINISHING » ADDED LONGEVITY

FUNCTIONALITIES



ROLLS MOTION

The lower rolls move independently in symmetrical linear slides :

- Each roll's movement is controlled by 2 high pressure two-way hydraulic cylinders (one cylinder on each end).
- The power transmission is direct for maximum performance.
- Rolls motion is driven by proportional distributors for high accuracy.

According to the chosen control device, rolls regulation and tilting (conical bending) are carried out by hydraulic or electro-hydraulic means. Both systems allow an optimal regulation avoiding any future machine adjustment. Moreover, this technology doesn't need any additional mechanical movement and regulation system.

The absence of parts subject to wear reduces at the absolute minimum interventions and maintenance costs.

ROLLS ROTATION

Rolls are mounted on bearings allowing maximum reliability for a minimum maintenance.

- Rolls rotation is controlled by very robust hydraulic motors or gear motors directly coupled to shaft ends. The moves and stops of the pieces are then very accurate, particularly important for a perfect pre-bending.

HYDRAULIC CIRCUITS

- A calibrated pressure relief prevents any overpressure on the cylinders and the gear motors, ensuring maximum operation safety.
- All hydraulic components are carefully selected in order to have the best performance and reliability (motor, pump, distributors ...).

LUBRIFICATION

All machine bearings are lubricated by a central lubrication system, with a manual or automated pump for RCS (option for RCE).

CONTROL DEVICE



PICOT RCE, RCS & R4C roll bending machines can be equipped with 2 different control systems :

- > **Full hydraulic control system**
- > **Electro-hydraulic control system** (with or without CNC)

The upgradeable design of the control desks allows interchangeability between various electronic regulation desks.

HYDRAULIC REGULATION

This high reliability system is designed to provide the full capacity of the RCS roll bending machines in small series production.

This system is the most standard on RCE, RCS and R4C machines.



- > **STANDARD CONFIGURATION (RCE & RCS 135 UP TO 380)**
HYDRAULIC REGULATION THROUGH LEVERS ON THE MACHINE .

CONTROLS

The movements are directly controlled by proportional hydraulic distributors, hand operated :

- Up/down front roll
- Up down rear roll
- Rotation of the three rolls
- Hydraulic opening/closing of the yoke (*only for RCS, optional on 135, 150 and 170 models*).



These very accurate controls are located next to the yoke in order to have the best visual control of the work without moving around.

PARALLELISM REGULATION AND TILTING OF ROLLS

The rolls parallelism regulation is provided by a hydraulic synchronizing valve. This system ensures accuracy and reliability over time.

The necessary tilting of each roll for cone bending is directly controlled through a graduated hand wheel located on the machine.

POSITION INDICATORS

During the work process, the position of each lower roll is indicated on two digital displays located on the control desk.

> STANDARD+ CONFIGURATION (RCE & RCS 135 UP TO 380) HYDRAULIC REGULATION THROUGH CONTROL DESK.



CONTROLS

All the machine controls are centralized on a mobile control desk, allowing the operator to visually check the rolling process with ease.

- Up/down of front roll
- Up/down of rear roll
- Forward/backward rotation of the 3 rolls
- Hydraulic opening/closing of the yoke (only for RCS, option on 135, 150 and 170 models).



PARALLELISM REGULATION AND TILTING OF ROLLS

The rolls parallelism regulation is provided by a hydraulic synchronizing valve. This system ensures accuracy and reliability over time.

The necessary tilting of each roll for cone bending is directly controlled through a graduated hand wheel located on the machine.

POSITION DISPLAY

During the work process, the position of each lower roll is indicated on two digital displays located on the control desk.



> CONFORT CONFIGURATION CONTROL AND INTERFACE DESK

COMMANDS

All the machine controls are centralized on a mobile control desk, allowing the operator to visually check the rolling process. The estimated rolling diameter is displayed on the screen.

OPTIMIZED CONTROL

The rolls movements are driven by proportional electro-hydraulic distributors and operated by four accurate proportional joysticks on the control desk :

- Up / down movement of front roll
- Up / down movement of rear roll
- Up / down synchronous movement of both pre-bending rolls
- Forward / backward rotation of the 3 rolls

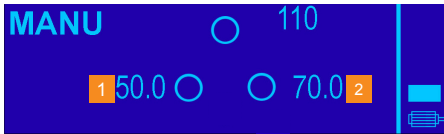
The hydraulic motions of the yoke are actuated by the keypad of the control desk (Only for RCS, Optional for machine type 135, 150 and 170).



USER FRIENDLY, COMFORTABLE AND INTUITIVE INTERFACE

- 28-key keyboard with easy-to-understand symbols
- Fluorescent graphic display with high contrast

> CONFORT CONFIGURATION following



1. Front roll position 2. Rear roll position

PARALLELISM REGULATION AND TILTING OF ROLLS

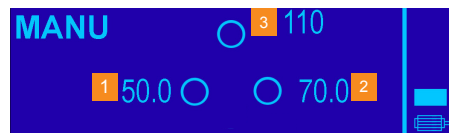
Rolls' regulation and tilting (for cone bending) are fully digital and permanently controlled by our electronic board. That means :

- No drift over time
- Quick and accurate tilting of the rolls, controlled from the control desk.

INTERFACE OVERVIEW - MANUAL MODE

The user directly controls all rolls moves trough proportional joysticks on the control desk :

- Lower rolls' positions are constantly displayed on screen.
- Diameter display



1. Front roll position 2. Rear roll position
3. Position of the sheet (NC assistance only)

> CONFORT+ CONFIGURATION

NUMERICAL CONTROL BY LEARNING

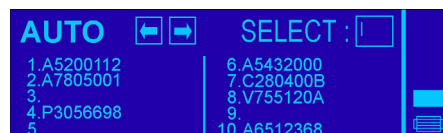
The «CONFORT+» option provides the «CONFORT» command desk with a numeric control learning capability. This systems allows series of technical parts production with high accuracy and excellent repeatability.

For series production, the numeric control records each step of the manual forming process into a program (learning). A program step includes :

- > Position of the front pre-bending roll
- > Position of the rear pre-bending roll
- > Rotation of the rolls in millimeters

The rolls' heights defines the bending radius (depending on sheet material, thickness, width...) and the rotation defines the bent length. Calculated bending radius is displayed on the screen.

In order to bend the next sheets, you just need to run the corresponding program. The numeric controller will then step by step repeat the recorded positions.



- Memory capacity : 500 programs of 50 steps each.
- Naming of programs : up to 14 alphanumeric characters.
- Selection of the program to run or edit into a list.



- Programs and parameters can be saved to a USB key.



> EASYROLL CONFIGURATION CONTROL DESK WITH TOUCHSCREEN CNC

COMMANDS

Like the «CONFORT» and «CONFORT+» versions, all rolls movements are accurately driven by four proportional hydraulic distributors :

- Up / down movement of front roll
- Up / down movement of rear roll
- Up / down synchronous movement of both pre-bending rolls
- Forward / backward rotation of the 3 rolls

The hydraulic motions of the yoke are directly controlled on the touchscreen (only for RCS, optional on 135, 150 and 170 models).

> **PERFECT EASE-OF-USE** through software ergonomics and large 18" touchscreen.

easyroll®

A simple interface dedicated to the user

Any unexperienced user can **fearless start bending** thanks to many guides provided by Easyroll, when experienced users will be able to reach the optimum use of the machine.



MATERIAL DATABASE

The patented Easyroll rolling process is a combination of spring back prediction and advanced algorithms to help the operator in all his rolling projects, from the most simple to the most complex.

In addition to the four materials stored in the standard base, the operator can create his own database by calibrating his own materials. The software will guide him during the samples calibration process by adapting the strategy to the kind of material (high tensile steel, composites, etc.)



**ASSISTED
CONCEPTION**



**IMPORT
.DXF FILES**



**SPRING BACK
CALCULATION**



**ASSISTED
PREBENDING**



**CONE BENDING
ASSISTANCE**



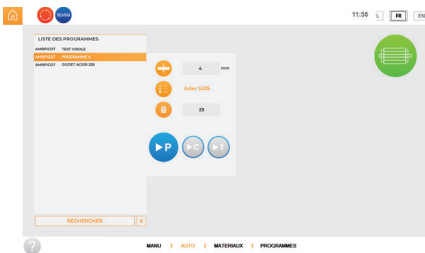
MANUAL MODE

Using the intelligent material database, Easyroll will guide the operator during the manual rolling process by displaying in real-time the estimated rolled diameter, based on the chosen material and thickness.

The operator can drive the movements of the machine with the proportional joysticks on the control desk or with the help of the buttons available on the touchscreen.

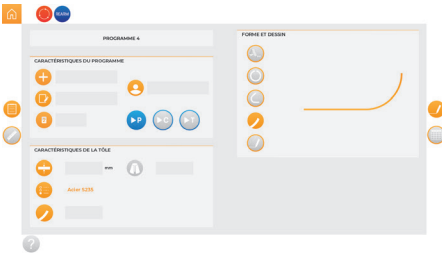
Cone bending

In manual mode, the rolls can be tilted for cone bending. The tilting angle is set on the touchscreen interface, and Easyroll will help the operator in choosing the best tilting angle based on the desired cone shape and the selected material.



AUTOMATIC MODE

The numerical command allows the serial bending of technical parts with good accuracy and high repeatability. The operator can choose between three modes : **Step-by-step** (with acknowledgment between each step), **continuous**, or **with interpolation** to improve the bending profile (bending of multi-radius profiles with combined translation and rotation).



PROGRAMMING

Each program is a list of steps. Each step is including the position of each roll, and the length to roll.

Easyroll allows several programming modes :

- 1- Program generation by learning from a first sample manually rolled.
- 2- Program generation from a sketch either drawn with the interface or imported as a .dxf file.
- 3- Program generation by interpolation of point to point 2D geometry (.CSV file). This mode is dedicated to profiles which can't be described as successive circle arcs, such as ellipses.

An option allows inserting a pre-bending sequence at the beginning of any program.



ASSISTED CONE BENDING

Latest innovation, Easyroll now allows to control the tilting of the rolls inside the programs, making the record of production steps for conic pieces possible. However, running such program is limited to step-by-step in order to check the correct bending of the metal sheet.

CONNECTIVITY

An Ethernet port allows to connect the machine to the company network and easily save the programs on the server.

A USB port is available too, on the control desk, in order to update the software and the PLC firmware.

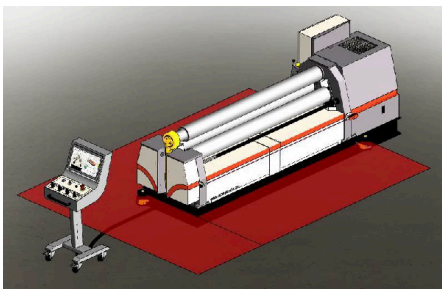


CONTROL DESKS INTERCHANGEABILITY

The scalable conception of the control desks allows the user to switch between the models, whatever the starting configuration (available on the Confort, Confort + and Easyroll configurations).



Thanks to the **Plug and Play connection system**, returning the machine to the manufacturer is not necessary, and changing the control desk is very easy, even remotely.



SAFETY AUTOMATIC MODE

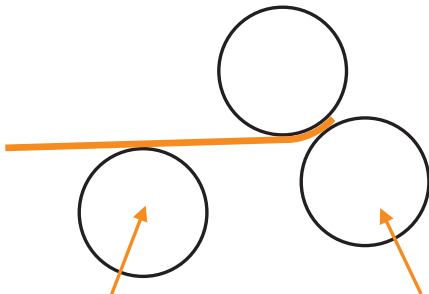
When using the machine in automatic mode, the working zone must be secured. That's why we propose a laser safety zone control. Any intrusion in the zone immediately stops the machine moves, which can be restarted once the zone free again.



The **safety laser scanners seamlessly work with the PLC** so that one or more intrusions will have no impact on the final piece. The PICOT safety laser scanners won't require any additional set-up after leaving our manufacturing plant.

Our roll bending machines can be delivered without this system under written request of the client, who wants to secure the working zone by other means.

ROLL FORMING PROCESS



PRE-BENDING

The independent symmetrical moves of the lower rolls allow an easy pre-bending without flipping the sheet out. This step is carried out by clamping the edge of the metal sheet between the top roll and one of the side rolls, then moving up the second side roll.

Depending on the operating mode chosen by the operator, the pre-bending step can be carried out at first or last stage of the forming process.

Remaining flat edge : about 2 to 3 times sheet thickness*

*(Average value for mild steel @ 240 N/mm², depending on the bending diameter).

CYLINDERS CALIBRATION

Thanks to PICOT's design, the 3 rolls RCE and RCS machines can adjust the circling of cylinders after welding. The power distribution of the three motorized rolls and the absence of pinching allows variable thickness without damaging the cylinder but keeping the constant rotation of the formed piece.

CYLINDER REMOVAL

The opening yoke of the upper roll provides the optimum space for removing the formed cylinders in the best handling conditions.

The racks are designed to provide the widest possible clearance.

CONE BENDING

The «central retractable braking tool for cone bending» option includes all necessary equipment for an easy cone bending process :

- The tilting of the rolls can be easily set up to get the desired cone angle.
 - The retractable braking tool makes the driving of the metal sheet easier, slowing down the small diameter edge in order to keep the generatrix on the upper roll axis.
- The wide clearance around the opening yoke allows bending of many kinds of cones : wide angle, large development etc.

SAFETY AND REGULATION

The design of PICOT's roll bending machines includes a strong approach to risks prevention based on a long design and manufacturing experience. The integrated devices provide the optimal functionality with a maximum safety. The machine complies with the provisions of the amended Machinery Directive (Directive 2006/42/EC) and the national laws transposing it. The machine is delivered with an EC certificate of conformity and bears the validation.



Authorized organizations regularly carry out checks on PICOT rolling machines to ensure that they comply with the regulations in force.

MACHINE ANATOMY

3 rolls bending machines
RCE/RCS



easyroll®

/ MACHINE ANATOMY

Conscious technological choices, guided by our technical expertise for the satisfaction of our customers



Important words

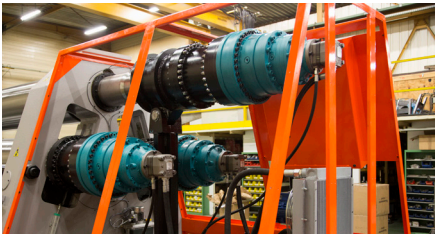
#REPUTATION

#EXPERTISE

#CUSTOMISED



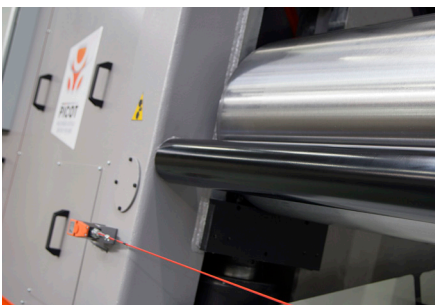
1 POWER



One motor (geared motor) per standard roll. We have fitted our machines with Danfoss motor for more than 35 years. The rolls' rotation is synchronised at the factory by a hydraulic device which prevents any variation over time.

Benefits: maximum torque, optimised efficiency, speed synchronisation, reliability.

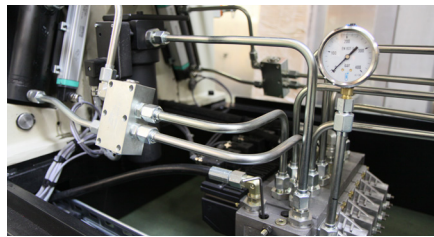
2 LINEAR GUIDE



The most effective technology to eliminate friction and enhance performance in all operating modes: cylinder and cone bending. Also the strategic choice for optimised prebending (on 3 & 4-roll machines).

Benefits: maximum hydraulic power efficiency, no wear.

3 PROPORTIONAL DISTRIBUTION



All our roll bending machines have roll position and rotation control with proportional adjustment.

From the standard, manually controlled machine to the machine fitted with a control panel with Danfoss proportional distribution, the quality of the rolling is controlled by increasingly progressive and very precise movements. The valves mounted on our machines are specific to Picot and were developed with Danfoss.

Benefits: progressiveness of movements, quality of sensitive zones, operator ergonomics.

4 PARALLELISM SYNCHRONISATION

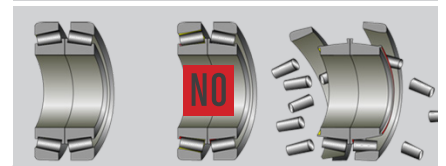
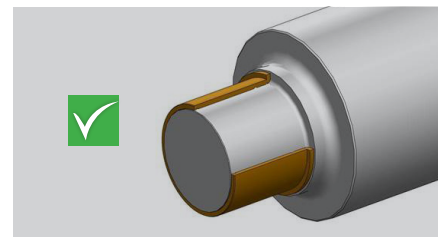
Since our first patent in the 70s, our choice has always been

- > either hydraulic control (hydraulic valves on standard machines)
- > or numerical control of each cylinder to ensure perfect parallelism throughout the machine's life. Cone bending is controlled by the same devices. Measurement and control in position are ensured by absolute linear scale systems: no need for calibration on start-up and the assurance of preserving the part even after an emergency stop or power cut.

The coupled lever (available from Picot for 40 years) simplifies the movements and controls the synchronisation of the pinch rolls one-handed.

Benefits: efficiency of the manufacturing process, precision of movement, operator ergonomics.

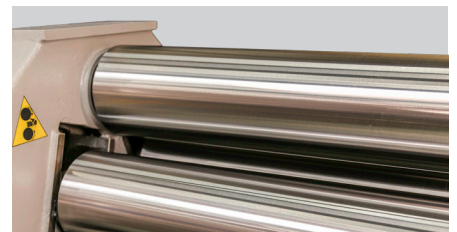
5 BRONZE BEARINGS



We fit all our machines with bronze bearings, which hold heavy loads during the rolling phases.

This technology is unmatched either in terms of its capacity or its longevity. Lubrication is centralised and it requires no maintenance.

6 ROLLS



The rolls are made from high quality steel with selected and traceable characteristics.

- > **Tailored bending.**
- > **Polished finish** to guarantee no marking, even in very sensitive materials.

- > **Induction hardening:** hardness 50-60 HRC.

Benefit: tailored production.