

MULTI – HEAD 2D PRIMARY TUBE BENDER

Mod. PQF 16 MT

Technical Description:

This machine has been designed to bend automatically cut-to-length tubes, simultaneously, starting from both the ends of the tube, with a programmed sequence and at the desired lengths and bending angles, with both heads closing to the center, where the last bends are performed.

It is particularly suited for bending small diameter and fragile tubes, having rather long straight lengths and multiple radii curves, such as the anti-moisture frame-heater tubes normally fitted onto the doors of domestic refrigerators and freezers.

The basic machine is composed of the following groups:

1. **Decoiling, cutting, feeding & transfer:** The main body is composed of a tube decoiling, straightening, calibrating and orbital burr-free and chip less cutting machine coupled with an outlet hopper generally as long as the straight tube that needs to be bent. Within this structure, made of tubular steel, pressed electro welded steel plates and aluminum structural elements, 2 tracks are incorporated that carry, each one, a trolley mounted on re-circulating ball bearings and onto which the bending heads are firmly anchored. Each group is totally independent and programmable. Intermediate partial lengths and the bending head positions are assured by brushless NC motors, programmable from the check-panel.

2. **Bending Heads:** Any bend can be obtained within 0° and 180° either left or right direction, as required. The bending head is securely anchored onto the above described trolley in such a way that it can be easily moved to the desired position, operating from the check panel.

Specially designed retractable bending-heads are positioned and used to obtain even tight bends and could be easily substituted if and when it is necessary to switch from one tube diameter to another or from one bending radius to another, or for different intermediate partial straight lengths.

Technical Description:

The bending angle of each head can be corrected or off-set with its NC unit, in order to compensate different spring-back effects of the tube, due to its physical properties, variable from one supplier to another or different batches of tubes.

3. **Clamping Groups:** each bending head will be equipped with a specially designed system composed of a set of bending dies with the required bending radius. The fixed

counter die will also act as a clamp to guarantee perfect execution of the required bending radii, obtainable repeatedly, with the complete set of 10 tubes.

4. **The bending/clamping group** is completed with adequate tube supports and tables, to offer a secure and safe bench during the tube feeding and bending operations. This group is also equipped with a conveyor belt that will automatically carry the group of 10 frames outside the protected area of the primary bender, to be picked up, manually, individually, to be further processed.



The work cycle is composed of 5 basic operations:

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- 1) Moveable pre-positioned clamps will firmly hold the group of tubes into the desired positions, by means of dedicated clamps (counter dies). CNC controlled independent bending heads will assure the model of product to be manufactured and can be programmed off-line, if requested.
- 2) The group of tubes will be placed in between the bending dies, of the required bending radius, ready to be clamped, in sequence, thereby obtaining the 2D bends to the required radii, angles and intermediate partial lengths.
- 3) Once the tubes are brought to a zero position, the clamps will automatically close and the pneumatic bending process will take place until all the 14-programmed bends are executed. The two cells together produce 1 frame every 5 seconds.
- 4) The pre-programmed bending cycle will take place, contemporarily, starting from both ends of the inserted tubes, until all the curves have been performed.
- 5) Evacuating of the finished parts is done by means of a conveyor belt, with a parking position, that will carry the group of bent frames outside the protected working area of the machine, ready to be picked up by the 2 operators.
- 6) In the meantime, a set of 10 tubes begins the next cycle.

Technical characteristics:

- Tube lengths workable max.: 10.000 mm.
- Tube diameters workable in copper / aluminum: up to max. 16 mm.

- Tube diameters workable with zinc/copper coated steel tubes: up to max. 10 x 0,5 mm.
- Nominal bending speed: 950° / sec.
- Nominal rotating speed: 900° / sec.
- Nominal bending tolerance: 0,10°.
- Nominal rotating tolerance: 0,10°.
- Nominal feeding tolerance 0,5mm.
- Installed power: 3 Kw.
- Air pressure (minimum): 6 Bar.