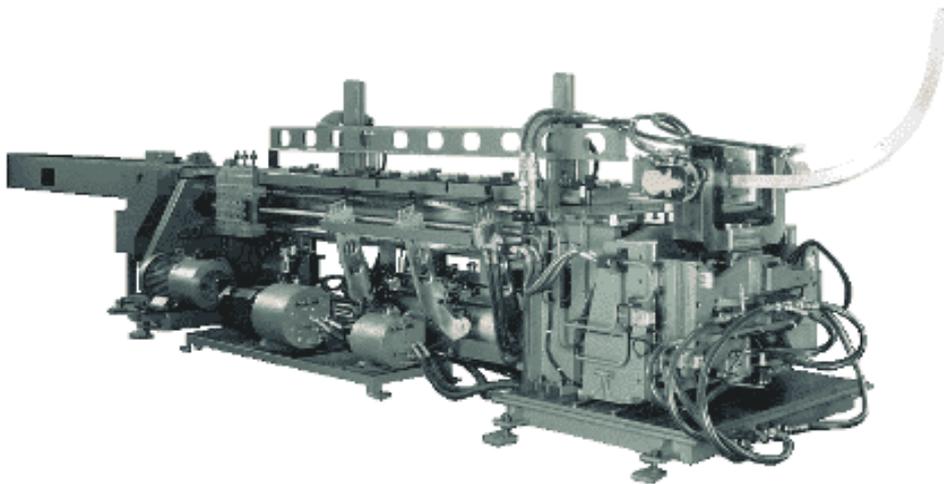


Messrs.: \_\_\_\_\_

The brief guide to Multibender for  
Continuous Free-R bending of  
Pipes with various cross-sections



Type: YPL-100

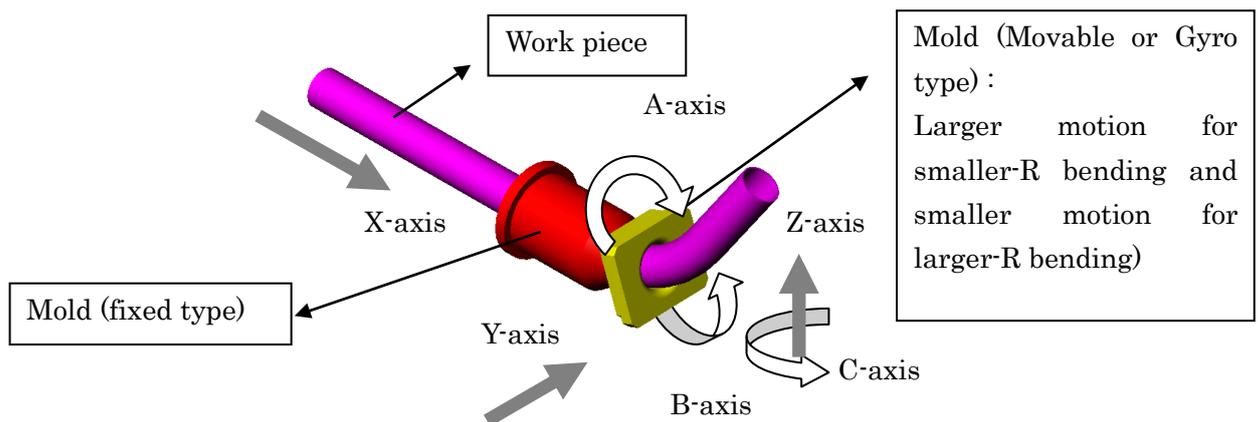
Opton Co.,Ltd.

Ver.1

- ◆ Free and continuous 3D bending can be met for grade A finish to the material of varieties of cross-sections. Best-suited to design-oriented car door sash, bumper and/or steel chair frames.

1. One mold set is enough to one material size for all bending specifications.

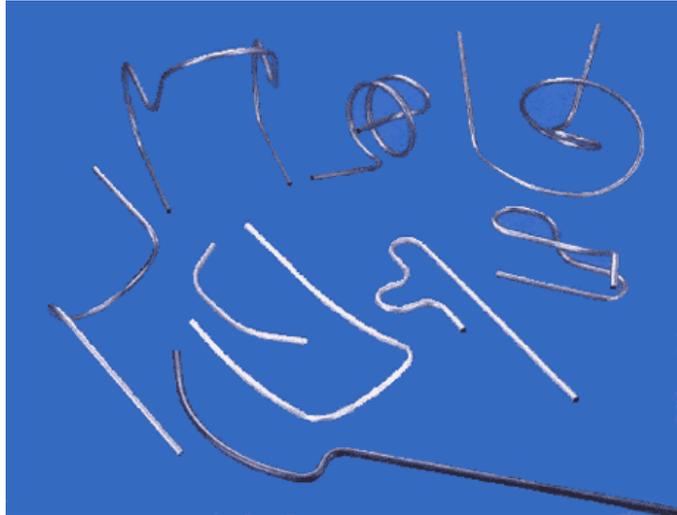
Unlike the standard bending machines that must need different-sized molds for different-sized work piece, Opton Multibender only needs one pair of dies, or one fixed to the machine bending head with the second movable for free positioning. A work piece is pushed at its rear end to be forwarded (or equivalent to DBB) through these dies. The fixed die holds a work piece while the second die makes numerically-controlled precision-rated turns in all directions (equivalent to POB and DOB) to execute bending of desired specification



## 2. Continuously free-R bending also available

2-1 Unlike standard bender that doesn't work for continuous R bending, Opton Multibender can meet continuous bending at free R simply by controlling the operation data.

2-2 Continuous 3D bending can also be met likewise by controlling the operation data. The molds is needed no more or less to the one in above 2-1.



3. Straight work piece can be bent in twisted form which can never be made by standard benders.

3-1 By turning the movable die, work piece can be bent in twisted form where bending is executed in direction twisted against cross-section as is easily imaged in wringing a towel.

3-2 By appropriate application of the twisting performance, the function can work as practical compensation for bending of irregular cross-sectioned material that tends to cause unscheduled formation with twisting.

This unscheduled formation with twisting is attributed to the imbalanced strength existed in two sides- left and right- of the material

4. World-highest quality of anti-deformed performance on the post-bend cross-section

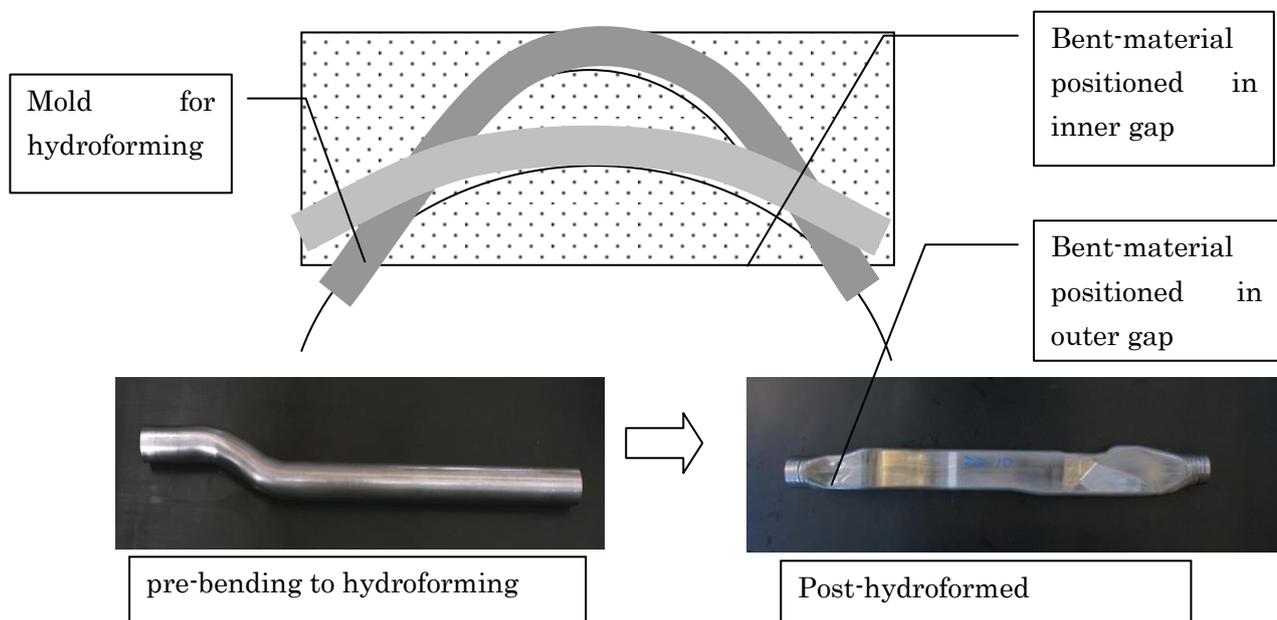
4-1 Thanks to “push-and-bend” being employed instead of conventional manner of catch-and-pulling work piece, material’s cross-section can keep better configuration with less deformation, shrinkage or flatening which is vital for appearance-emphasized products.

4-2 Thanks to minimized deformation on the bent cross-section area, good contacting surface can be made on the bent section for easier mounting of parts.

## 5. Best-suited for pre-bend application in hydroforming process

5-1 Compression force is given to material thickness in push-and-bend machining, resulted in less-reduced thickness achieved comparing to the one by standard pipe benders. Ideal for pre-bend application in hydroforming process.

5-2 In pre-bend application for hydroforming process, a work piece can be located in the best-selected position within the gap of propagation molds to make an optimized bend-formation needed for propagation.



## 6. Machining data can be prepared from 3D CAD design data

6-1 Old manual entry for point-to-point data was once used to be employed to Multibender, and that required rather longer time for starting prototyping production.

6-2 Newly developed is the data entry with CAD data that are processed to the data in 3D coordination to express detailed cross-section configuration by XYZ axes. This data allows quality control over linear-axial motions on each of X-Y-Z- axis, where fine bending finish can be achieved to a standard pipe for example, but with spring-back compensation only arranged separately.

## 7. New Multibender more stable with dispersion of transformed design less than half vs. the one of old-versioned Multibender

7-1 For deforming a work piece with asymmetric cross-section, unexpected twisting is very likely to the work piece. This can be eliminated by compensatory control of the A-, B- and/or C-axis.

7-2 Smart function is equipped to the New Multicender with the high-speed laser displacement gauge being installed, which forwards the detected controlled data of A-,B- and C-axis in real-time to allow automatic creation of modification data.

## 8. Small-R bending can be met (Optional feature)

8-1 Small-R bending has come to be met which wasn't by the old-versioned Multibender.

8-2 This optional feature has come to reality by super-quick high-frequency heating devised in the fixed-type mold.

## 9. Super performance by the Multibender with the productivity enhanced to double leading to the production-time and - cost reduced to half.

9-1 Machining tact time is not related to the number of bending points since a work piece is steadily pushed forwards all the way.

9-2 An example is 15-seconds total machining time may be expected for 10-points bending which may come around 30 seconds by a pipe bender for capacity of dia.30mm. ( With 100mm/DBB, 60°/POB and 45°/DOB)

9-3 One pair of molds is enough for one cross-section design regardless of varieties of bending specifications, leading to lower production cost at the end.

10. Quiet machine operation qualified enough for undisturbed conversation in the production area

Thanks to the driving power source either by AC servo motor or DDV, operation noise is very small without using standard hydraulic pump.

11. Desk-wide space is only needed for mold-storage

As one pair mold is only needed for one cross-section design regardless of varieties of machining specification, easier management and cost reduction can be made of tooling.

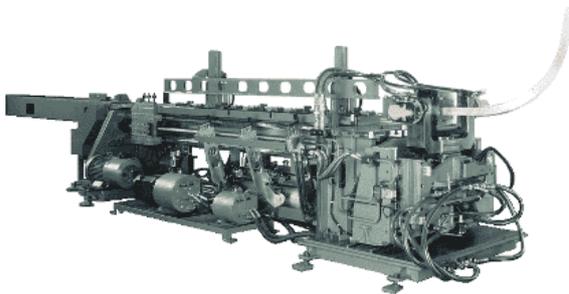
12. Half-sized space-saving production may be likely.

An example is the elimination of feeding device by a roll-forming machine being directly connected to the bending mechanism of Multibender.

By setting material cutter and unloading robot in the line, automated and space-saving production can be designed.

13. Two types available, one for pipe with round cross section and the other with irregular cross-section.

The series includes Pipe-Multibender exclusive for pipe with round cross section and Multibender as the other that can meet for irregular cross-sections as well.



Multibender for work piece with irregular cross-section



Pipe-Multibender exclusive for work pieces with round cross-section

## In starting feasibility study

For starting a study on Multibender, followings are offered:

Please pick up any one below that most suites your initial interest.

1. Opton staff visit to an inquirer is offered to make detailed presentation with DVD on a PC.
  - The movie of 「Car-door sash manufacturing system」
2. Opton staff visit to an inquirer is offered bringing an machined sample.
3. Opton factory visit by an inquirer is most welcome where the multibender is exhibited for demonstration.
4. Opton staff is pleased to make a visit to an inquirer for the best proposal upon Opton's receipt of inquirer's product information covering the title, OD, thickness, material, Q'ty of production, repetitiveness of production etc.

Opton stays always ready to meet anyone above