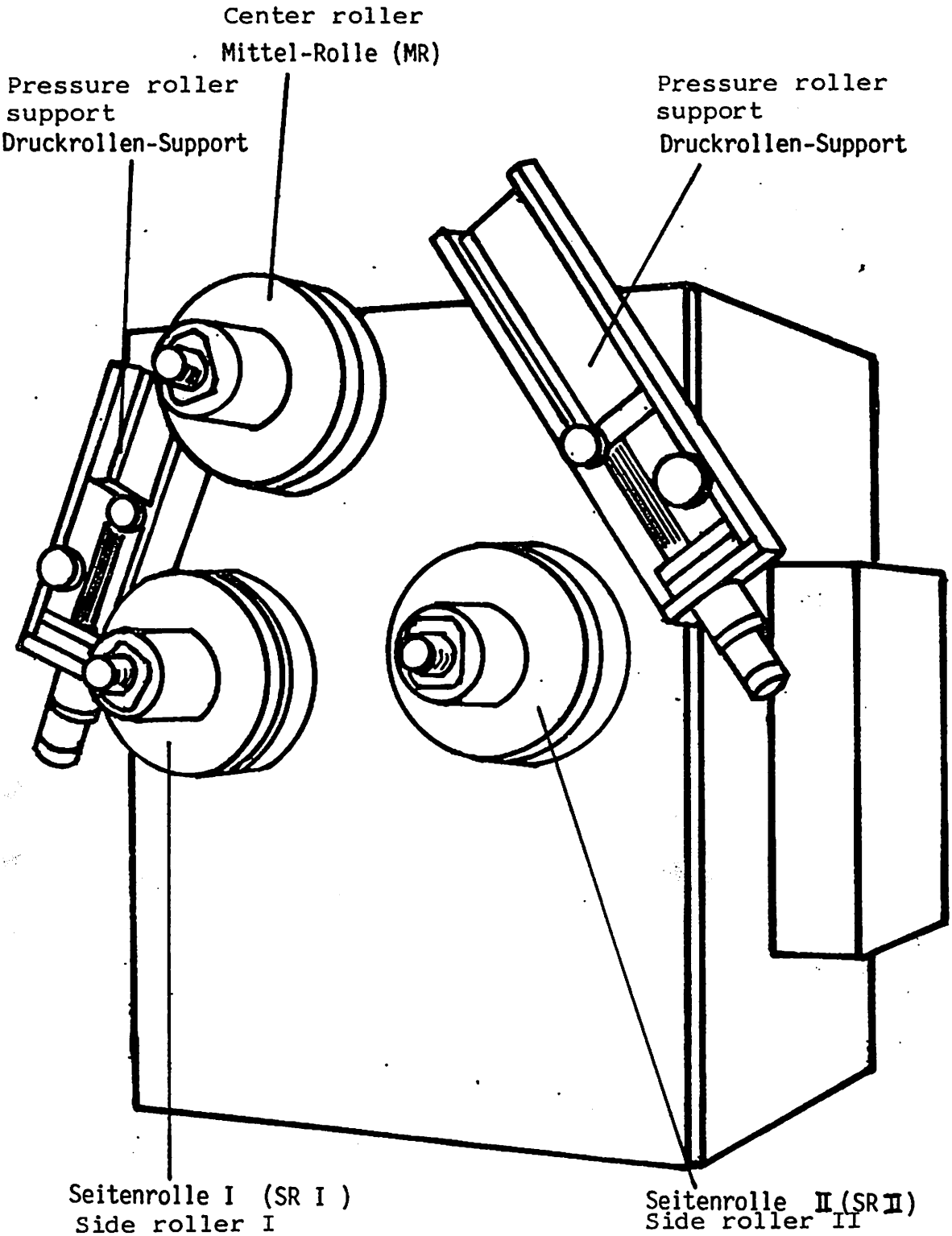


Skizze 1 Sketch 1

Geändert am ..... Ersatz für Aug. 79 Ersetzt durch .....

11/89

Ausführung/Bauart

Construction

HPR-V (Vertikale Aufstellung)
HPR-H (Horizontale Aufstellung)
HPR-V+H bedeutet, dass die Maschine durch einfaches Umlegen sowohl vertikal als auch horizontal zum Runden eingesetzt werden kann.

HPR-V (vertical erection)
HPR-H (horizontal erection)
HPR-V+H means, that the machine can be used for vertical as well as for horizontal bending by simple tilting.

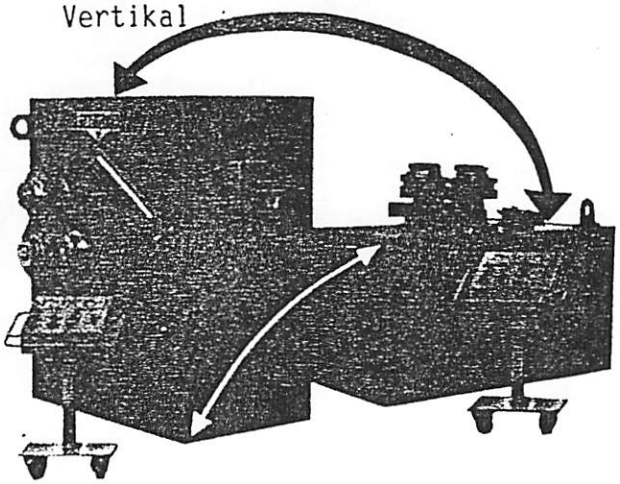
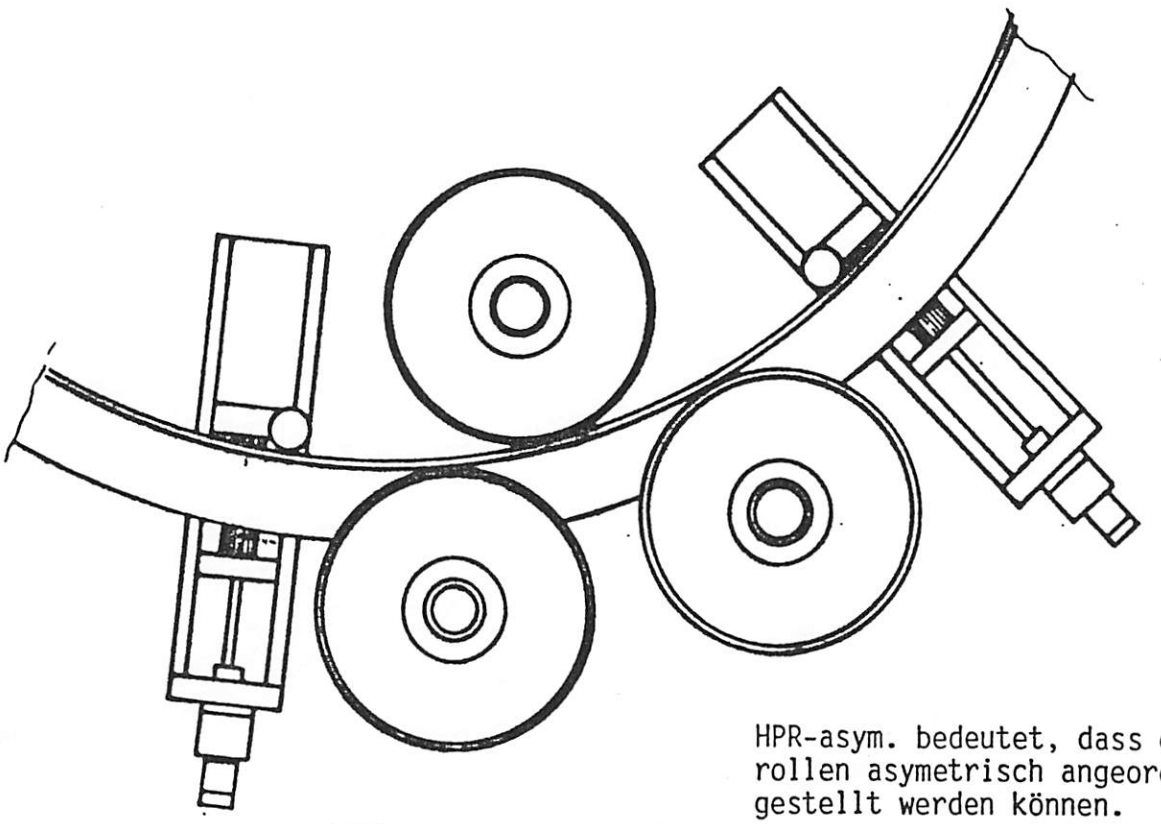


Bild 1
Picture 1



Skizze 2
Sketch 2

HPR-asym. bedeutet, dass die Biegerollen asymetrisch angeordnet und zugestellt werden können.

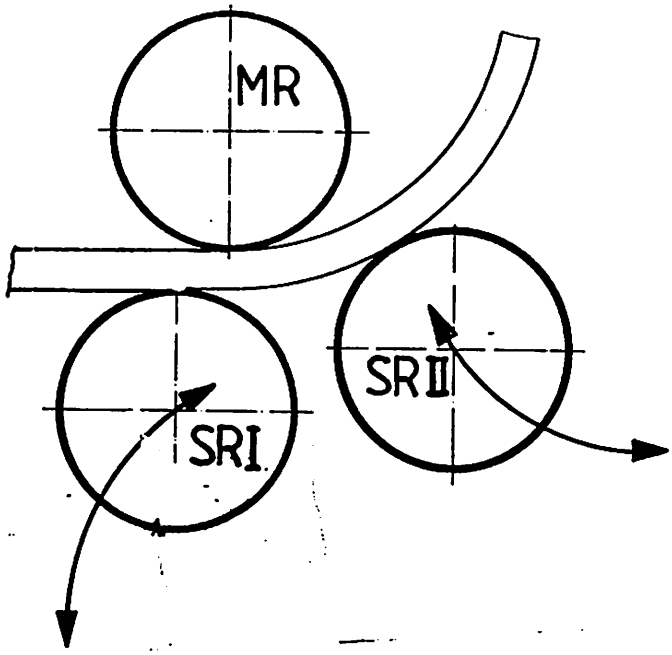
HPR-asym. means that the bending rollers can be adjusted and arranged asymmetrically.

Geändert am .....
Ersatz für Aug. 79
Ersetzt durch .....

Ausführung / Bauart
Construction

Asymetrische Anordnung der Biegerollen - Typ HPR-asym.

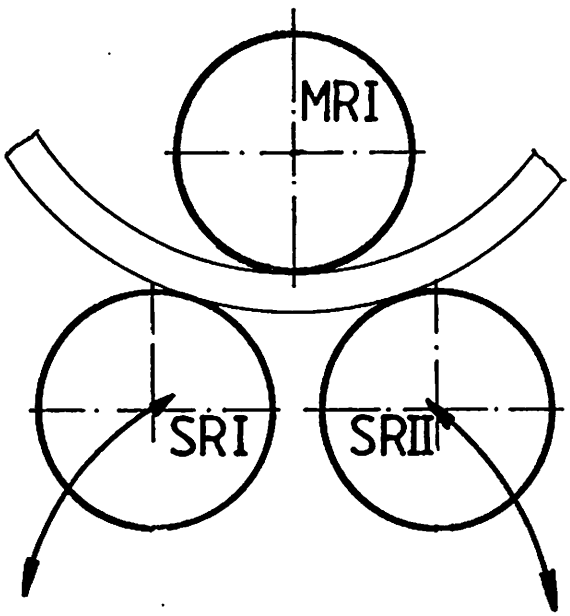
Asymmetric arrangement of the bending rollers - Type HPR-asym.



Skizze 3
Scetch 3

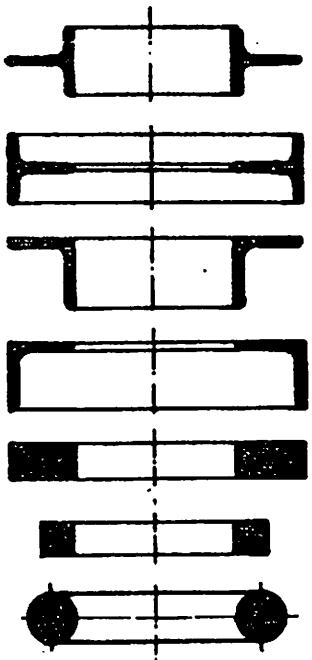
Symetrische Anordnung der Biegerollen - Typ HPR-sym.

Symetric arrangement of the bending rollers - Type HPR-sym.



Scetch 4
Skizze 4

Geändert am .....
Ersatz für Aug. 79
Ersetzt durch .....



UNIVERSAL BENDING ROLLERS

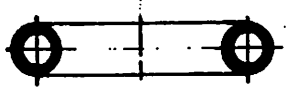
This set of tooling is in a construction that T-, angle-, flat- and square sections can be bent.

During the bending the sections are guided optimal between the rollers in order to prevent every undesired deformation.

By moving one part of the roller by means of a mounting nut over a moving thread the rollers are adjusted to the corresponding section size.

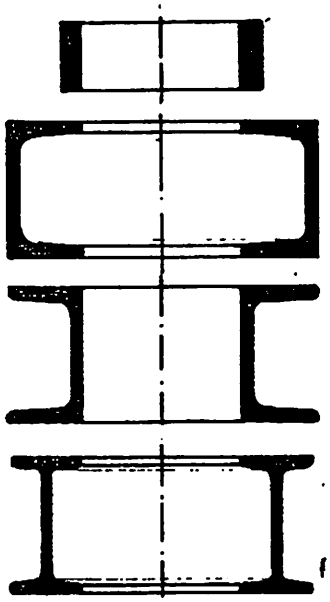
Partly the rollers are exchanged one against the other.

With the set of universal tooling T- and L- sections can be bent leg inward as well as leg outward.



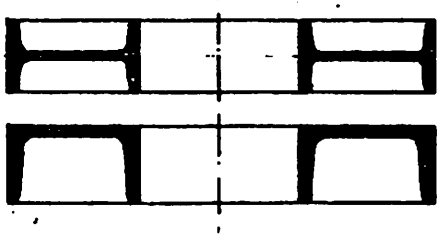
O FORM BENDING ROLLERS

For each tube size a set of tube bending rollers is required.



U + I-FORM BENDING ROLLERS over Y-Y-AXIS

The sections are guided lateraly between the bending rollers. The web of larger sections is supported additionally by rollers to prevent an inadmissible deformation.



U + I-FORM-BENDING-ROLLERS over X-X-AXIS

The sections are guided lateraly between the bending rollers. In order to prevent a falling down of the flange on the collapsing of the web, the section is hold during the bending process by a traction device engineered by Haeusler.

Geändert am .....
Ersatz für Aug. 79
Ersetzt durch .....

Description of the Pressure Roller Support

The **HAEUSLER** Section Bending Machines of the type HPR are fitted out with 2 pressure roller supports. These are differed in

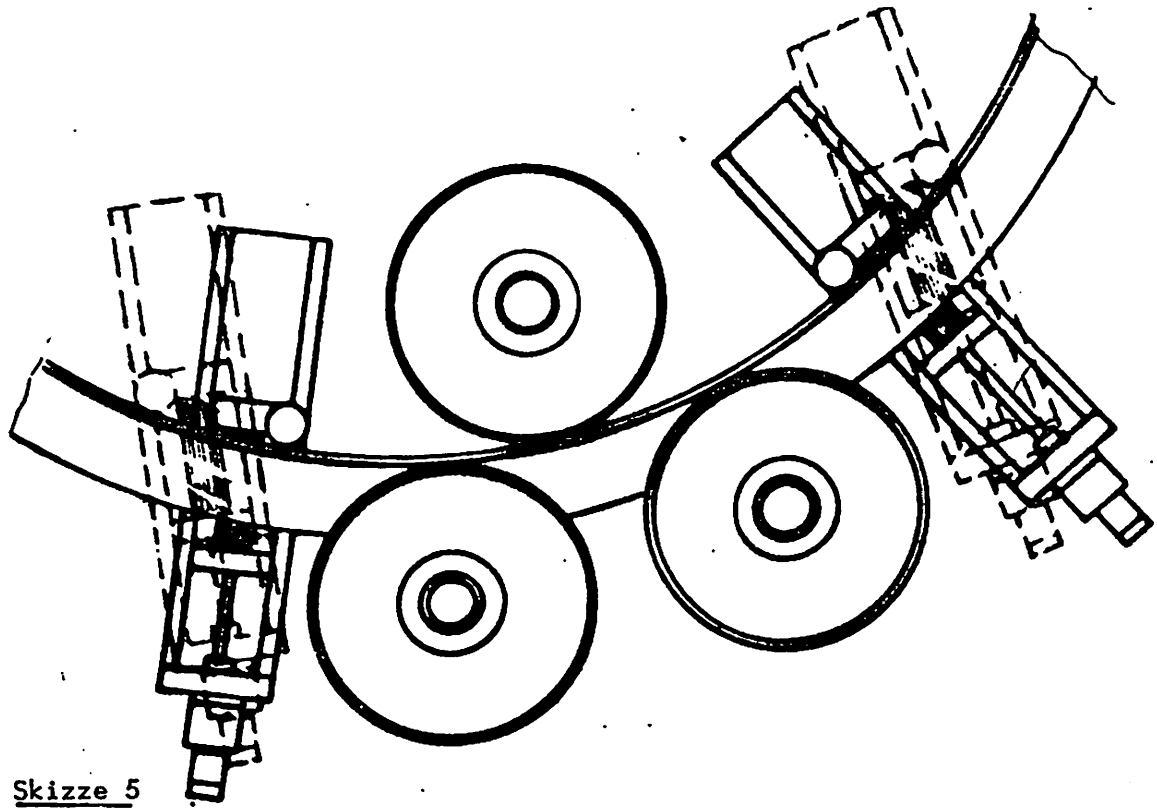
- Pressure roller support (infeed side)
- Pressure roller support (discharge side)

During the bending they

- lead the sections
- correct the physical conditional torsion of the asymmetric sections
- determine the lead of a coil

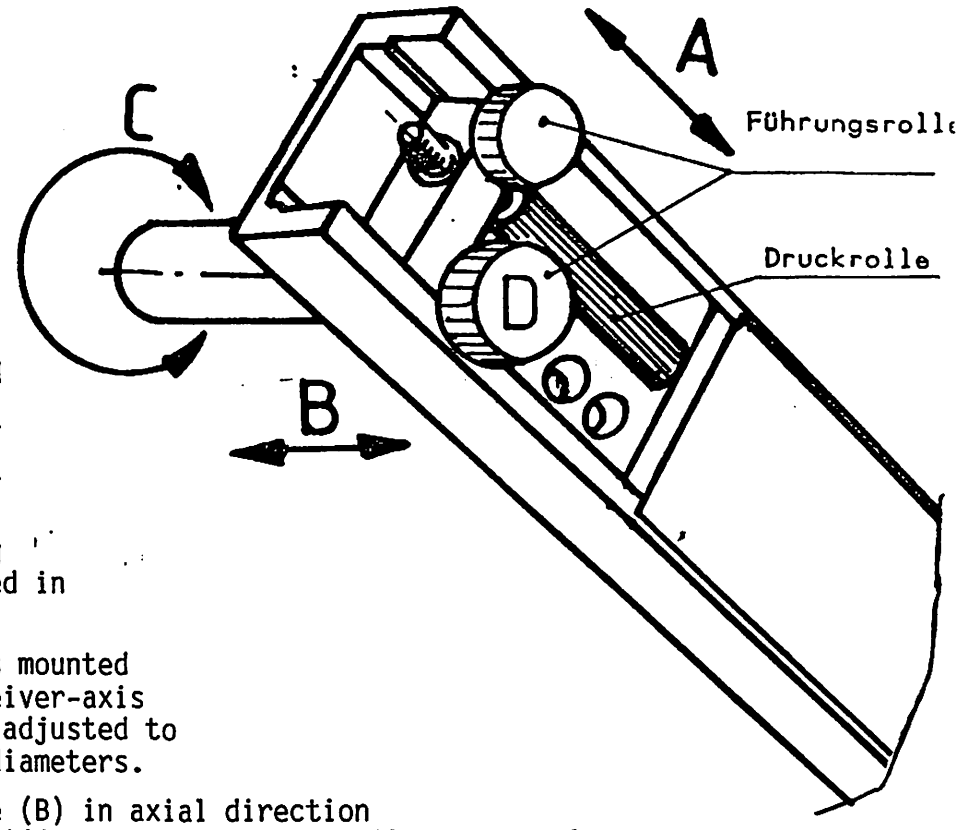
The adjustment of the pressure roller supports can be controlled manual over threaded spindle and rattles resp. hand wheels or also automaticaly over servo-motors.

During bending the pressure roller supports must be adjusted mostly rectangular (90°) to the section. So the sections roll allong without damaging their surface or the one of the pressure roller.



Skizze 5

Geändert am ..... Ersatz für Aug. 79 Ersetzt durch .....



The pressure roller support is fitted out with a pressure roller and with a guiding roller.

Both rollers are placed on a sledge, which can be adjusted by means of a threaded spindle or a cylinder (A).

Furthermore the guiding roller (D) can be mounted in different positions.

The complete support is mounted turnable round the receiver-axis (C), so that it can be adjusted to the different bending diameters.

By its adjusting device (B) in axial direction it is adjusted to the different sections as well as to coils.

Skizze 6

	ANWENDUNG
A	Radial - Adjustment "A" - Adjustment of the bending roller to bending diameter - Feed motion of the guiding roller to the section
B	Axial - Adjustment "B" - Feed motion of the pressure rollers to the section - Adjustment of the pressure rollers for the bending of coils
C	Swivelling - Adjustment "C" - Adjustment to bending diameter - Feed motion as near as possible to the bending rollers
D	Displacement of the guiding rollers - To be mounted according bending diameter (i.e. near to the bending rollers)

Ersatz für 4y.79. ersetzt durch .....

APPLICATION OF THE PRESSURE ROLLERS

Bending of Rings

When bending flat rings the pressure rollers are only adjustd slightly to the section.

Mostly it is not required to adjust the pressure rollers for symmetric sections, provided that the sections were delivered free of torsion.

Bending of Coils

When bending coils the lead is reached by adjusting the pressure rollers at the running out side.
It is to be concerned that a small adjusting stroke of the pressure effects already a large deviation resp. coil lead.

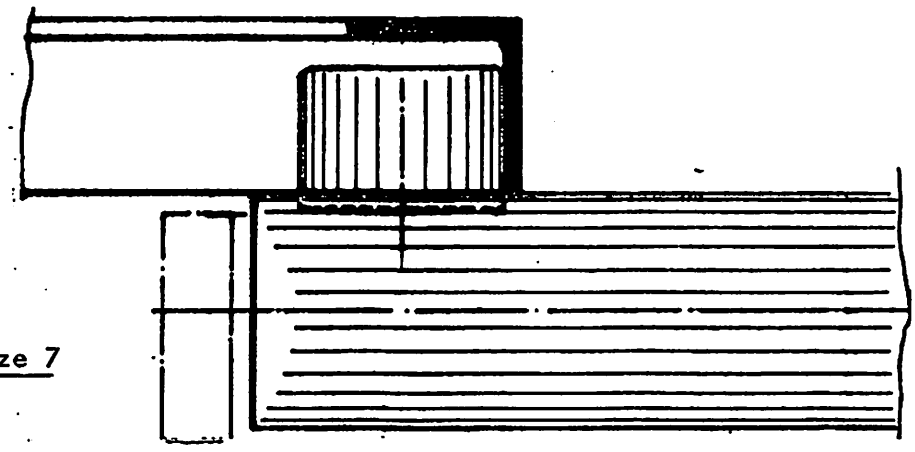
APPLICATION OF THE GUIDING ROLLERS

Bending of Rings resp. Coils

The exchangeable guiding rollers have to guide the sections during bending. Hereto they are positionned on the pressure roller support in such a way, that they are arranged at the outside for rings with a small diameter and at the inside for rings with a large diameter.

BENDING OF RINGS/COILS WITH L-SECTIONS (LEG INWARD)

For this bending process the guiding roller has to fullfill an important function. According scetch 7 it is adjusted at the inside of the leg and prevents the leg from collapsing.
The adjusting position resp. adjusting pressure is found by check the angle accuracy of the L-section. The L-section must only tuch slightly the pressure rollers during bending .
Do not forget to oil resp. to grease the sections.
It is important for alle bending; Try to round in only few passages.



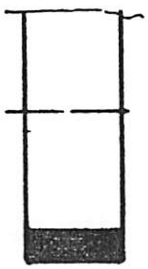
Skizze 7

Geändert am ..... Ersatz für Anz. 29 ..... Ersetzt durch .....

BENDING OF FLAT IRON (on edge X-X axis)

Preparation of the first end according enclosed sketch No. 9 on page 13. This enables an easier infeed of the section.

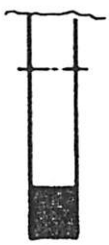
Infeed the section between the rollers and press them on by means of a special key. The pressing on pressure of the rollers is to be selected so that the iron to be bent runs through safely without damaging the surface. As during bending a strong compressing occurs at the inside diameter, the center roller is to release correspondingly.
We recommend also to oil the section in order to prevent a corroding of the section.



BENDING OF FLAT IRON (flat Y-Y axis)

a) Narrow cross-sections can be bent with the set of universal rollers in the same roller position as for flat irons on edge or as for square irons.

b) Wide cross-sections are bent with the outer diameter of the rollers. The iron is guided by the guiding supports.



BENDING OF ROUND IRON

For the bending of round irons the set of universal rollers is used normally. Those are adjusted as for the bending of flat or of square irons.
For special cases also section rollers (as for tubes) may be used.

BENDING OF THE SQUARE IRONS

Same roller position as for flat iron on edge. Use additional rings according cross section. Other wise use the same bending method as for flat iron on edge.

Geändert am .....

Ersatz für Aug. 79

Ersetzt durch .....

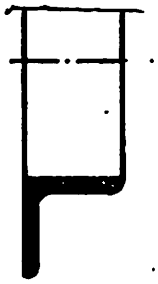
BENDING OF T-IRONS (leg outword)

T-irons leg outwards need no special preparation for the bending because of the symmetrical cross section.

BENDING OF T-IRONS (leg inwards)

For the bending of T-irons leg inwards the same preparation must be made as for the bending of angle leg inwards; strong pressing on of the leg in the tool slit.

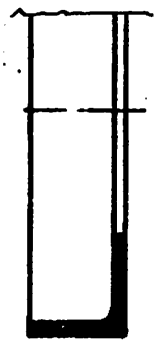
According the section the slightly inclined intermediate rings must be used.



BENDING OF L-ANGLE IRON (leg outwards)

Infeed the iron between the rollers and press them on by means of a special key. The pressing on pressure of the rollers is to be selected so that the iron to be bent runs through safely without damaging the surface. We recommend also to oil the section in order to prevent a corroding of the section.

The system of the pressure rollers is to adjust so far at the exit side that the leg which touches the roller lays parallel on the roller. According bending result the position of the pressure roller system must be changed.



BENDING OF L-IRON (leg inwards)

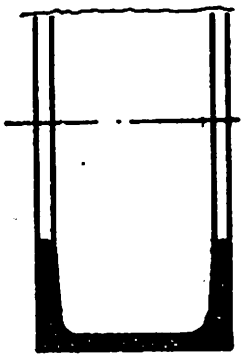
The angle is to bevel at the ends according sketch No. 10 on page 13. Afterwards infeed the section between the rollers. It is important, that the leg in the tool slit is hold well and oiled evt. in order to prevent undulation resp. corroding of the leg. Now the pressure roller at the infeed side is adjusted towards the section to be bent in order to get a certain preclamping of the section. By means of the pressure roller system, which is adjusted at the exit side, and of the correcting roller, which is adjusted towards the leg, the deformation of the section is corrected, whereby according bending result the pressure rollers must be adjusted correspondingly.

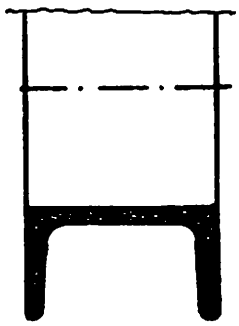
Ersatz für Aug 79.
ersetzt durch .....

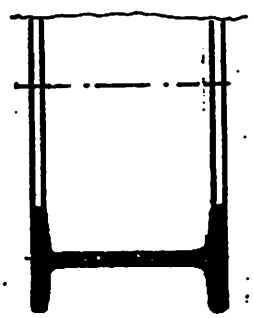
BENDING OF TUBES

Mount the form rollers for tubes. For each tube dimension one set of tooling is required.

For the bending of thinn walled tubes to an extreme small diameter and with a high cross section exactitude we recommend to fill the tubes.
There can be reached an essential improvement of the deformation of the circular cross section with a HPR-asym.-machine, where the exit rollers can be adjusted together as near as possible which has the effect of a certain calibration.







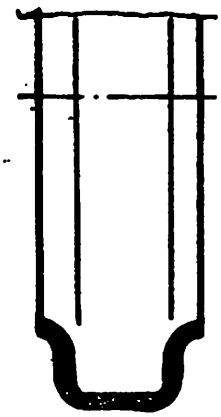
BENDING OF U- and T-SECTIONS in Y-Y-AXIS

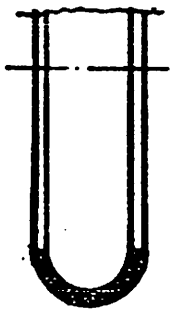
Prepare the bending tools with the corresponding intermediate rings for the section.
Infeed the section and adjust the rollers strongly together.
The two legs of U-sections must be slightly pre-clamped order to prevent a deformation.

Ersatz für Aug. 79
Ersetzt durch .....

BENDING OF U- and I-SECTIONS in X-X-AXIS

Mount the draw unit and prepare the bending rollers according to the section (see, assembling drawing) During bending take care that the draw and pressure rollers are positioned rigidly towards the section. The roller should be adjusted for a certain diameter if possible during the running through of the section to prevent a local buckling of the section.





PROFILING AND BENDING OF HALF TUBES, OMEGA-SECTIONS ETC.

Mount the corresponding form rollers. Mount the feeding support or the preprofiling device.

Infeed the band and be very careful, that the bond is fed exactly centralized by the guiding rollers.

Infeed the band between the form rollers and adjust them as much as it is necessary to form the required section.

Important: The roller gap between the form tools must at least correspond to the plate thickness otherwise the machine may be overloaded. Set the bending rollers to the required bending diameter. Take care that enough stroke reserve is left in cases where the bending roller is operated over a bracket. Correct omega sections and other special sections by using the correction roller.

PRODUCTION OF SINGLE RINGS

We recommend to mark on the straight material the theoretic length of the ring to be bent and then to round it to a larger diameter than requested, Only the two section ends should be bent to size

Afterwards remove the pre-bent ring and cut the unbent straight ends. After re-infeeding the ring into the machine it can be bent to size.

Ersatz für Aug. 79 ersetzt durch .....

CHART FOR EXPERIENCE VALUES

To take advantage from the gained experience for further bending operations we recommend to establish a chart, where all different values such as position of the roller(s), position of pressure roller arrangements, dimensions of the section, diameter of the ring, material specifications, number of passes and so on are registered. These values can be very helpful at a later date when similar rings have to be bent. (see Instruction Manual 4.8.3.2 - Chart for Adjusting Values for HPR.)

PRECAUTIONS WHILE BENDING HAEVY SECTIONS

When bending a long bar of a heavy section, some action must be taken to support the bar by means of a crane or a supporting device, to avoid any deformation of the workpiece caused by its own weight. Very important is the supporting of the bent section while bending coils and large diameters.

ASSEMBLING OF BARS FOR SERIAL WORK

For serial work the different bars can be buttwelded together, by this method considerable time and material can be saved.

ADDITIONAL DEVICES

If the machine is equipped with additional devices, bear in mind that all additional features have to be removed when they are not used.

Disregard of this precaution can cause serious damages to the machine.

WORKING SPEED

- Rotation Speed

When the machine is designed for different rotaion speeds, resp. for a stepless speed range, attention has to be paid, that working speed is in a good ratio to the section to be bent, that means

max section size/resistance = min. rotation speed

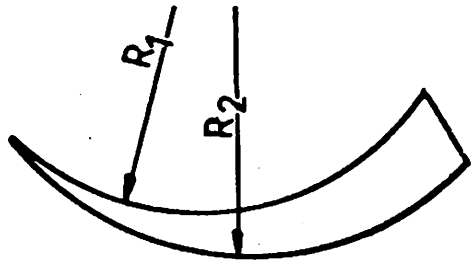
- Adjusting Speed

Is the machine equipped with different adjusting speeds take care, that the high adjusting speed should only be used when the rollers are not under load.

The adjustment of devices should also be effected without load.

Ersatz für 13.79
ersetzt durch .....

RADIUS GAUGE

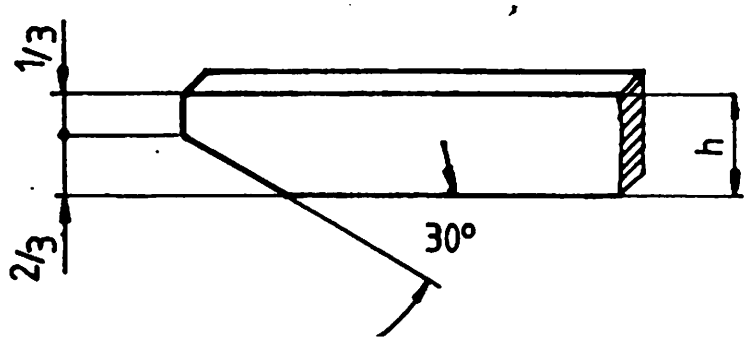


Sketch No. 8

Gauge for checking the bending radius made from sheet metal 2 mm thick.

BEVELLING OF SECTIONS

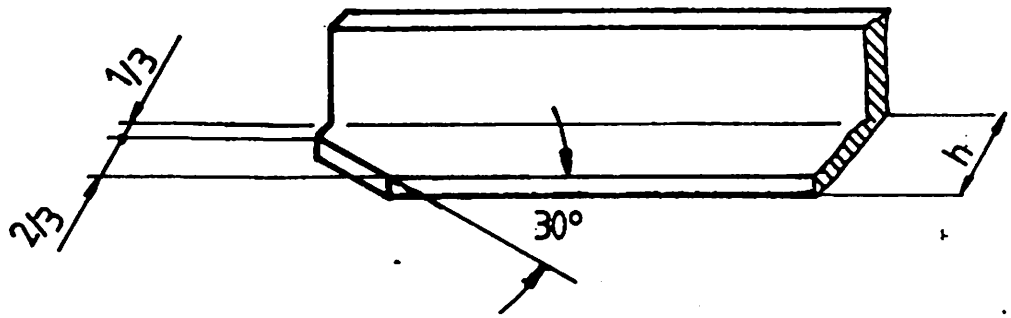
Sketch No. 9



For bending flat iron "edgewise" the first end has to be prepared as shown in sketch No. 9

BEVELLING OF SECTIONS

Sketch No. 10



/ To avoid as much as possible flat ends of angles leg inward, it can be advisable to prepare the horizontal leg of the profile as shown in Sketch No. 10.

IMPORTANT The leg being held by the tool-gap should be well lubricated, drilling emulsion or grease to avoid a mechanical erosion of the profile.

Angles leg outward, T- and rod iron as well as pipes may be bent without leading end preparation.

Ersatz für Aug. 79
ersetzt durch

HPR	Versuch Nr: Datum:		4.3.1.2 (4.1.3.2)
Material	Profil:		
	Breite:		
	Dicke		
	Länge:		
	Querschnitt:		
	Widerst. Moment: W_x W_y		
	Werkstoff:		
	Besondere Merkmale:		
	Biegeradius: SOLL		
Einstellwerte	Seitenrolle I		
	Seitenrolle II		
	Druckrollen-Support I		
	Druckrollen-Support II		
Druck			
	Rutschkupplung OW		
	Rutschkupplung UW		
	Biegeradius: IST		

Assay - number			
Date			
Name			
MATERIAL	Profile		
	Width		
	Thickness		
	Length		
	Cross section		
	Section modulus (W/x)		
	Section modulus (W/y)		
	Material		
Bending radius : Proposed			
VALUES	Side roller (SR) I		
	Side roller (SR) II		
	Press.roller support I		
	Press.roller support II		
Bending radius : Actual			
PRESS	Center roller (CR)		
	Side roller (SR)		
	Systempressure-cylinder		

Remarks:
This chart is used for Adjusting Values for HPR. To take advantage from the gained experience for further bending operations we recommend to establish a chart.

These values can be verry helpful at a later date when similar rings have to be bent.