Instruction and maintenance manual

Profile Bending Machine

PB 70/2 H

1. GENERAL DESCRIPTION

1.1 Structural Data

- basic frame manufactured in arc-welded sheet metal,
- machine casing in steel (type Fe 360),
- shafts rotate on double journal box with prestrained taper roller bearings,
- shafts and gears in high-tensile steel (type 38 Ni Cr Mo 4),
- rolls (supplied as standard) in hardened steel (type C 40).

1.2 Characteristics of the machine

Designation: PB 70/2 H

Name: Bending machine for iron, aluminium and alloy section bars and tubes.

2. NAMEPLATES ON THE MACHINE

2.1 Type - plates and mandatory plates

CE mark: there is a type plate located on the machine and contains the data specified in current standards.

<u>Electric Supply</u>: this sign in black with a yellow background is affixed to the door of the machine's electrical control unit.



3. TECHNICAL SPECIFICATIONS

two, grooved surface
steel
in hardened steel, working on a double conical bearing
separate from the structure
in a single piece, sliding on nitrided and ground slide rails
fixed to machine casing, nitrided and ground
steel, fully machined
for material support and correction
with cast-iron casing
vertical or horizontal
digital on the control panel for adjusting the pressure rolls

3.1 Technical data and Overall Dimensions

Diameter of shafts:	50	mm	
Diameter of upper roll:	152	mm	
Diameter of lower rolls:	162	mm	
Revolution of shafts:	8,5	rpm	
Geared motor:	1,1	kW	
Hydraulic Motor	1,1	kW	
Pressure of hydraulic cylinder	8.000) kp	
Base:	600 x	900	mm
Height:	1000	mm	
Approximate weight:	420	kg	

3.2 Standard Equipment

- Rolls and distance spacers
- Operating keys
- Instruction and maintenance manual
- Stop brackets (angle irons)
- Feet

3.3 Sound Levels (ISO 3740 - 46)

Average sound pressure level:	68.5 dB
Sound power level:	85.0 dB
Measurement distance:	1.6 m vertically; 1 m horizontally

4. INSTRUCTIONS FOR TRANSPORT AND INTERNAL MOVEMENT



WARNING: The machine must be moved by trained personnel (fork-lift truck drivers, crane operators, etc.)

The machine's structure is particularly robust and rigid, which means it can be moved without additional dismantling operations; when moving the machine you are advised to follow the rules below and refer to Figure 4 - 1 below, which shows three eyebolts.





- 1. Place the machine in an upright position (with the axes of the rolls horizontal);
- 2. Use only the 3 eyebolts shown in the illustration **4.1** to lift the machine;
- 3. Lift without causing impacts to the machine or its structure either while moving it or supporting it.



NOTE: When transporting the machine by vehicle, it must be well secured to the vehicle by ropes / belts.

5. STORAGE AND WORKING ENVIRONMENT

5.1 Storage

- During any period of <u>storage</u> the machine must be kept in a dry, covered place.
- The machine must be protected from splashes of water (including those unforeseen).
- It should be emphasised that the machine also contains electrical and electronic parts, which therefore makes it highly sensitive to temperature fluctuations, excessive heat and high humidity levels: permissible range between 5% and 95%, provided there is no condensation.
- The <u>ambient temperature</u> during storage must be between -20°C and +60°C.

5.2 Normal Operation

- During <u>normal operation</u> the machine must be located in a dry, covered place.
- To ensure that the machine operates efficiently, the <u>ambient temperature</u> must be between 0°C and 45°C and the <u>relative humidity</u> must be below 90% (without condensation).
- The connecting cables must be laid so as to avoid small-radius curves.
- Locations subject to corrosive vapours or sources of excessive heat should be avoided.

6. CLEANING THE MACHINE

Before use, the machine must be thoroughly cleaned to remove the protective oil applied to painted surfaces. Aggressive -solvent- cleaners should not be used.

Note: These liquids <u>must not be sprayed</u> on but applied with a cloth when the machine is disconnected from the electric supply (the machine must of course also be at ambient temperature).



7. INSTALLATION INSTRUCTIONS

7.1 Positioning the roll - bender unit

The roll-bender unit of the PB 70/2 H is capable of operating in two modes, depending on the positioning of the axes of the rolls which may be (as shown in Figure 7 - 1 below):

- positioned vertically horizontally (see Position I);
- or (by turning the roll-bender unit through 90°) positioned horizontally (see Position II).



FIGURE 7 - 1

The first position is typically used in standard operation, and for greater ease of operation.

The second position is preferred where sections are being bent into a spiral, particularly when these are very long and as a consequence the actual spiral could invade the operator's working space, thereby constituting a hazard. However, if the roll-bender unit is turned over, the spiral will "climb" upwards, to the benefit of operator safety.

7.2 Stop brackets

It is important to stress the position of the stop brackets (angle irons for securing the rollbender unit) in relation to the position of the actual unit. These stops are used to lock the machine in place, thereby avoiding the risk of tipping during normal operations.

WARNING!!!

In order to avoid risks arising from the unwanted movement of the roll-bender unit (especially when bending heavy or spiral bars) it is not permitted to use the machine unless the stop brackets are firmly secured to the floor and the machine!





Two stops (or stop brackets) as shown in the illustration on the right are supplied with each machine.

Each stop has two oblong holes (to allow the necessary adjustments) through which to insert the fixing screws, which must be at least M10.

These fixing screws must be fixed to the floor (using screw anchors) and the roll-bender unit between the chassis and the foot as shown in the illustration below.

FIGURE 7 - 2



FIGURE 7 - 3

7.3 Feet



FIGURE 7.4

The machine is also provided with eight steel feet for supporting the machine on the floor.

These feet are supplied ready-fitted on the rear and based of the machine as shown in the illustration opposite and Figure 7 - 1 on Page 8.

If the machine's working position is changed (from horizontal to vertical and vice versa) two of these feet must be detached and remounted to allow the stop brackets to be attached, as described in Section 7.2 above, on Page 9.

The use of other systems for supporting the roll-bender unit and fixing it to the floor is <u>not permitted under any</u> <u>circumstances</u>.



7.4 Illumination

The machine does not have its own lighting system and must therefore be installed and used in premises with adequate lighting, i.e. where an illumination of not less than 100 lux is guaranteed. This illumination value should however be not less than 300 lux for maintenance operations (see Section "Routine Maintenance and Cleaning").

7.5 Connecting the Control Pedestal

Install the control panel fixing it to the ground through 4 expansion dowels, **at a least distance of m 1,40 from the work plane**; carry out this operation before connecting the machine to the electric system. Without this precaution it **is forbidden** to take the machine in operation. The device remains also during the displacement and transport operations; as in this case the machine can work only after the connection of the control panel at a distance of m 1.40 from the work plane.

7.6 Electric Supply

Before connecting the machine to the electric supply, ensure that the voltage is suitable for which the machine has been designed. The installed voltage can be read from the type-plate that is fixed on the machine.

7.7 Disposal of packing materials



Remove any protruding nails from wooden boards, pallets and covers.

Dispose of wood, cardboard, nylon sheets, nails and any other packing material in accordance with current regulations.

8. INSTRUCTIONS FOR USE

8.1 Description of Control Panel



The operations described below must only be carried out by experienced, fully trained personnel!



Figure 8 - 1

When the main switch on the side of the machine is switched to ON, the red lamp on the emergency button lights up (Figure 8 - 1).

Besides the foot control, the pedestal also houses the digital control panel. All the machine's operational and set up functions can be controlled from this panel. The warning lights on the panel also enable the operator to check that the machine is operating efficiently. As described in the sections below, the fact that the lights are on indicates that the machine is malfunctioning or has actually jammed.

8.1.1 Instructions for using the panel and the machine

When the main switch on the right side of the machine is switched to ON, the red light of the EMERGENCY BUTTON lights up and also the four-digit display will light up to indicate that the machine is fully operative at this point.

If the slide support is at the highest point of its vertical stroke the quota display will show the quota *000.0*. If it is at its lowest point, the display will show *129.0*.



FIGURE 8.3: LIMIT POSITIONS OF THE SLIDE SUPPORT

If the up and down controls for the hydraulic cylinder ($\forall \land$ HYDRAULIC CYLINDER) are actuated at this point the slide support will move up or down, causing the current quota to appear on the display.



ATTENTION: as it is possible to set a reference quota for the stroke of the hydraulic cylinder between 0 and 129 mm the cylinder may stop once it has reached this quota; to bypass this shutdown move the BYPASS switch to position 1 (the BYPASS ON light will then light up). For details of how to set this reference quota, see the section on "Setting the quota".

8.1.2 Emergency conditions

Pressing the red ACTIV EMERGENCY pushbutton down to block up all the operational functions of the machine and the corresponding red light comes on.

To restart the machine release the emergency stop button.

In the case of a power failure and subsequent restarting, the machine will be return in working position us long all the emergency buttons are unlooked.

8.1.3 Setting the quota display

The manufacturer supplies the quota display preset in accordance with the following scheme, depending on the position of the slide support

- slide support at top limit position:
- slide support bottom limit position:

display shows *000.0;* display shows *129.0.*

In the event that the display leaves off to show these quota values for the points indicated (this happens exceptionally due to shocks, temperature differences, and the development of play), proceed to set it as follows:

1. Remove the red plastic cover from the display with a screwdriver (see the illustration below) taking great care not to chip the cover. When this operation is complete it will be possible to gain access to the adjusting trimmers as shown in the diagram in Figure 8.5;



FIGURE 8.4: HOW TO REMOVE THE DISPLAY COVER USING A SCREWDRIVER

- 1. Move the slide support to its maximum upstroke position;
- 2. Actuate trimmer A until the quota shown on the display is 000.0;
- 3. Next move the slide support to its maximum down stroke position; actuate trimmer A until the quota shown on the display is **129.0**;
- 4. Repeat these two operations several (3 or 4) times to ensure that the display has been set correctly.



FIGURE 8.5: DIAGRAM AND ADJUSTING TRIMMER



ATTENTION: setting these quotas incorrectly is the same as obtaining an incorrect intermediate quota on the display; in the same way, any quota set using the procedure described in the following section will be equally unreliable.

It can happen that once a quota to be achieved has been set the slide support on its down stroke does not stop at the quota set but at another (the display shows a different quota from the quota set).

In this case, proceed to adjust the quota as shown below:

- 1. Set a quota to be achieved (for example 050.0) as indicated in the next section;
- 2. Move the slide support to the maximum upstroke position (the display will show *000.0*);
- 3. Make sure that the BYPASS switch is at *0*;
- 4. Move the slide support down: if during its down stroke it stops at another quota (for example *050.0*) you should:

- 5. Adjust trimmer R until the display shows a quota equal to the set quota less the difference between the set quota and the quota at which the slide support stopped (in our case: 050.0 (051.0 020.0) = 49.0);
- 6. Check that the desired quota is being reached.

8.1.4 Setting a quota



ATTENTION: if problems arise when setting the quota (quota not adhered to) read the previous section.

The down stroke of the slide support can be controlled by the hydraulic cylinder to ensure that it always reaches the same quota when working on subsequent work pieces. This facility makes it possible to replicate operating conditions in an extremely simple and reliable way. If desired, it is possible to force the piston to descend beyond the set quota without cancelling it simply by using the BYPASS switch as indicated above.

ATTENTION: the upstroke of the piston is not affected by the quota set as a reference.

The procedure for setting this reference quota is as follows:

- 1. Hold down the blue PUSH TO SET button: the display will show the quota previously set irrespective of the current position of the slide support;
- 2. Using the QUOTA ADJUST potentiometer set the value to the quota at which you wish the slide support to stop on its down stroke;
- 3. Release the blue PUSH TO SET button; the slide support will now stop at the set quota each time unless the BYPASS switch is actuated (when doing so check that the BYPASS ON light is lit).



NOTE: this type of operation becomes necessary when you want to carry out <u>a number of identical bending operations on</u> <u>different work pieces of the same type of section</u>. In this case you should proceed as follows. During the first bending operation (which you can read about in *perfecting the process*) calibrate the position of the pressure piston to take some account of the elastic recovery of the material being bent. Test the piston in a number of different positions until the work piece obtained has the exact curvature required. At this point read the quota shown on the display and set it as the reference quota as described above.



FIGURE 8.6: ELASTIC RECOVERY

8.2 Description of electrical control unit



Figure 8 – 7

The electrical control unit is powered by a transformer (T) with a 24V output and an input selectable between 230V and 400V. If necessary, it is possible to change over from one supply voltage to another: to make this changeover consult the electric diagram for the machine.

The machine motor is protected by a thermo-magnetic overload interrupter preset to take account of the machine's output and the supply voltage for the motor (see also the electric diagram for the machine).

PB 70/2 H Profile Bending Machine

RHTC B.V.

If the drive motor is overloaded the relative thermo-magnetic interrupter will cause the electric circuit to open resulting in the complete shutdown of the machine's operational functions. In the event of such a situation the GREEN MAIN CONTROL LAMP on the control pedestal will OFF. In order to restore the functions of the machine you will have to gain access to the electrical control unit having first switched off the main switch; then wait a few seconds and switch on the released thermo-magnetic circuit breaker. After closing the panel of the electrical control unit and switching on the main switch again, you will note that the GREEN MAIN CONTROL LAMP is ON and you can restart your work.



Main switch in OFF Position

Main switch in ON Position

Figure 8 – 8

ATTENTION: in order to gain access to the electrical control unit you have to open the cover using the appropriate key after switching the main switch to OFF position and releasing the connector to the control pedestal. This operation completely cuts off the electric supply to the machine, in accordance with current standards.

ATTENTION: if for any reason you have to work on the electrical control unit you are recommended to shut off the electric circuit to the machine completely by physically disconnecting it from the electric supply.

ATTENTION: remember that any work on the electrical control unit must be carried out by trained authorised personnel.





Figure 8 - 9

8.3 Description of the control pedals for the drive rolls

The control pedals for the drive rolls are located on the base of the support pedestal for the digital control panel. These pedals are used to control the rotating movement of the drive rolls by determining their direction of motion. By pressing the pedal on the left marked with the symbol \leftarrow you will have the rolls rotating anti-clockwise and if you press the right-hand pedal marked with the symbol \rightarrow the rolls will rotate clockwise.





FIGURE 8 - 10

Optionally, the machine may be fitted with a special type of pedal unit equipped with a built-in emergency control which is directly operated by foot pressure. This additional emergency control operates in exactly the same way as the main emergency control located on the control panel. The additional emergency control is actuated when the foot exerts a greater pressure on either the right or left-hand pedal.



FIGURE 8 - 11

The result of operating these emergency controls is that the machine's operational functions are immediately shut off and the RED LIGHT on the control pedestal will OFF. To deactivate the emergency pedal, through the holes in the pedal housing (see Figure 8 - 10), press the reset button corresponding to the pedal operated to effect the emergency shutdown. If the emergency is successfully cancelled, you will note that the RED LAMP on the EMERGENCY is ON and you can restart your work.

8.4 Connecting the machine to the electric supply

The PB 70/2 H is provided with a three-phase AC motor of the multi-voltage type (see also the specifications and the connection system shown in the electric circuit diagram attached to this manual. The Motor operates the drive rollers by means of a suitable reduction gear. As the motor are used to operate the left and the right side you should pay scrupulous attention to the instructions below when connecting the machine to the electric supply.

8.4.1 Procedures for connecting the machine to the electric supply

- 1. Check that the main switch on the machine is in the OFF position;
- 2. Insert the multi-pole plug for connecting the control pedestal into the appropriate multi-pole socket located in the bottom of the machine bedplate (Figure 8 7);



FIGURE 8 - 12

3. Connect the supply cable for the machine to an approved electric plug of a suitable capacity;

4. Insert the machine's electric plug in the socket of an electrical control unit fitted with a thermo-magnetic circuit breaker and differential; at this stage make sure that the voltage supplied by the electrical control unit is that for which the machine is preset;

5. Actuate the main switch on the machine by turning the lever to the ON position; (Figure 8 - 3) the operation will be indicated by the red light on the machine's control panel;

6. Enable the machine's drive rolls by pressing the left pedal (indicated by \leftarrow) and check that the driven rolls are actually rotating anti-clockwise.



Figure 8 - 13

If the rolls are rotating in the wrong direction (clockwise), check the wiring in the plug and reverse the phases as required to obtain the correct rotation of the driven rolls as illustrated.

ATTENTION!!!

In case the direction doesn't correspond to the arrow because of the rotation of the hauling matrices, disconnect the machine from the voltage and invert one of the three feeding-phases, since the direction of these three phases R-S-T determines the rotation direction of the matrices.

8.5 Change of feeding voltage

The machine works with a 230 V or 400 V voltages according to the customer's request.

The requested voltage can be checked on the TYPE plate

However it is possible to modify the voltage following the here mentioned operations and referring to the Figures 8 - 14, and 15.

Also this operation must be effected by competent people only.

ATTENTION!!! If for any reason you have to work on the electrical control unit you are recommended to shut off the electric circuit to the machine completely by physically disconnecting it from the electric supply.



Figure 8 – 14

8.3.1 230 V DELTA Connection

- Remove the motor base and execute the star connection;
- enter the circuit under the control board as indicated in the previous paragraph;
- move the feeding cable of the transformer into the 230 V-marked seat;
- regulate the Thermic cut for the Main and Pump motor out till the 4.7 A amperage (Figure 8 – 16 and table 8 - 1).

Attention!!! If the THERMO-MAGNETIC CIRCUIT BREAKER doesn't cover the range you need to adjust, you have to replace the circuit breaker which covers the desired range.



Figure 8 - 15

8.3.2 400 V STAR Connection

- Remove the motor base and execute the triangle connection;
- enter the circuit under the control board as indicated in the previous paragraph;
- move the feeding cable of the transformer into the 400 V-marked seat;
- regulate the Thermic cut for the Main and Pump motor out till the 2,8 A amperage (Figure 8 – 16 and table 8 - 1).



Figure 8 – 16

Amperes	400V	230V
pump	2,8	4,7
motor	2,8	4,7

TABLE 8 - 1: ADJUSTMENT VALUES FOR THERMO-MAGNETIC CIRCUIT BREAKER

9. ROLLS

9.1 Types of rolls

9.1.1 Standard rolls

The machine is fitted with standard rolls which can be adjusted to bend the most common types of commercial sections (see also Section 11 "Possible Bending" on Page 34).

9.1.2 Special rolls

If you need to bend special sections RHTC is able to supply a wide range of special rolls (optional) to meet your requirements. In such cases you are advised to consult RHTC to obtain your supplies of these accessories as otherwise the warranty conditions will be invalidated with immediate effect and, as a result of this improper use, RHTC will not accept responsibility for any malfunction which can be attributed to the use of non-original rolls or at any event rolls not supplied by the manufacturer of the machine.

When mounting the special rolls on the machine you must make sure that they exceed the useful length of the shaft so that they can be secured by the nuts. If mounted these rolls do not exceed the useful length of the shaft you will have to use part of the rolls supplied as standard to secure them on the shafts.

9.2 Mounting and removing rolls



WARNING:

these operations must only be carried out when the machine is disconnected from the electric supply!







9.2.1 Lower shafts

Once you have disconnected the electric supply these shafts remain locked and you can therefore unscrew the nut (see illustration above) which holds the rolls in place using a standard spanner, size 36.

Now remove the rolls and, after reassembling them in the correct sequence for the next job, tighten the locking nut, using the spanner again.

9.2.2 Upper shaft

The pressing shaft is idle, so to carry out its blockage, observe the following instructions:

- 1. to release the holding nuts of the matrices is necessary to act on the blockage pin of the shaft as indicated in the Figure 9 1 and in the following instructions:
- 2. push the pin using a screwdriver and turn the shaft acting on the blockage nut of the matrices: the pin will sink into the suitable seat and will prevent the shaft wheeling;
- 3. after having composed the matrices, screw again the blockage nut pushing light the blockage pin of the shaft (always using a screwdriver).



FIGURE 9 - 1

4) by removing the screwdriver wheel the shaft to the suitable direction to lead the pin to the initial position. Doing so the shaft will be idle again.

ATTENTION: Before doing other operations verify that the shaft can wheel freely.

10. INSTRUCTION FOR ARRANGING THE ROLLS

The set as STANDARD consists of:

• rolls and distance spacers iin a range of sizes, as illustrated in Figure 10 - 1.

These accessories are specifically designed to provide the possibility of multiple combinations, which allows the greatest versatility in the bending of a wide range of sections.



FIGURE 10 - 1

	FIRST	ROLL lower	DISTANCE ROLLS	LAST upper	ROLL lower
Diameter of rolls in mm	152	162	74	152	162

D is the aluminium distance spacer and the quotas are expressed in millimetres (mm).

With regard to the sequence of rolls shown in Figure 10 - 1, the "first roll" means the one on the left in the illustration and the "last roll" is the one on the far right.

As can be seen in the illustration, these rolls can be fitted in two ways, depending on the position of the groove; the **first roll** may be fitted with the 2 mm groove on the inside (as in Figure 10 - 1), in which case this roll is identified as **"R2"**, or with the groove on the outside, in which case this roll is identified as **"R0"**. The same applies to the **last roll**: if the 4 mm groove is on the inside (as in Figure 10 - 1) this roll is identified as **"R4"**, otherwise it is **"R6"**.

For example, the arrangement for the working of a section with a thickness of 10 mm (Figure 10 - 2) is shown below, where the fitting arrangement can be specified as follows:

Thickness of section	First roll	Distance rolls	Last roll
10 mm	R2	18.3 mm	R6





If during the bending operation the material becomes deformed due to excessive friction with the rolls, you can avoid this problem by adding a suitable number of 1 mm (distance) spacers, as supplied with the standard set of equipment, to the distance rolls as appropriate.

11. POSSIBLE BENDING

Table below shows two different types of bending operation, as follows:

O STANDARD ROLLS

* SPECIAL ROLLS

FOR CONTINUAL PRODUTION RUNS SPECIAL ROLLS ARE NECESSARRY

SPECIAL ROLLS: RHTC can supply these rolls to the customer's technical specification which should contain details of the typical dimensions of the section to be bent.

REF	Profil	Masse Dimension in mm	Dia int min in mm	Walzen Roller Galets
1		20 x 5 60 x 10	300 500	ο
2		50 x 10 100 x 15	300 400	0 ●
3		15 35	250 600	o
4		15 35	250 600	*
5		25 x 25 x 4 50 x 50 x 6	350 500	*
6		25 x 25 x 4 50 x 50 x 6	350 600	*
7	$\left(\begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	20 x 20 x 3 60 x 60 x 7	350 800	o
8		30 x 30 x 4 60 x 60 x 6	350 600	o
9	R	30 x 15 x 4 80 x 45 x 6	300 600	0
10		30 x 15 x 4 80 x 45 x 6	350 800	o
11	H	30 x 15 x 4 60 x 30 x 6	600 1000	o
12		10 35	250 500	*
13	600	2'' GAS 70 x 1,5	1000 1500	*
14		20 x 15 x 2 60 x 40 x 3	250 1400	0 ●
15		20 x 20 x 2 50 x 50 x 3	250 1400	0 ●
16		30 x 15 x 2 80 x 30 x 3	300 1500	*
17	T	38 50	600 800	*

12. BENDING PROCESS

NOTE: the process illustrated below is discussed in this manual before the section relating to the arrangement of the rolls (see Section 10). The user of the machine should therefore read this topic attentively before putting into practice the instructions given here. For PB 70/2 H using the foot pedal.



12.1 Notes



The sole purpose of the screw that determines the movement of the slide support is to prevent the slide from returning; it is not intended to withstand the pressing force required to bend the material.

Therefore THIS SCREW MUST NOT UNDER ANY CIRCUMSTANCES BE USED TO ACHIEVE THE FORCED DEFORMATION OF THE MATERIAL.

12.2 Procedure for starting the bend

The following instructions must be strictly observed to ensure that the machine is operated correctly:

1) start the machine and lay the material to be bent in position, threading the section between the rolls (Figure 12 - 1);



FIGURE 12 - 1

 2) stop the machine and reverse the direction of rotation of the rolls until the section to be bent moves backwards so that the corner of this section is in the position shown by A in Figure 12 - 2, then let down the compression roll until it comes into contact with the material



FIGURE 12 - 2

3) stop the machine again and reverse the direction of rotation until the machine is in the position shown in Figure 12 - 3, moving between the rolls. As it does so, the section will begin to bend without the operator having to operate the compression die further;



FIGURE 12 - 3

4) repeat points (2) and (3) in sequence as described above, referring to Figures 12 - 2 and 12 - 3, by lowering the compression roll in the first of the two stages until the desired curvature of the workpiece is obtained (Figure 12 - 4).



FIGURE 12 - 4

13. LATERAL STRAIGHTENERS



FIGURE 13 - 1

13.1 Use

Lateral straighteners are used:

 to obtain spirals (helicoidal sections) and coils, particularly with tube section (both square and round) if the pitch of the spiral is more than twice the size of the side or the diameter of the tube; this type of process is carried out by pushing the work piece forward by an amount equal to the angle of the helix or the pitch to be obtained. In this case it is advisable to work with the rolls of the roll-bending unit in vertical position (see also Section "Positioning the roll-bending unit");

or

for stepping, as a guide when working on sections which tend to kink or deform in the direction of the straightener itself. This phenomenon mainly occurs in "L" and "Z" shaped bars or box sections. In this case the straightener acts to correct the undesirable tendency to deform and holds the work piece in the correct working position, thereby minimising the lateral deviation of the pieces being bent.

There are several ways of adjusting these straighteners in relation to the basic position shown in Figure 13 - 2 below:



FIGURE 13 - 2

to the ideal position for the job to be done (spiraling/stepping); this adjustment is made by means of the appropriate mechanical devices on the straightening rolls until the rolls are in the positions as shown in the illustration below:





It is possible to adjust the lateral straightening rolls in order to correct any inaccuracies which may arise from curvatures which cause deviations from the linearity of the workpiece as a result of the lack of internal homogeneity which is always present in cheap materials.

NOTE: Where the lateral straighteners are not required for use in the job in hand, make sure that these rolls will not interfere with the section to be bent.



14. SPECIFICATIONS FOR THE HYDRAULIC SYSTEM



Three-phase electric motor: 400V, 50 Hz, 4 poles, 1,450 rpm, output 0.75 kW. Gear pump: cubic 1.0 cm³, flow rate 2.5 l/min, max. operating pressure 180 bar, max. pressure bar.

Oil tank: 2.5 l.

15. SPECIFICATIONS FOR GEAR MOTOR

15.1 General data

Motors:	Power	1.1 kW
	Speed	89.6 rpm
	Ratio	1:15.4

Reduction units: RE series with double reduction



15.2 Table of spare parts

Reference No.	Name
1	drive housing (stator)
2	drive shaft (rotor)
3	gear cover
4	bearing
5	snap ring
6	packimg ring
7	fast pinion
8	slow wheel

Reference No.	Name
9	gasket
10	gear casing
11	spacer
12	snap ring
13	bearing
14	distance case
15	bearing
16	slow shaft
17	snap ring
18	packing ring
19	bearing
20	reduction wheel 1
21	snap ring
22	pinion countershaft
23	bearing
24	snap ring
25	lubrication ring
26	spacer
27	distance ring
28	locating pin
29	oil filler cap
30	oil level and drain plug
31	rear plate
32	distance ring

15.3 Design characteristics

The reduction unit is provided with a special "for life" lubrication system which uses synthetic oil and therefore does not need to be lubricated on a regular basis; however, in the event that the lubricant has to be topped up, use only IP Telesia Compound A or Shell Tivela Compound A; the total oil capacity is 0.2 litre.

This lubrication system acts continuously on the two pairs of permanently engaged gears with parallel axes in which the "fast" pinion is mounted directly.

on to the drive shaft and the "slow" wheel on to the outgoing shaft coaxial to the fast one (compare the illustration below).

The casing is made from a robust casting of engineering cast iron, fitted with "feet" to secure it to the bearing structure.

The gears are cylindrical with helicoidal teeth, cut in high-tensile, treated steel alloys.

Packing rings of the highest quality and careful finishing of the seats and work on the shafts combine to seal in the lubricant and prevent dust or foreign bodies from entering the reduction unit.

As lubrication is used as the lubricant, the gear motor can be operated either in horizontal or in vertical position. The bearings which support the motor are lubricated with grease and therefore do not need to be lubricated during their service life.

The control panel is equipped with suitable devices which protect against overloads and must be specially adjusted if the power supply is to be changed from 230V to 400V and vice versa as specified in the appropriate section.



FIGURE 15.1: SECTIONAL VIEW OF SERIES RE GEAR MOTOR

16. ROUTINE MAINTENANCE AND CLEANING



WARNING!!!

Any maintenance, repair or cleaning operations must be carried out with the power supply disconnected and in well-lit conditions (*minimum illumination required 300 lux*). It is strictly forbidden to use compressed air for cleaning.

16.1 Maintaining the machine's mechanical components

The maintenance operations specified for the machine in question have been planned so as to reduce the time spent on this work. To this end, the bearings have been installed preloaded in order to minimise the play and vibration caused by the machine's rotating parts.

The machine must be cleaned regularly to prevent dirt, shavings or anything else from causing damage due to the seizing up of rotating parts (bearings and gears) or internal parts (slides, etc.)

The normal maintenance operations required are described below.

16.1.1 Greasing of bearings

Operation to be carried out after 800 / 1,000 hours of service(or 9 months), by removing from their seats the gaskets which protect the bearings. Use synthetic grease or a similar product.

(Bearing MP/2 Chemical grease)

16.1.2 Lubricating the gears

Operation to be carried out after 700 hours of service (or 9 months), using a lubricant which is suitable for temperatures between 30°C and 140°C, anticorrosive, protective and water-resistant.

16.1.3 Hydraulic system

First replacement of the hydraulic oil after 100 hour then every time after 3000 hour but at least one time a year

Type of the hydraulic oil: HLP 46 or similar Oil

16.1.4 Maintaining the slide support rails

Wherever they are found, clean off scale deposits left by the material worked on the slide support rails to prevent this scale from causing these parts to seize up. Lubricate the rails thoroughly after every 500 hours of operation (or 9 months).

16.2 Disposal of parts



NOTE: used oil and lubricant must be disposed of in accordance with the legislation in force in the country in which the machine is installed.

If all or part of the machine is disposed of, the parts to be disposed of should be collected and sorted (for example, iron with iron and plastic with plastic).

These parts must also be disposed of in accordance with the legislation in force in the country in which the machine is installed.

17. UNSCHEDULED MAINTENANCE

17.1 Adjusting the slide support

If any play occurs in the movement of the slide support on the upper shaft or when irregular sliding of the slide support on the rails is noted, this device has to be adjusted as described and illustrated below:



FIGURE 1 - 1

- After disconnecting the machine completely from the electric supply and switch off the main switch, remove the rear casing and position the slide support at the maximum limit of its upstroke so that you have room to handle around the part shown in the illustration;
- Next use a spanner to loosen the 4 nuts shown in the detail in Figure 17 1; Loosen the 4 adjusting worm screws using an Allen -hexagonal- key until the desired sliding rate is obtained;
- Tighten the 4 nuts with the spanner;
- Before proceeding to replace the rear casing, check that the slide support is sliding evenly over its entire stroke.

Replace the rear casing on the roll-bending unit.