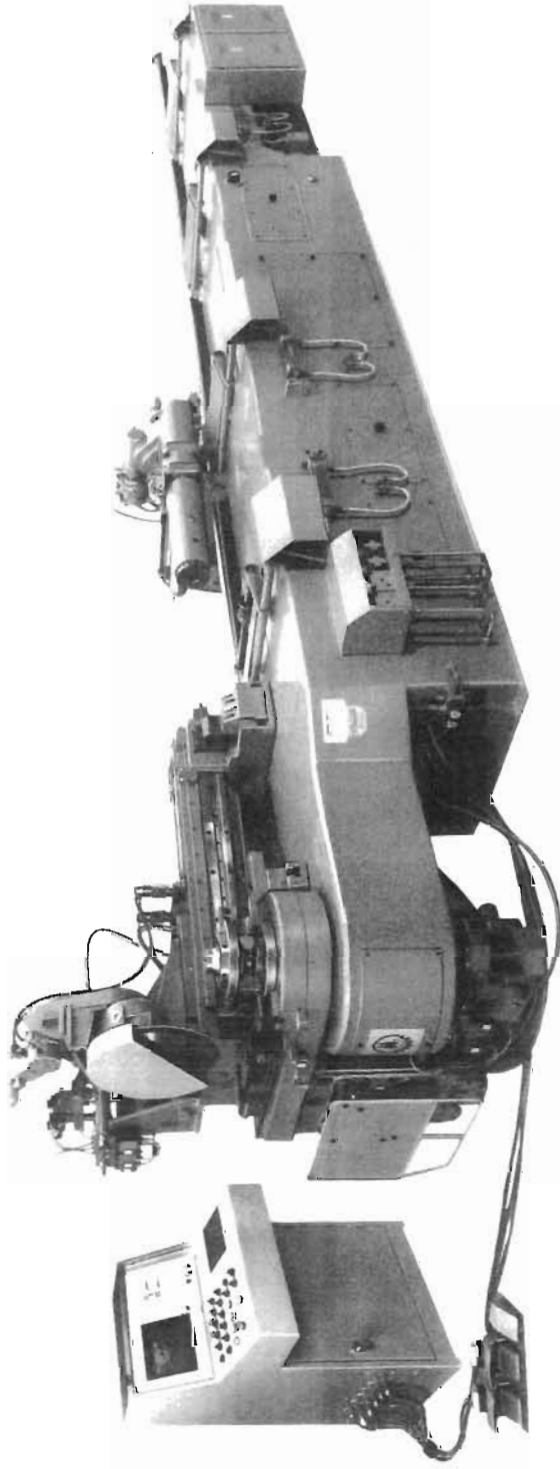




**CNC CONTROLLED BOOSTER
BENDING MACHINES FOR BENDING
WITH AND WITHOUT MANDREL
WITH TUBE POSITIONING DEVICE**

PREFERABLY FOR MANDRELLESS BENDING

These booster benders guarantee a most economical production of single bends as well as mass production.



**80
Type CNC 100 DB**

for mandrelless bending with automatic saw and split bending tool

A flip-over table can be supplied for the production of flat superheater coils.

Additional reduction in production costs can be achieved by means of further accessories, like tube loading device and automatic cutting saw.

APPENDIX F

APPRAISAL OF EQUIPMENT

A world-wide survey of computerised bending equipment was undertaken by Fabrication. The appraisal of this equipment is summarised as follows.

1. Schwarze-Wirtz
Perfekt CNC 80 DB

This bending machine offers the most preferred features which include mandrelless bending, increased tube handling and cutting equipment. All aspects are highly developed and are in practical use in most European Tube Fabricators.

2. Yamamoto, Japan
Yamasui YPB-704

This machine was carefully studied as we already have a similar machine. However, the additional features required to gain maximum production have not been developed to the same extent as Scharze-Wirtz machines.

3. Pongrass - Aust.
100H-3

This company has not had the necessary experience in mandrelless bending and material handling and cut-off devices. Long development period required in Pipe Fabrication's Newcastle Works at an unknown cost.

4. Wickman Aust.
Teledyne Pines
E.N.C. 100

This company is not prepared to offer tube loading or cut-off equipment. Also tooling costs

are extremely high.

5. I.H.I. Japan
NC DB 100N

As above plus insufficient technical data to fully assess performance.

6. Elliott Machine Tools
Power Bend (U.K.)
C.N.C. PB 120

This machine is only capable of handling tube up to 7 metres long. We require 13 metres. This would involve additional butt welds.

The recent overseas visit by a Fabrication Engineer confirmed that the German Company, Schwarze-Wirtz had developed bending technology and associated equipment far in excess of other manufacturers, hence the preference given to this supplier, to enable immediate utilisation once installation is complete.

**Our Booster Benders Solve Your Problem,
BUT WITH NC-BOOSTER BENDERS STILL MORE ECONOMICAL**

Here below some advantages of the booster bending system:

a) Manufacture of Tight Bending Radii

The booster bending system facilitates the manufacture of very tight bending radii (1,2 O. D.) through which, e. g. boilers with higher capacity can be manufactured in smaller dimensions. Furthermore, bending of thin-walled tubes under use of a mandrel to tight radii is possible, because the booster bending relieves the outer wall of the tubes.

b) Use of Long Tubes


The booster bending system further enables the use of very long tubes since no mandrel is required, i. e. long tubes can be welded together behind the machine and bent to a finished system. This eliminates the matching procedure. Because our NC-booster benders are equipped with tube positioning unit, it is still easier to handle these long tubes.

c) Bending Tolerances

The booster bending system also guarantees to keep the tolerances for wall thinning as well as ovality within limit, i. e. when bending a radius of 1,2 O. D. the max. wall thinning is 10–12 %, and max. ovality approx. 7 %.

d) Lower Manufacturing Costs

Our NC booster benders offer a data input system for bending angle, angle of rotation, and tube feed. Input of these informations can be carried out through decade switches, punched tape, cassette, or data centre. After tube loading, the complete manipulation of tube up to a finished system is done automatically. This means a high saving in labour cost, high accuracy, and repeatability. For flat heavy super-heater coils a flip-over table is also available. Tube loading device, cutting saw, and take-off unit save further operational cost. These benders offer you a most economical operation in piece work range as well as in mass production.

Technische Daten:	Technical data	NC 80 DB
Max. Leistung: Rohr- ϕ x Wandstärke, Zugfestigkeit: 70 kg/mm ²	Max. capacity: Tube o.d x wall size. Tensile strength: max. 70 kg/mm ²	89 x 5 mm
Max. Widerstandsmoment:	Max. modulus of section:	26,2 cm ³
Min. Rohr- ϕ :	Min. tube o/d:	25 mm
Max. Biegeradius bis Rohrmitte:	Max. bending radius up to centre of tube:	250 mm
Min. Biegeradius:	Min. bending radius:	50/1,2 x D mm
Max. Rohrlänge (Standard):	Max. tube length (standard):	4000 13000 mm
Max. Biegewinkel: (Genauigkeit $\pm 0,2^\circ$)	Max. bending angle: (Accuracy: $\pm 0,2^\circ$)	200° U/Min. RPM t/min.
Max. Biegeschwindigkeit: Vorlauf (stufenlos regelbar): Rücklauf (konstant):	Max. bending speed: Forward (steplessly adjustable): Return (constant):	3 5
Hauptpumpenmotor für Biegefunktion:	Main pump motor for bending function:	18,5 kW
Motor der Ölumwälz- und Zusatz- pumpe für Nebenfunktionen:	Motor of pump for oil circulation and auxiliary functions:	15 kW
Ölbeheizung (autom. Funktion):	Oil heater (automatic function):	2 x 1,9 kW
Ölkühlung (autom. Funktion):	Oil cooler: (automatic function)	Wasser/Water/Eau
Hydraulische Rohrpositionier- vorrichtung	Hydraulic tube positioning device:	
Max. Wendewinkel: (Genauigkeit $\pm 0,1^\circ$)	Max. reversing angle: (Accuracy: $\pm 0,1^\circ$)	360°
Wendegeschwindigkeit: Schnellgang stufenlos regelbar:	Reversing speed: high speed (steplessly adjustable):	0-8 U/Min. RPM t/min.
Max. Verfahren des Vorschubwagens: (Genauigkeit $\pm 0,5$ mm)	Max. track length of feed carriage: (Accuracy: $\pm 0,5$ mm)	4000 mm
Max. Verfahrensgeschwindigkeit: Schnellgang stufenlos regelbar:	Max. speed of feed carriage: high speed (steplessly adjustable):	0-40 m/Min.
Gewicht der Maschine einschl. Positioniereinrichtung: ca.	Weight of the machine, inclusive of positioning device: approx:	10 500 kg