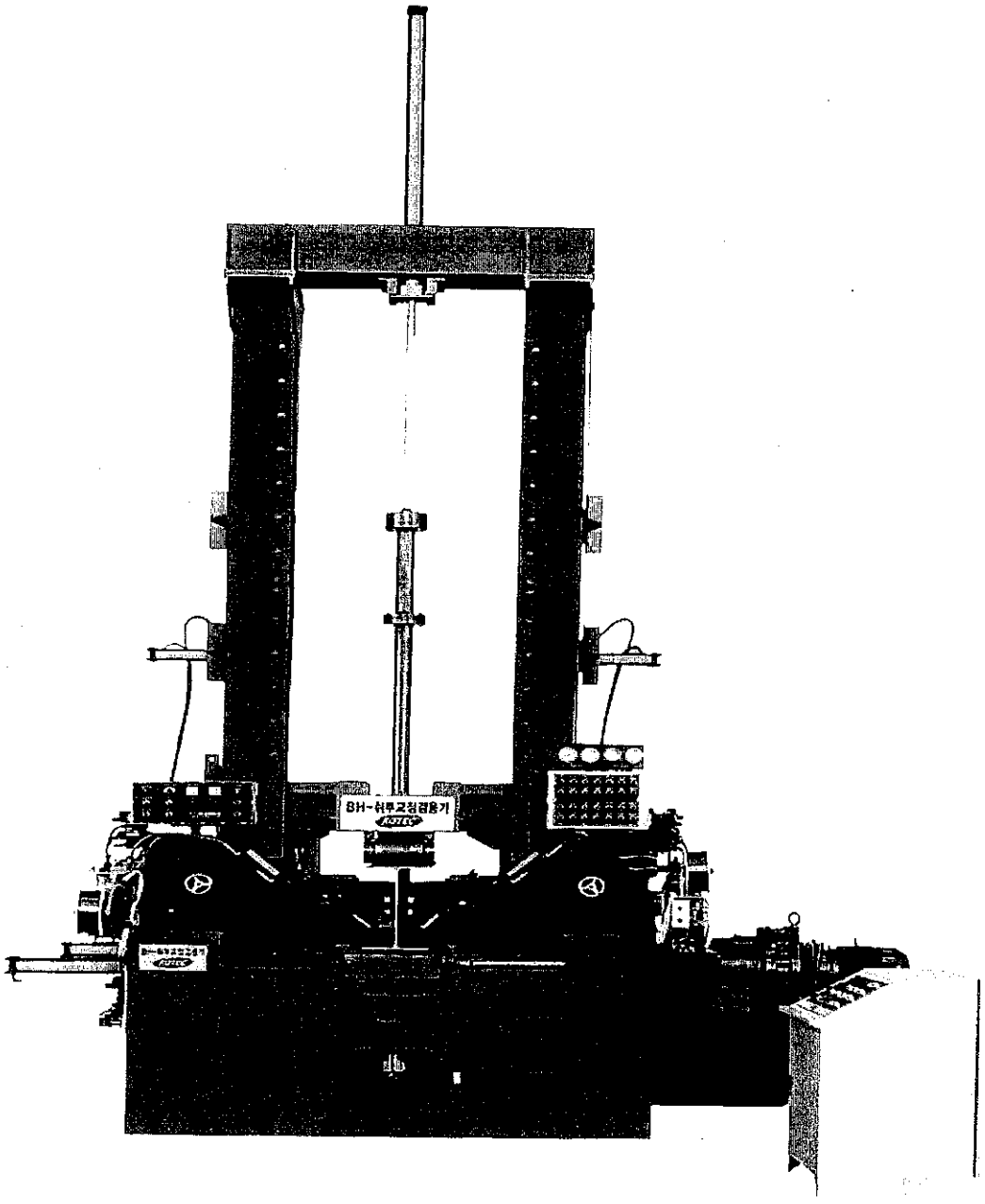
BEAM WELDING & STRAIGHTENING MACHINE
KDS-2500
Technical Proposal



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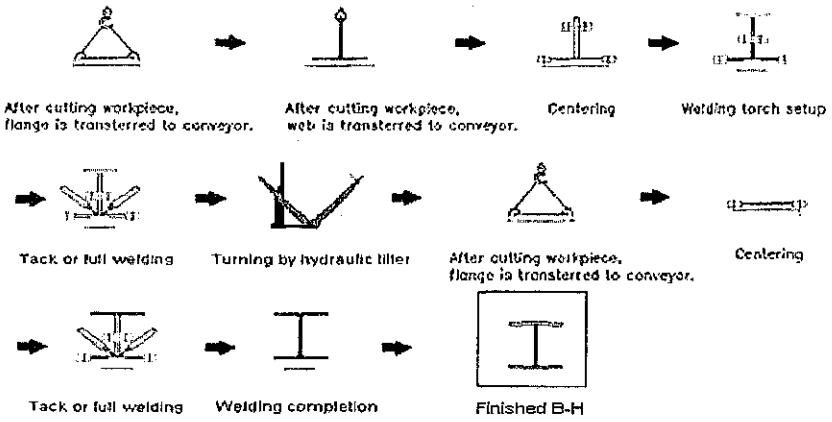
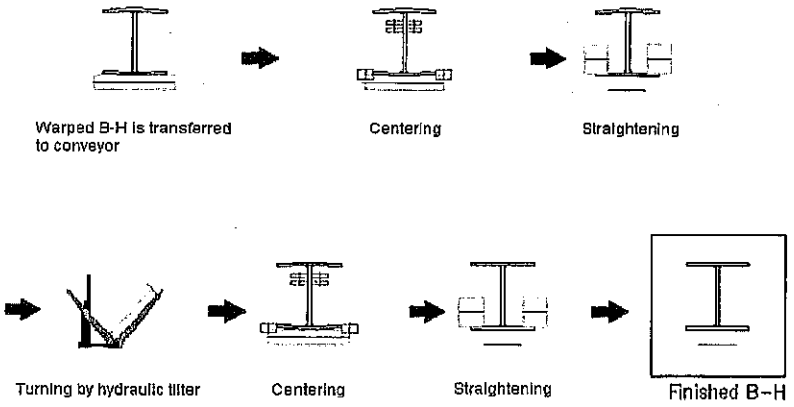
1. Introduction

This machine is totally designed, manufactured, installed and fist commissioned by KOTEC. To produce built-up H-beam or camber beam for the structural steel industry, KDS-2500 is combined machine which is capable of welding and straightening H-beam simultaneously. This combined machine will be useful for customer that has short workshop space.

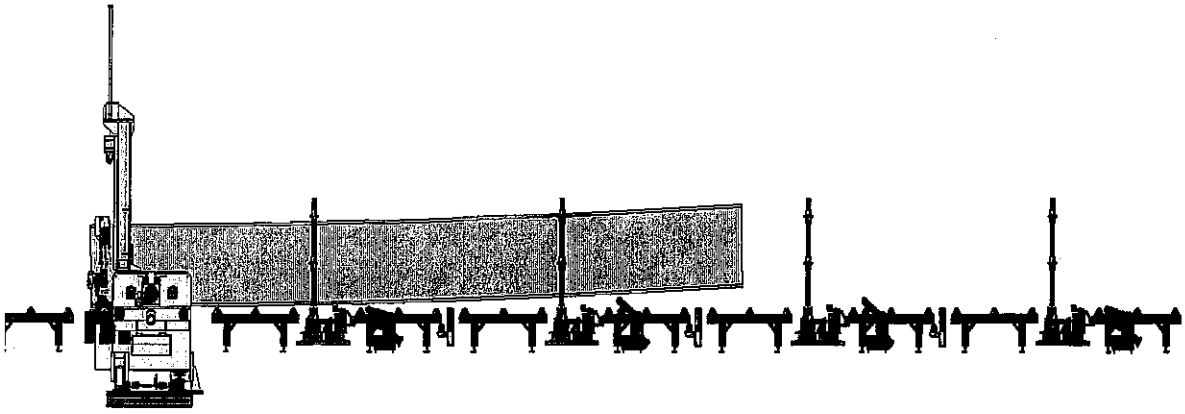
A. Beam welding



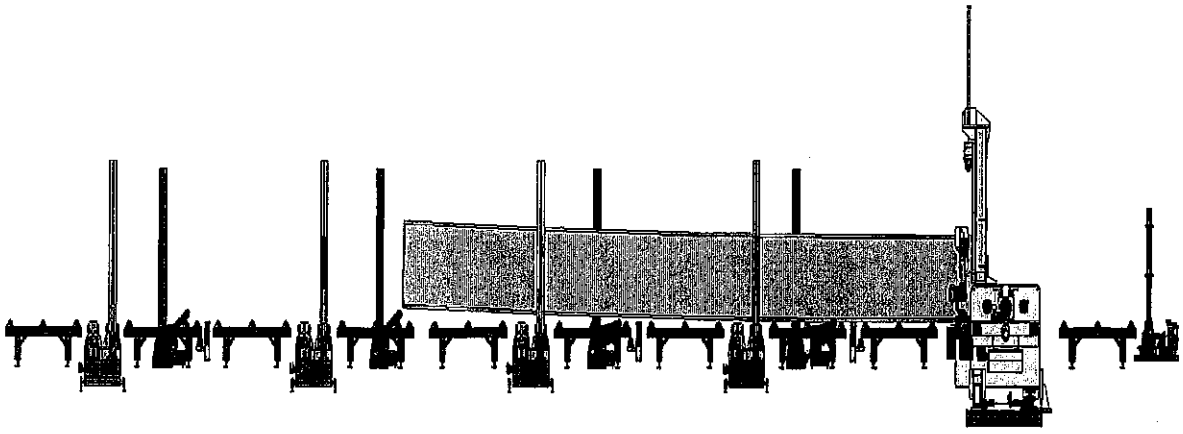
B. Straightening



2. Schematic diagram of Cambering job



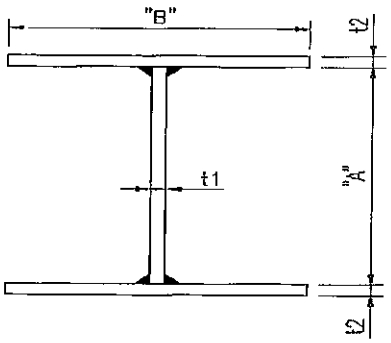
(Fig. 1 : Infeeding of workpiece)



(Fig. 2 : Outfeeding of workpiece)

3. Capacity

A. Required workpiece

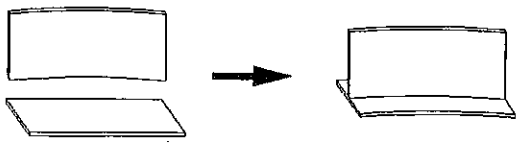


Condition	Capacity
Flange width (B)	200 ~ 800mm
Flange thickness (t2)	16 ~ 70mm
Web height (A)	320 ~ 2,500mm
Web thickness (t1)	6 ~ 50mm
Workpiece length	25,000mm

B. Wide application

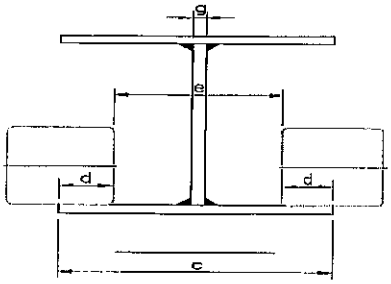
(1) Examples of various shaped working

a. Camber beam welding



b. Warped beam straightening

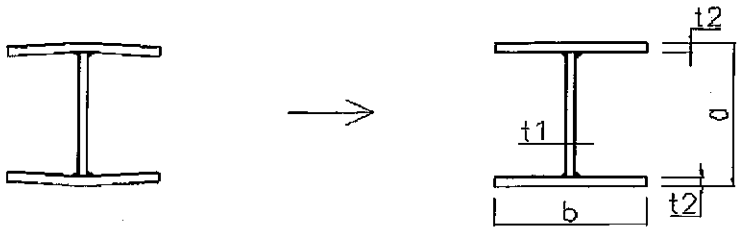
(2) Straightening principle



〈Upper & lower roll and hydraulic pressure setting talbe〉

F/T (mm)				
8	150	—	40	
	220	—	50	
10	220	—	60	
	250	—	60	
12	220	—	70	
	300	—	70	
14	450	—	120	
16	250	70 x 2	110	
	300	90 x 2	110	
	450	140 x 2	150	
	500	160 x 2	150	
19	220	60 x 2	150	
	250	70 x 2	165	
	450	140 x 2	165	
	500	160 x 2	165	
25	250	70 x 2	165	
	300	90 x 2	180	
	350	90 x 2	180	
	400	120 x 2	180	
	500	160 x 2	180	
28	220	60 x 2	195	
	250	70 x 2	195	
	350	100 x 2	195	
	400	120 x 2	195	
	400	130 x 2	200	
32	180	50 x 2	200	
	330	105 x 2	200	
	400	130 x 2	205	
40	400	120 x 2	205	
45	400	120 x 2	205	
	500	120 x 2	205	
50	400	120 x 2	210	
	500	120 x 2	210	
60	800	80 x 2	230	
70	850	70 x 2	250	

(3) Flange straightening table



Flange thic-kness (t2)	Width (b) / Type	100	200	300	400	500	600	700	800
6 ~ 16	SS41								
	SM50								
19	SS41								
	SM50								
22	SS41								
	SM50								
25	SS41								
	SM50								
28	SS41								
	SM50								
32	SS41								
	SM50								
36	SS41								
	SM50								
40	SS41								
	SM50								
50	SS41								
	SM50								
60	SS41								
	SM50								
Web height (a)		Standard : more than 380 (upper roller diameter : 330Ø)							
Straightening speed		6.3m / min – 60Hz							

C. Workpiece feeding speed

(1) Beam welding (Inverter control) : 150 ~ 25,000mm/min, 80Hz
① Feeding speed of submerged arc welding (Tentative setup) : 150 ~ 2,500mm/min
② Feeding speed of pitch (Tentative setup) : 500 ~ 6,000mm/min
③ Return speed of workpiece (Tentative setup) : 500 ~ 12,000mm/min (by conveyor)

※ Feeding speed of workpiece is temporarily set up for each ①-②-③ in consideration of working efficiency. Also, the time required for tack welding of ①-② is temporarily set up by timer on operation panel accroding to workpiece size.

(2) Straightening : 6,300mm/min, 50Hz
① 1 set of drive motor with 415V / 50Hz

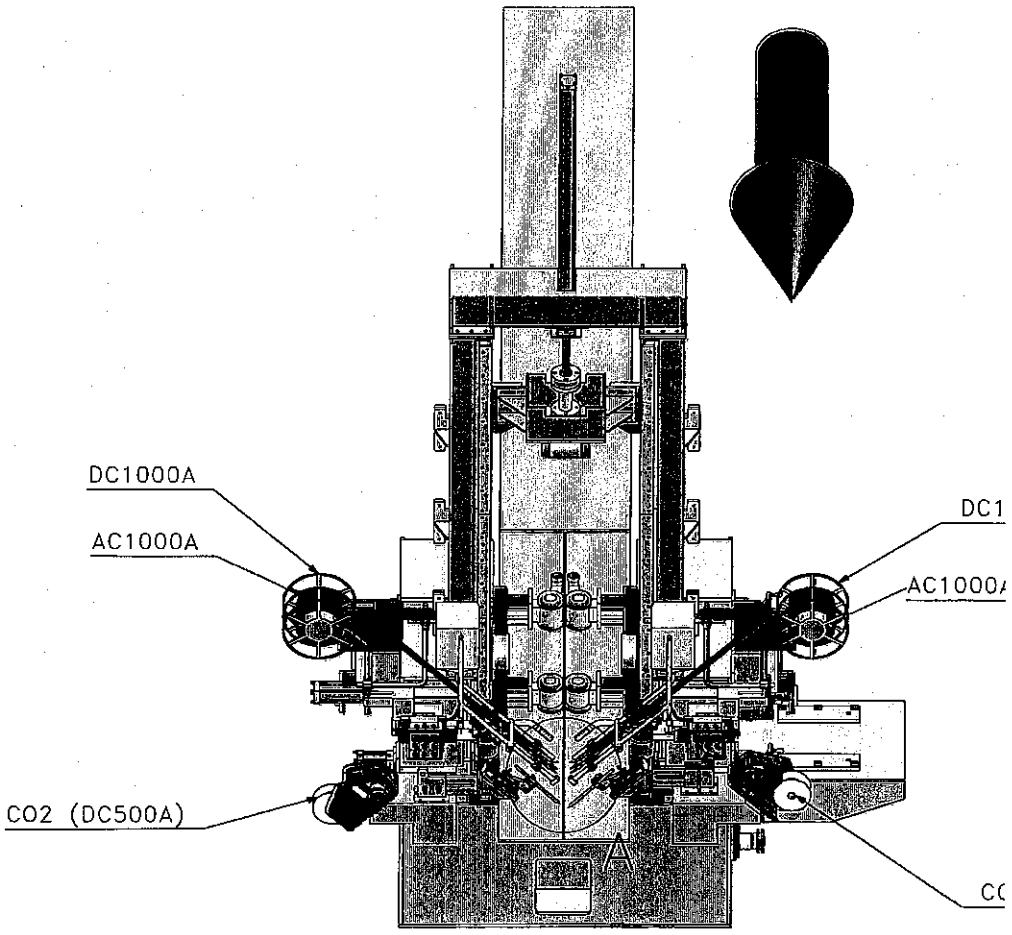
D. Electrical motor

(1) 1 set of drive motor with 415V / 11 kW / 50Hz
(2) 1 set of control & operation panel
(3) Hydraulic pressure (Max. 210Kg/㎠)
① Hydraulic pump unit (150L)
② Motor with 4P / 11kW
③ Approved by CE mark

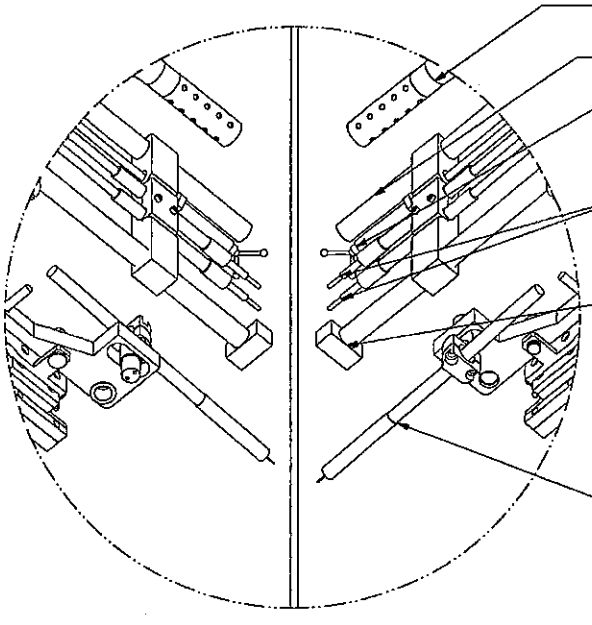
E. Automatic welding machine

(1) 2 sets of TANDEM submerged arc welding power source (DC & AC 1000A) for full welding
① Mounted 4 welding torches and seam trackers respectively on the machine
② Input voltage, phase & frequency : 3P, 415V, 50Hz
③ Rated primary input : 80KVA
④ Output current range : 400 ~ 1000A
⑤ Max. unload voltage : 80V
⑥ Rated duty cycle : 80%
⑦ Wire diameter : Ø2.4
⑧ Welding speed : 800 ~ 1,800mm/min
⑨ Approved by CE mark
⑩ Dimension : 740 x 1,070 x 1,160 (W x D x H)
⑪ Weight : 500kg per set

(2) 2 sets of CO2 arc welding power source (500A) for tack welding
① Input voltage, phase & frequency : 3P, 415V, 50Hz
② Rated primary input : 32KVA
③ Output current range : 60 ~ 350A
④ Output voltage range : 15 ~ 36V
⑤ Crater current range : 60 ~ 350A
⑥ Rated duty cycle : 60%
⑦ Wire diameter : Ø1.4 ~ 1.6
⑧ Welding speed : 3,000mm/min
⑨ Approved by CE mark
⑩ Dimension : 400 x 510 x 850mm (W x D x H)
⑪ Weight : 120kg per set

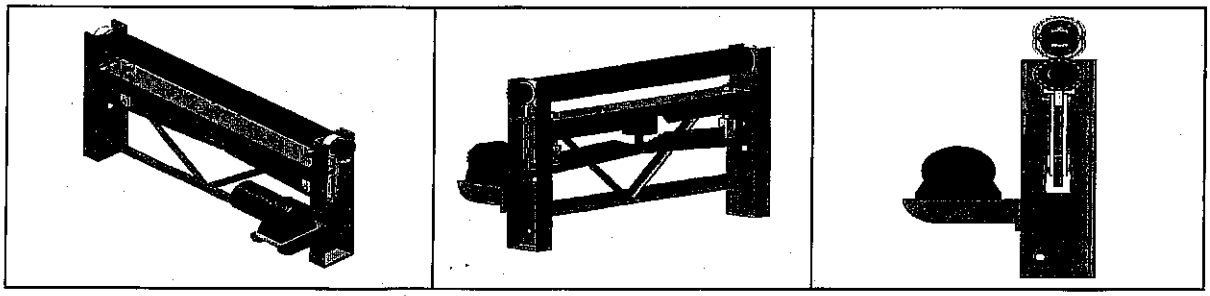


DETAILED VIEW : A (1 : 10)

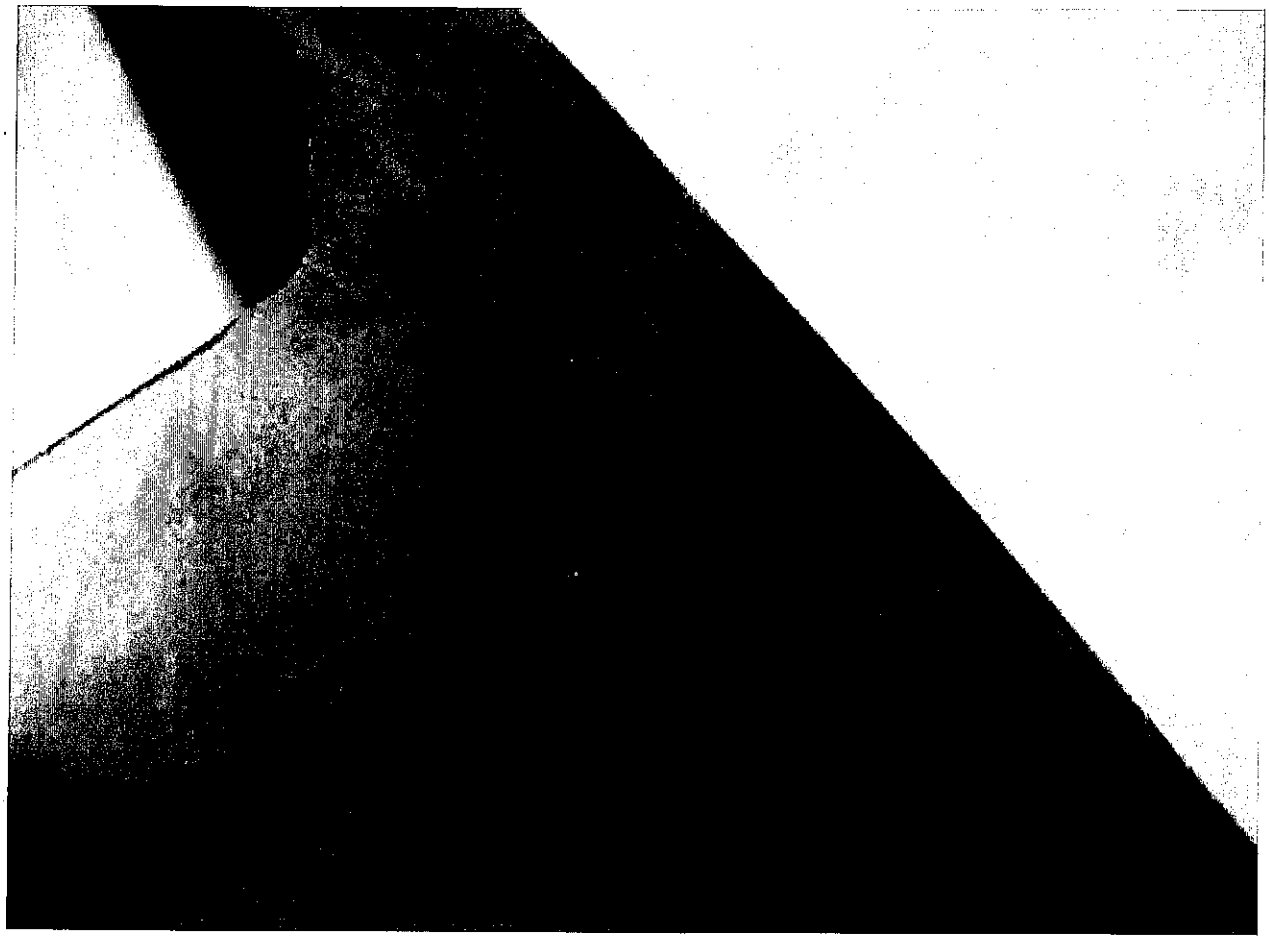


F. Loading & unloading powered rollers

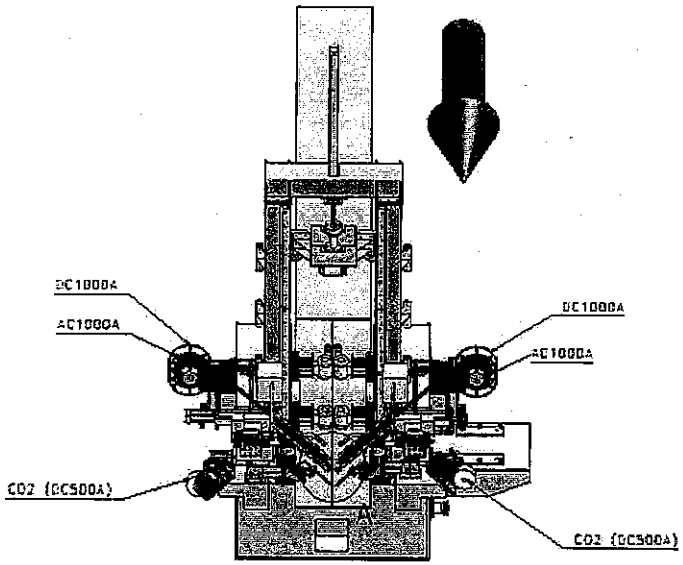
① 6 sets of drive motor with 415V / 1.5Kw / 50Hz
② Hydraulic up & down stroke : 50mm
③ Hydraulic pressure : Max. 140kg/㎠
④ Lifting power : 6,000kg per set
⑤ Feeding speed : Max. 7,800mm/min

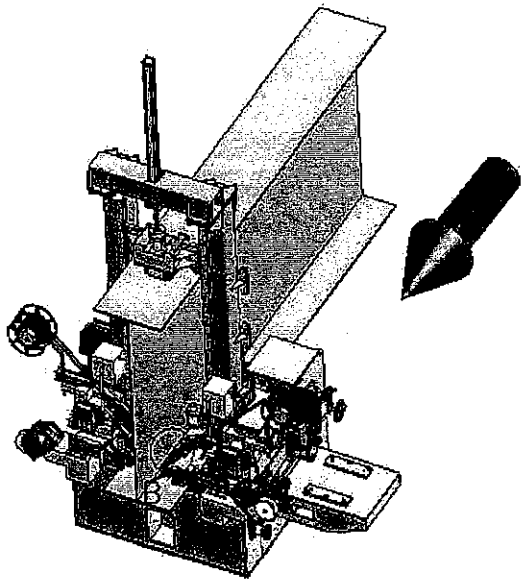


(Fig 3. Dynamic view of powered roller)

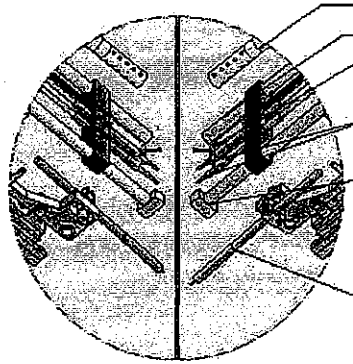


dia. 2.4mm, 2 wires, at 750A, 34V, 90cm/minute, for web 20mm, flange 12mm thickness.





DETAILED VIEW : A (1 : 10)



DETAILED VIEW : B (1 : 15)

Selectable eighter SAW(Submerged Arc Welding)
or FCAW(Flux Cored Arc Welding)

DATE	2009-06-01	TITLE	8H WELD & STRAIGHTENING MACHINE		
			08KTR10		
DESIGN	DESIGNED	CHECKED	APPROVED	SCALE	DWG. NO
N.I. (Cm)	N.I. (Cm)	----	----	1 : 30	KTAS-2500

KOTEC KUMKWANG TECH.CO.LTD

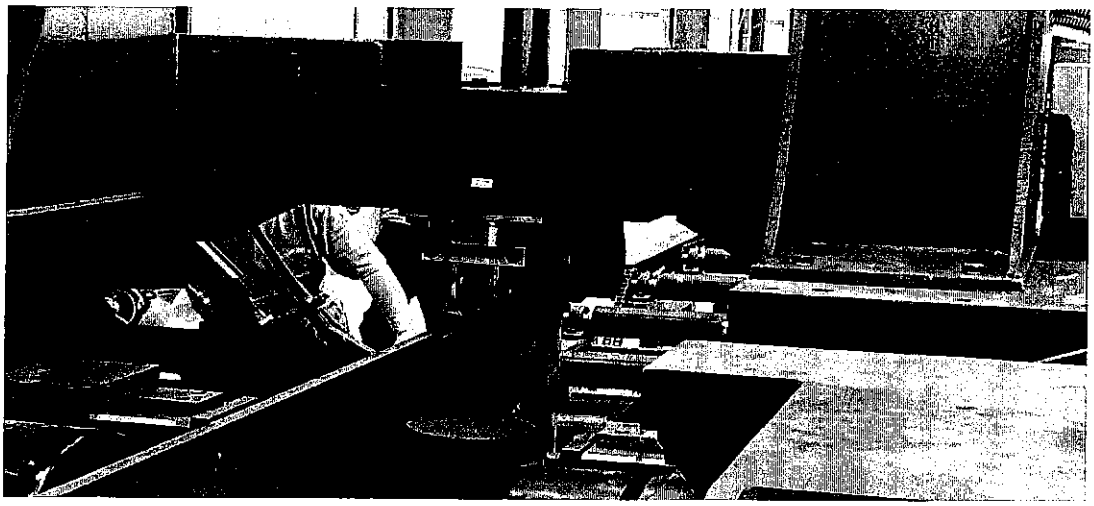
KOTEC

4. Mechanical structure

A. Machine

a. Overall dimension : 4,400 x 2,180 x 6,100mm (W x L x H)
b. Weight : 10.5 ton (without hydraulic elements)
c. Components

(1) Press roller – 1 set
This device pressurizes to fix flange and web keeping correct position when T & H beam is welded and straightened. (See Fig. 4)
① Cylinder : FA80B2300stroke (140kgf/㎠)
② Up/down speed : 150mm/sec
③ Press roller : Ø100 x 50L (web) or Ø160 x 220L (flange)



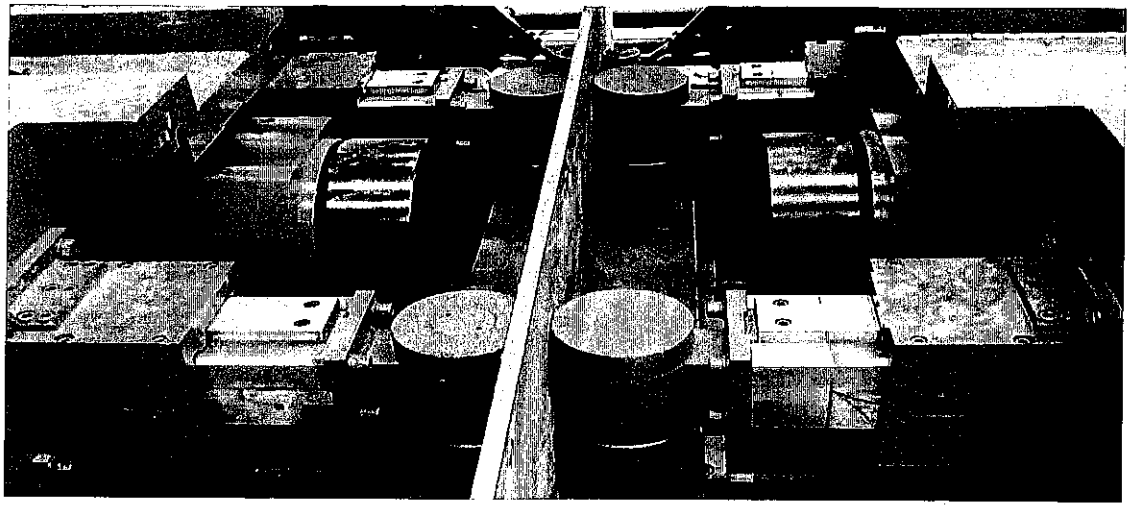
(Fig. 5 : Press roller)

(2) Upper roller – 2 sets
This device pressurized to fix flange with bottom roller for straightening.
① Transfer cylinder : FA50B400stroke (140kgf/㎠)
② Fixed cylinder : Ø80 x 50stroke (140kgf/㎠)
③ Transfer cylinder speed : approx. 50mm/sec (Adjustable in line with working conditions)
④ Fixed cylinder speed : approx. 50mm/sec (Ajustable in line with working conditions)
⑤ Upper roller : Ø280 x 140L

(3) Flange guide roller – 2 sets (One is cylinder type, the other is handle type)
① Cylinder : FA80B80st (140kgf/㎠)
② Cylinder speed : 70mm/sec
③ Handle screw : TM50 x 60pc
④ Guide roller : Ø176 x 220L

(4) Web guide roller – 2 sets (One is cylinder type, the other is handle type)
① Cylinder : FA80B400st (140kgf/㎠)
② Cylinder speed : 70mm/sec
③ Handle screw : TM50 x 6pc
④ Guide roller : Ø176 x 220L

(5) Bottom roller – 1 set
① Cylinder : Ø300 x 90st (210kgf/㎠) – Produced by KOTEC
② Cylinder speed : 39.63mm/min
③ Bottom roller : Ø400 x 220st
④ Drive motor : 11kW / 289:1
⑤ Drive speed : 7.6mm/min
⑥ Driven chain : RS#80 double
⑦ Driven sprocket : RS#80 x 35NT



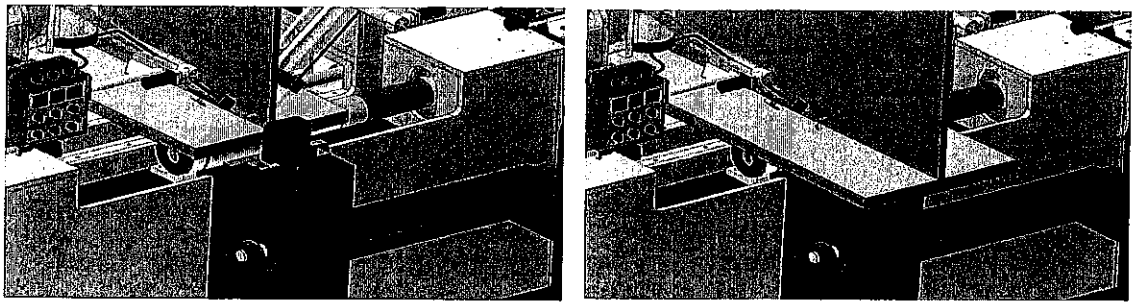
(Fig. 6 : Web guide roller)

(6) Hydraulic elements (Max. pressure : 250kg/㎝)
① Hydraulic pump – 1 set
② Hydraulic motor with 11kW / 380V / 60Hz – 1 set

(7) Stopper

In case of infeeding workpiece to weld, safety stopper enables it to be firmly aligned in line with welding starting position. It functions as hydraulic up/down.

① Cylinder : FB50 – 160 stroke (140kgf/㎠)



(Fig. 7 : Working principle of stopper)

(8) Screw jack – 4 sets

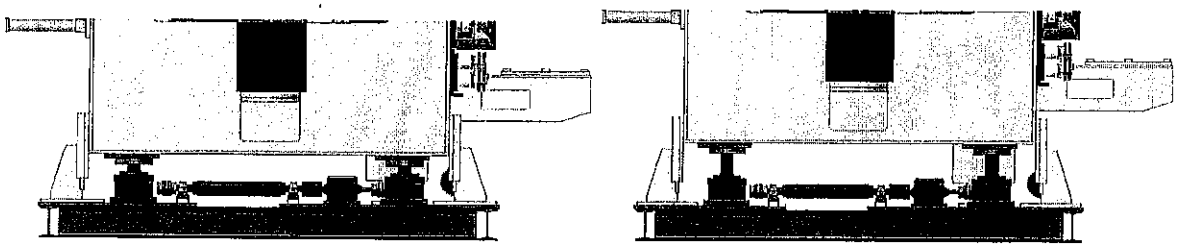
For cambering job, 2 sets of screw jack pushes up the machine like below figure.

① Pressing capacity : 80 ton

② Screw jack : 300 stroke

③ Motor : 5.5kW (Reduction ratio – 11:1)

④ Gear box : Model ES 8M/B – II – LR



Before pushing up

After pushing up

(Fig. 8 : Working principle of screw jack)

B. Centering device – 4 sets

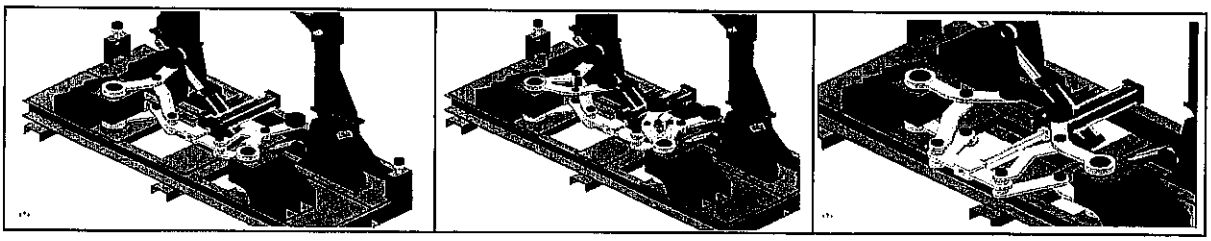
As hydraulic up/down system, this device centers web plate on the middle of flange. Its quantity is subject to change depending on workpiece length.

How to center workpiece : Flange is put in the middle of conveyor keeping lying position and web is fixed in the middle of flange while it is standing on flange. Keeping opened condition for feeding workpiece to conveyor if hydraulic cylinder moves forward, flange is fed and centered on conveyor if cylinder for flange centering comes into operation. Next, web is fed by crane and standing web is fixed in the middle of already centered flange by means of cylinder for web centering.

(1) Flange centering

① Cylinder : FY80 – 400 stroke (140kgf/㎠)

② Guide roller : Ø125 – 60L

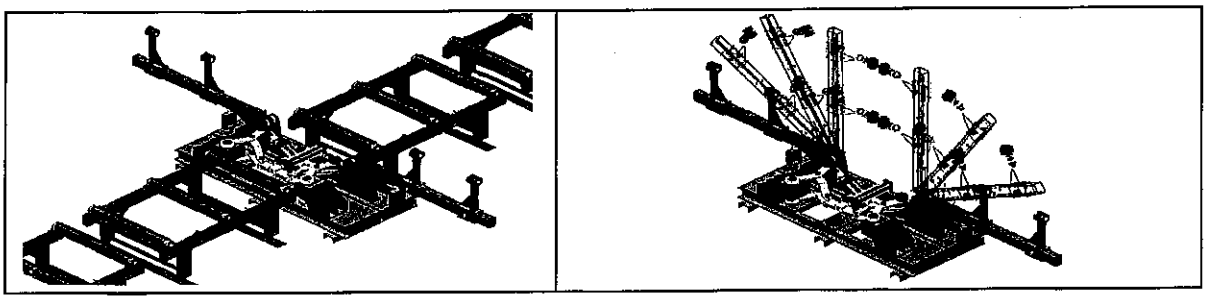


(Fig. 9 : Flange centering)

(2) Web centering

① Cylinder : TA80 – 280 stroke (140kgf/㎠)

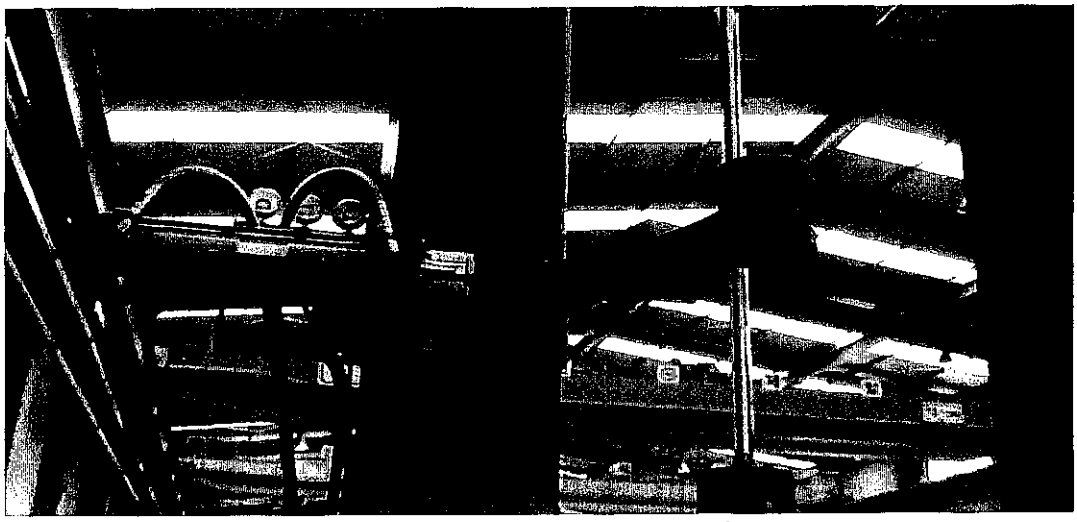
② Guide roller : Ø125 – 40L



(Fig. 10 : Web centering)

(3) Auxiliary centering device

Apart from 4 sets of centering device mounted on conveyor, auxiliary centering device equipped with the machine enables workpiece to be completely fixed in harmony with 4 sets of main centering device. In the event of web height of workpiece comes to over 15,000mm, it may be unbalanced or fall down because main centering device is too short (approx. 800mm) to fix such long size of workpiece.



(Fig. 11 : Auxiliary centering device)

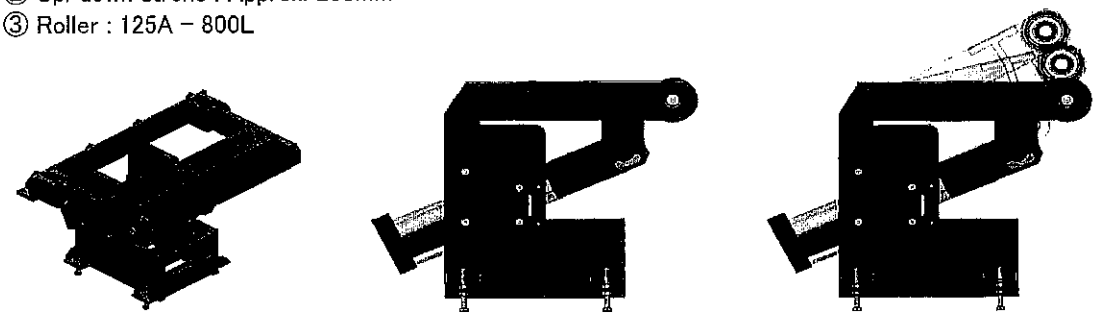
C. Hydraulic up/down roller

In the event of infeeding and outfeeding of camber beam, this roller is hydraulically lifted like 3rd figure below to hold workpiece and protect it from any impact of falling during feeding.

① Cylinder : TA140 – 185 stroke (140kgf/㎠)

② Up/down stroke : Approx. 260mm

③ Roller : 125A – 800L

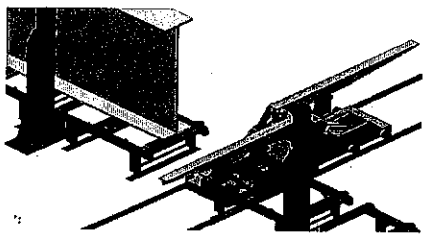


(Fig. 12 : Working principle of up/down roller)

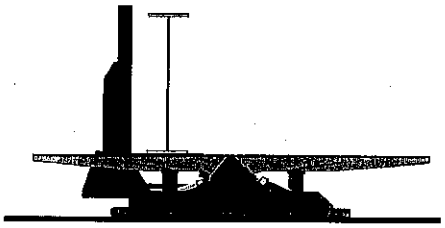
D. Hydraulic tilter

Finished beam is controlled by hydraulic tilter, which it has the total functions to traverse on rail, lift and tilt workpiece.

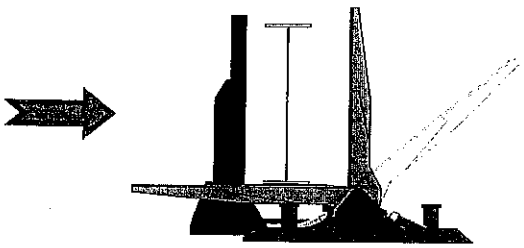
① Cylinder : Ø140 – 320 stroke (140kgf/㎠)
② Driving motor : 1.5kW (Reduction ratio – 90:1)
③ Tilting range : 0 ~ 90° (Inner tilting arm), 90 ~ 180° (Outer tilting arm)
④ Procedures : See the next page.



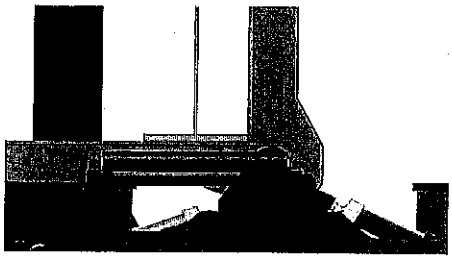
Tilter traverse (In)



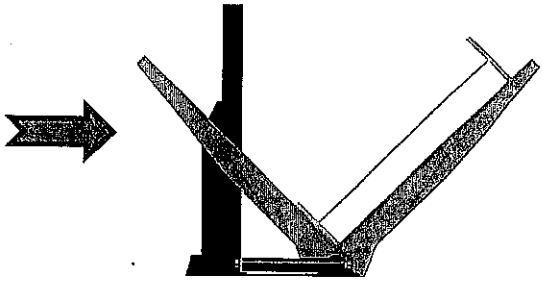
Lifting of workpiece



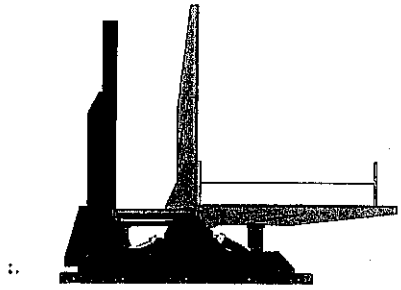
Vertical position of outer tilting arm



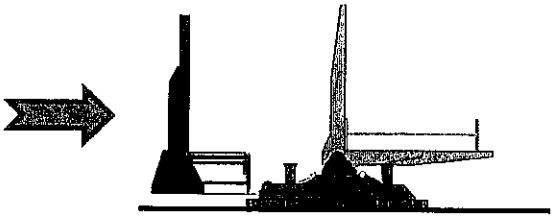
Squashed up against tilting arm



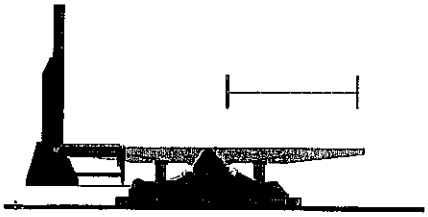
Tilting status up to 45°



Tilting status up to 180°

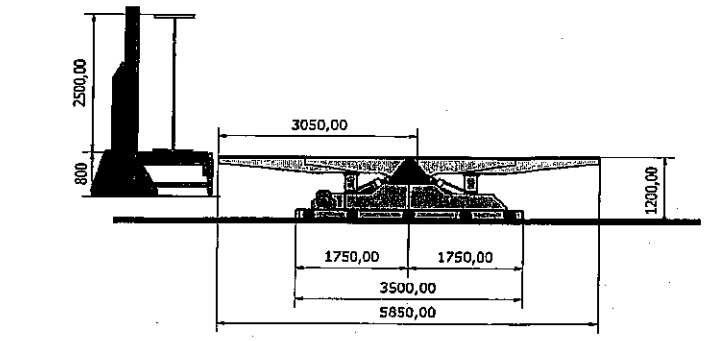


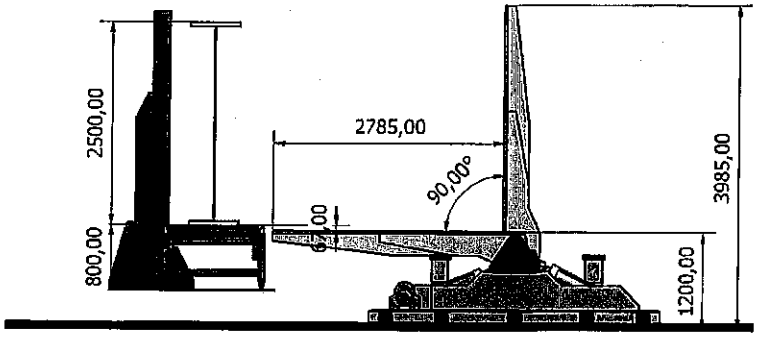
Tilter traverse (Out)

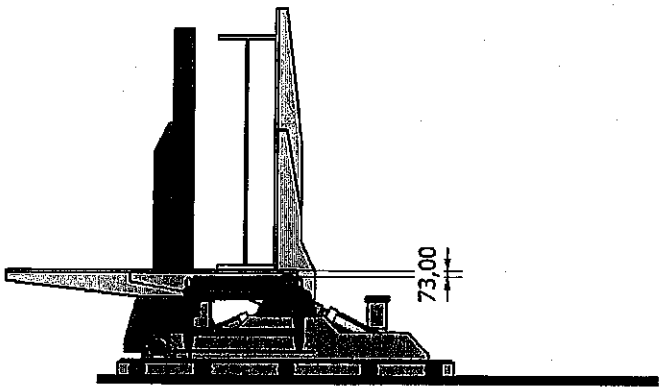


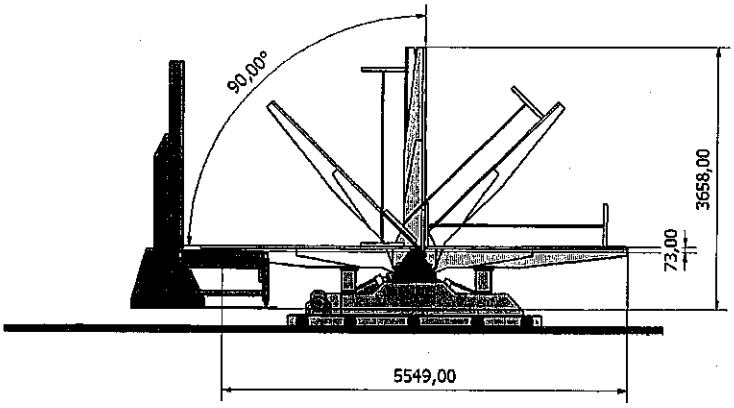
Workpiece handling

⑤ Dimension


2500,00
800
3050,00
1200,00
1750,00
1750,00
3500,00
5850,00

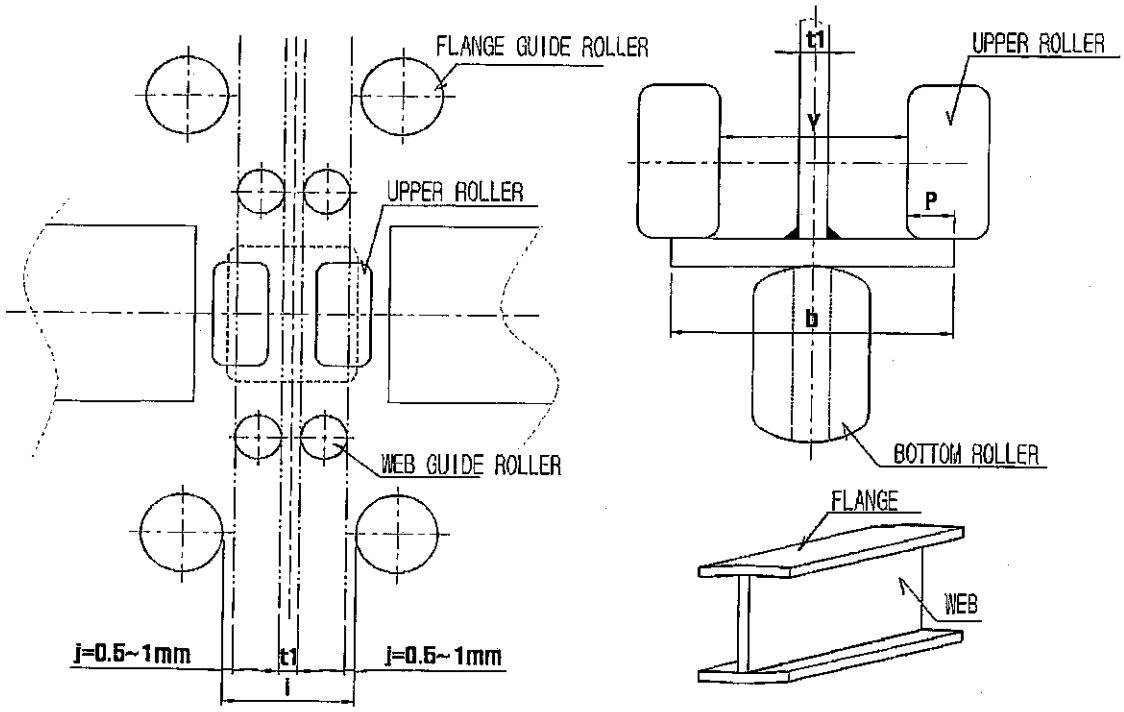

2500,00
800,00
2785,00
90,00°
73,00
3985,00
1200,00


73,00


90,00°
3658,00
73,00
5549,00

5. Straightening method

Flange straightening method



1) Left and right rollers of flange guide roller are to be set at a little wider than the flange width (i=b+2J) as the above figure. Web guide roller handle side is to be set at 1/2 of web board thickness (t1).

2) The gap of upper roller depends on workpiece section and type, but it is set on the location of Y=b-2p (p=50~150), pressed and fixed.

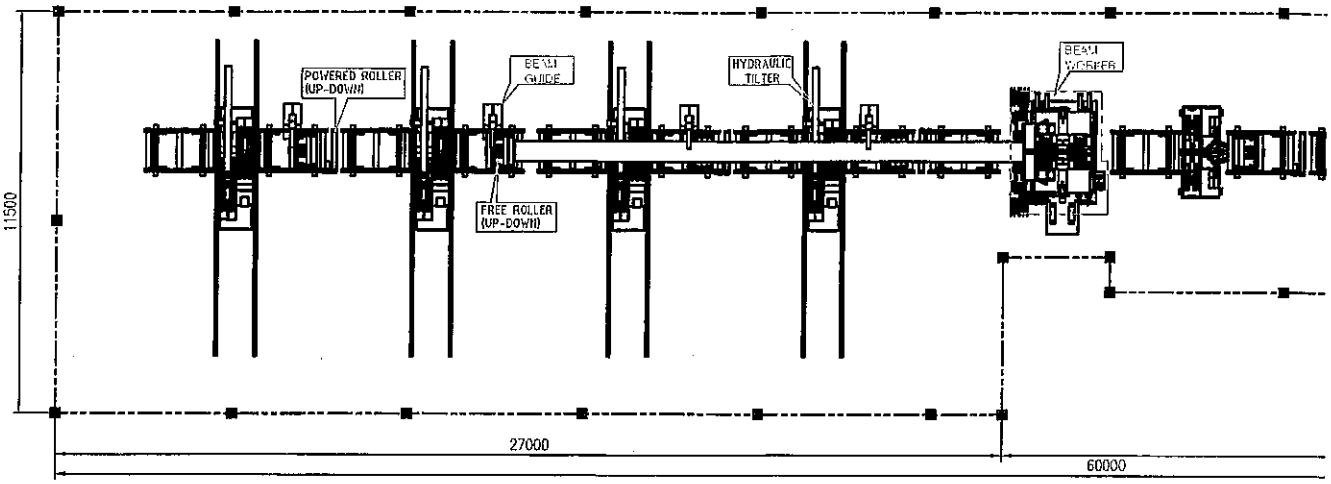
3) Bottom roller is pushed up by hydraulic cylinder and pressurized considering flange's elasticity, but it is strongly recommended to set first at required pressure.

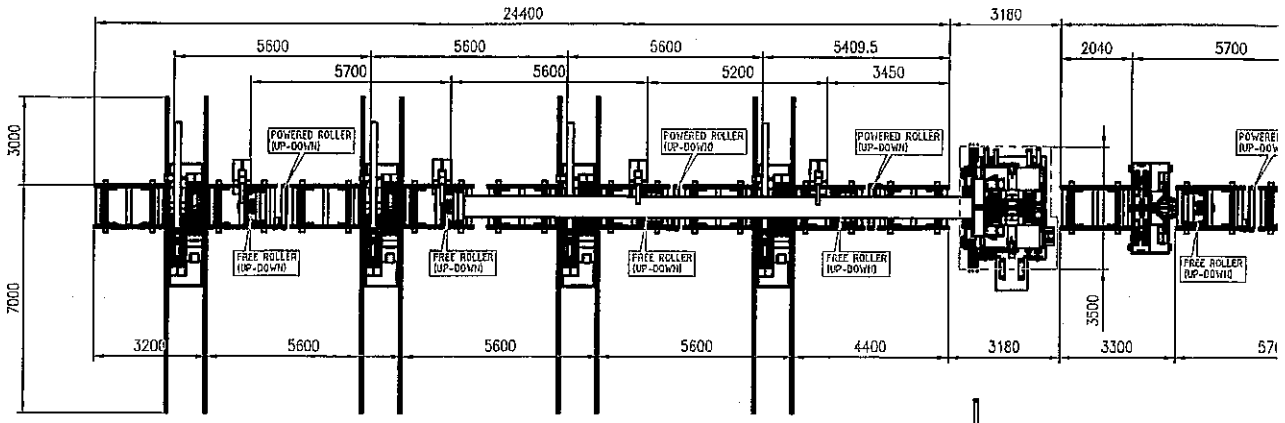
4) Web guide cylinder side is to be set at the point to touch web material. (Scale of pressure gauge is zero.)

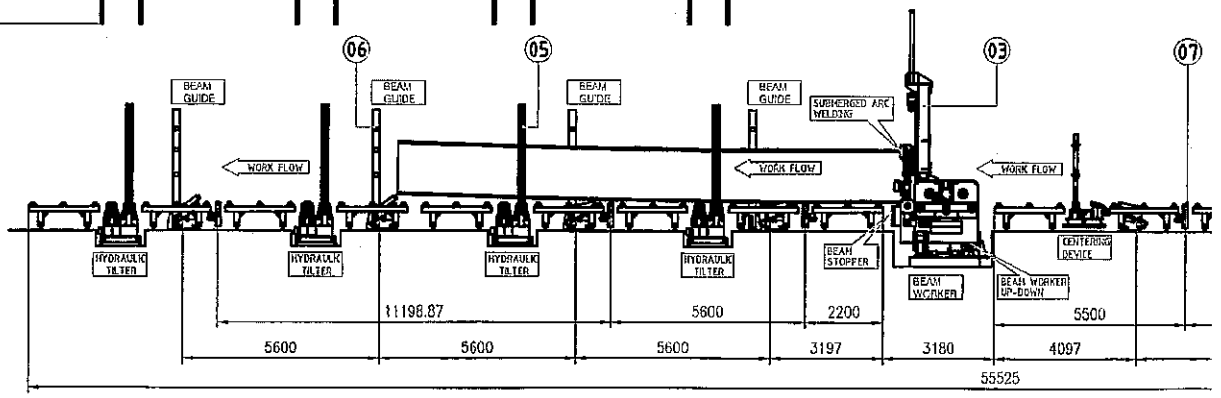
5) By driving lower roller by drive motor, flange bending can be straightened continuously.

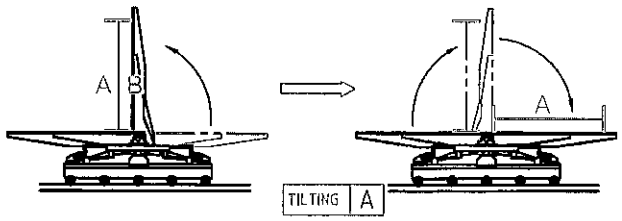
6) Refer to attached table regarding the specification of standard and small roller.

×× LAYOUT××

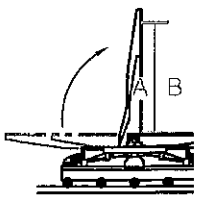




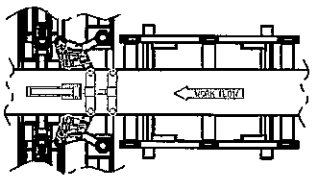




HYDRAULIC TILTER



FLANGE CENTERING



FREE ROLLER (UP-DOWN)