

**PHI Automatic Steel Beam Welder**



## For Fast Fabrication of Quality "H" Beams...

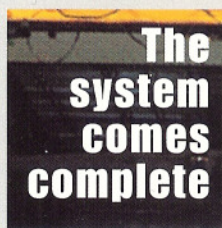


**Y**ou can now manufacture custom beams continuously with minimum delays for changing beam sizes or shapes. The PHI Automatic Steel Beam Welder gives your operation higher productivity, on both straight and tapered steel beams. It automatically welds both flanges of the beam at once, delivering the penetration you need on up to 1/2" steel web and 1-1/2" flange—all in one operation, one pass, and from one side. The PHI system produces a fillet weld between the web and flange. Welds are uniform and of the quality demanded by construction codes.

### High-Quality Welds, Even at High Speeds.

Working at a convenient push-button console, the operator presses the start button. The machine automatically holds the steel in position, while the work piece is fed under the two weld heads. Pressure and guide rollers maintain accurate alignment of web and flanges. All guides are easily adjustable to

match the dimensions of the beam section. Welding is performed by a pair of submerged twin-arc welders. The system automatically dispenses and removes flux, reducing manpower requirements and cutting material costs through recycling of the flux.



**THE PHI AUTOMATIC STEEL BEAM WELDER** comes complete with welding equipment, flux dispenser and recovery systems, dust collectors, wire turntables, and hydraulic system. Installation supervision and operator and maintenance personnel training is available.

### MACHINE CAPACITY

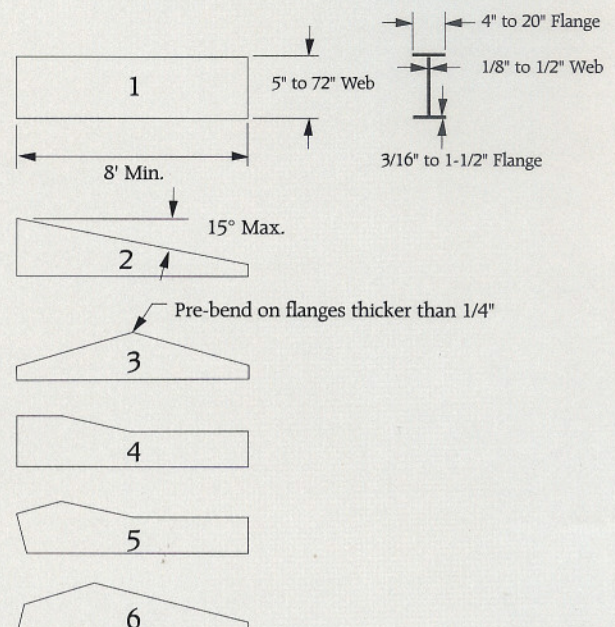
Web Thickness:	1/8" to 1/2"
Web Width:	5" min. to 72" max.
Web Taper:	15° max.
Flange Thickness:	3/16" min. to 1-1/2" max.
Flange Width:	4" min. to 20" max.
Beam Length:	8 ft. min.
Beam Section:	325 lbs./ft. max.
Beam Weight:	12,000 lbs. overall, max.
Weld Fillet Size:	1/8" min. to 5/16" max.
Welding Speed:	20" to 120" per minute

### Typical Welding Speed:

1/8" fillet on 10 ga. material	80" to 100"/min.
3/16" fillet on 1/4" material	60" to 70"/min.
5/16" fillet on 3/8" material	25" to 30"/min.

### WIDE VARIETY OF BEAM SHAPES

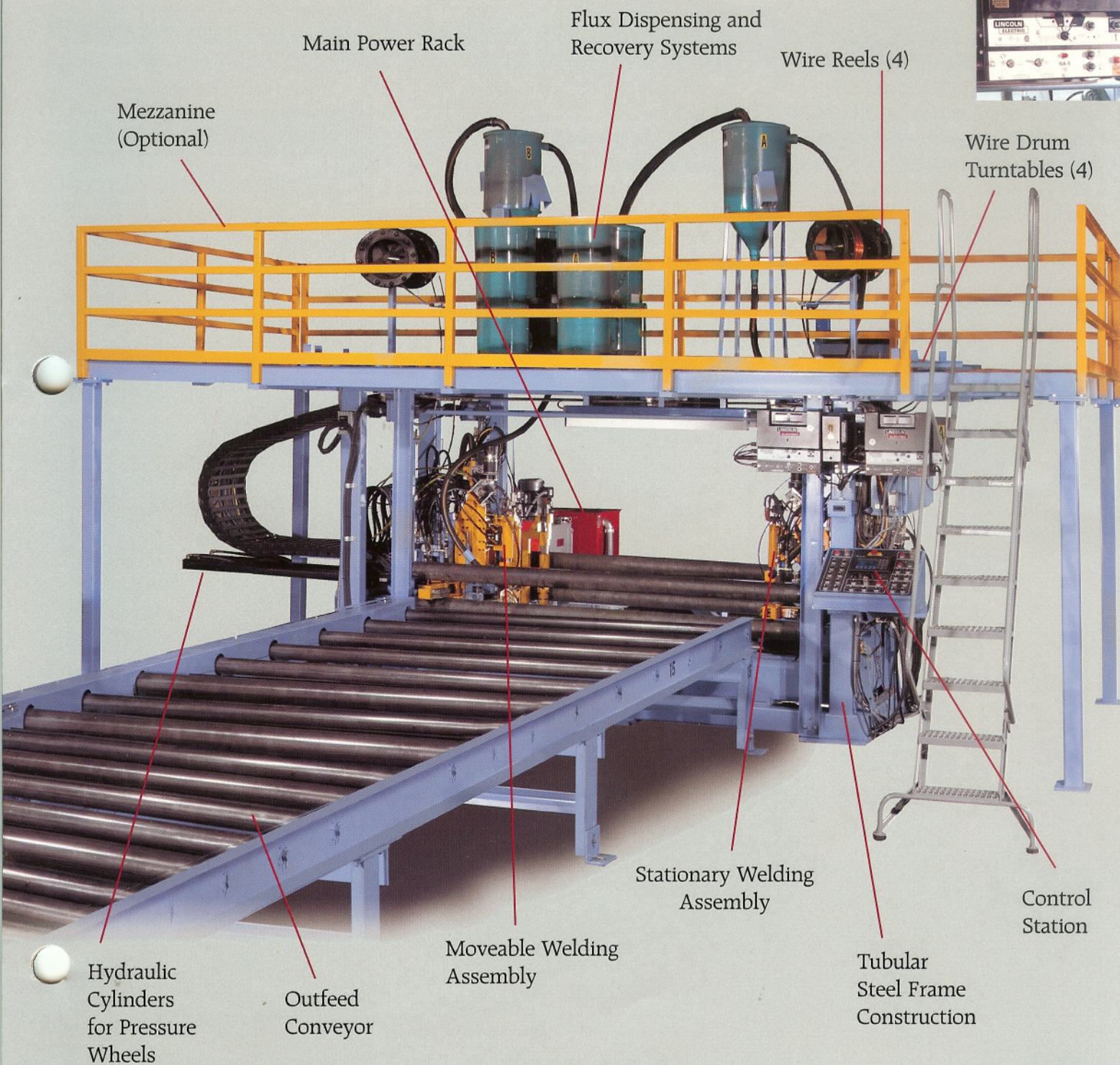
Typical beam configuration which can be welded on PHI Automatic Steel Beam Welders.





PHI

## ...PHI Automatic Steel Beam Welder





# PHI offers a complete "H" Beam Fabrication Line. In addition to

## 1 SEAM WELDER

The Seam Welder is used to join separate web sections with a 100% welded seam and to fabricate long webs from short sections or to join sections of different thickness.

The two pieces to be joined are aligned against an edge guide and clamped in position by means of air cylinders. The grooved copper back-up plate is brought to seam tightly against the lower side of the joint. The welding head travels along the joint and welds it by single-wire submerged arc.

Clamps are released and web is conveyed to the tacking fixture. Welding equipment consists of welding head with flux hopper, travel carriage, controls and 1,000 Amp. power source.

A flux recovery system is provided to dispense and recover welding flux. The Seam Welder Hydraulic Power Unit and Electric Controls are also used to drive the conveyors at entrance and exit of the Seam Welder.

## 2 TACKING FIXTURE

The tacking fixture is used to assemble the beam prior to the Main Welder.

The web and flanges are brought in from the seam welder and flange storage racks respectively, transported to the tacking fixture and positioned prior to tacking the leading edge of the beam.

Loading of the flanges on the conveyors can be done manually by an operator or automatically, using PHI's flange-loading Gantry.

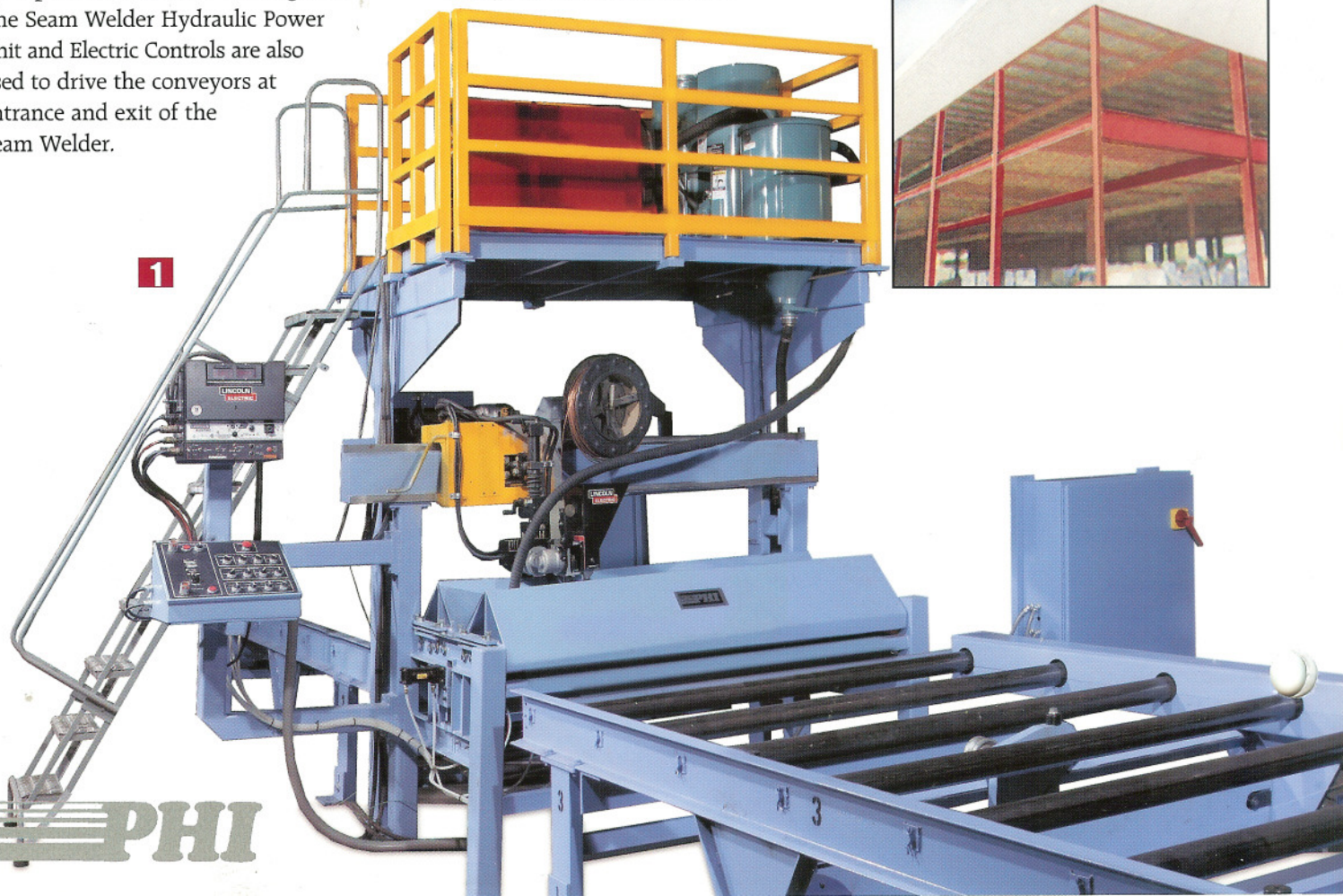
The two flanges are placed on the conveyor section on opposite sides of the web, rotated into the vertical position and held by magnetic guide rollers. The three pieces are advanced into position against a retractable stop and hydraulically clamped in their proper relative position.

The operator manually tack welds them together. Clamps are released, and the tack-welded beam is conveyed to the welder.

After initial adjustment of clamp positions for the first beam, the operator controls all material movement from the control panel for all subsequent beams of the same size.



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# the main welder, the line includes:

## 3 ELECTRIC CONTROLS

The Electrical Control Panel on the Main Welder provides maximum system control flexibility. The Welder can be operated in either Manual Mode or Automatic Mode.

In Manual Mode, the sequence of operations is achieved by using individual controls located on the control panel. Welding parameters also are set individually on each welding head controller.

In Automatic Mode, the PLC control increases "arc-on" time by eliminating manual operations.

Using the "IN" conveyor, operator brings the beam to the starting position, chooses one of the preset welding programs (welding speed, wire speed and voltage), and pushes the "START" button.

Total sequence of operations, including movement of the beam with welding speed, positioning of the welding heads, start and stop of the welding process on stationery and moveable sides, activation of web holding, copper back-up assemblies and pressure cylinders, and STOP of the operation will be accomplished automatically.

The PLC provides the accuracy, reliability, versatility quality, and quick change of the parameters for different welding applications.

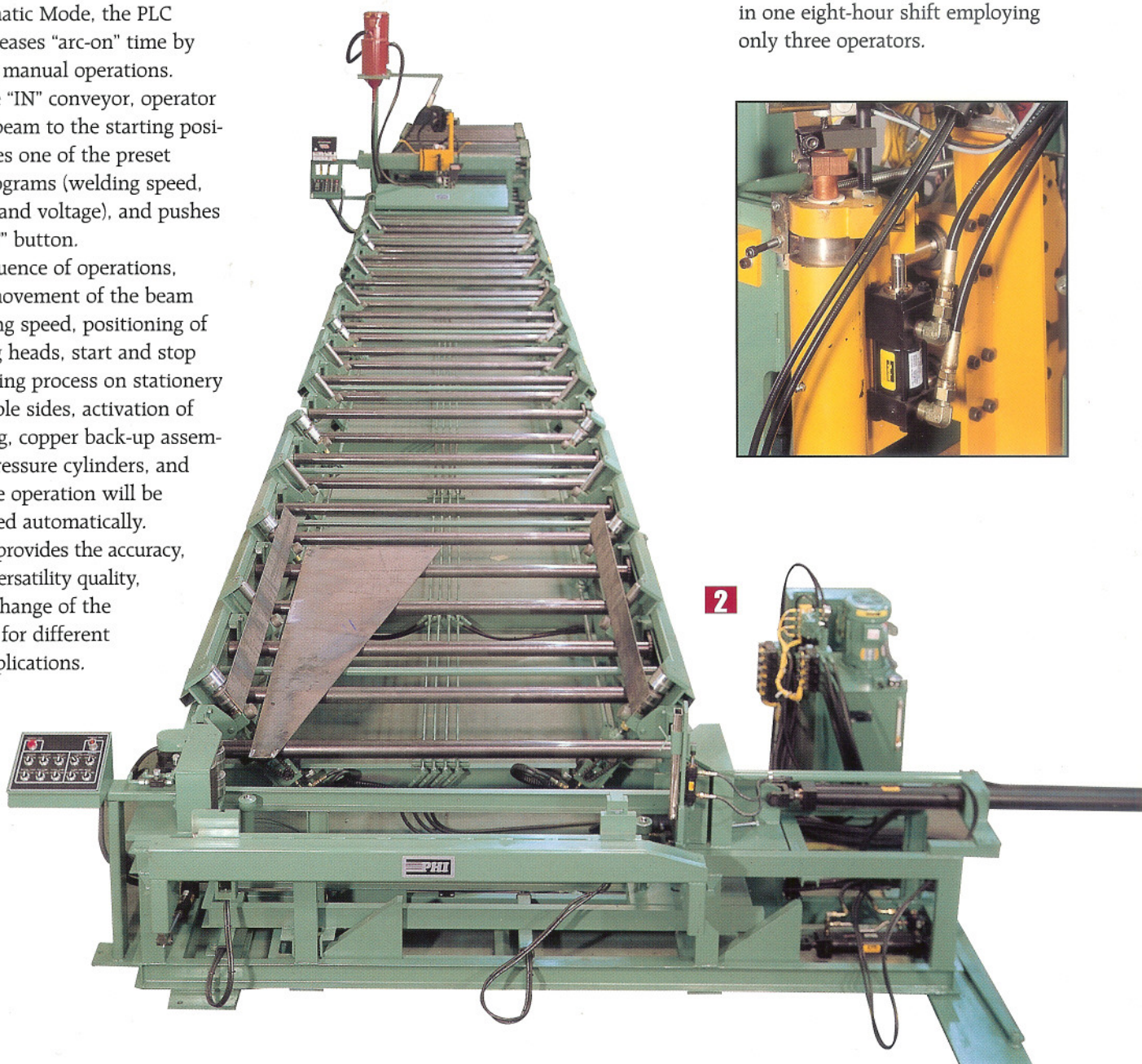
The interface between operator and machine is through an Allen Bradley Model 550 Panel View, which has been programmed by PHI to display all parameters of a welding program, and to display on different screens input/output status for troubleshooting and diagnostics.

Programming of welding parameters for different beam sections is also accomplished through the panel view screens.

## 4 PRODUCTION CAPACITY

The main characteristic of PHI's Automatic Steel Beam Welder System is its ability to produce beams continuously, beam after beam, with minimum down time for changing welding parameters or beam sizes.

While actual production capacity will depend on the size and type of beams to be fabricated, typical output is 2,000 tons of steel per month in one eight-hour shift employing only three operators.





# THE PHI ADVANTAGE: Standard and Optional Control Systems

## CONVEYORS

The Seam Welder, Tacking Fixture and Automatic Welder are interconnected by means of a Conveyor System, to form a complete production line that allows continuous Steel Beam production.

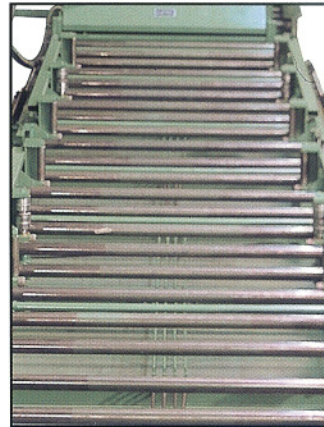
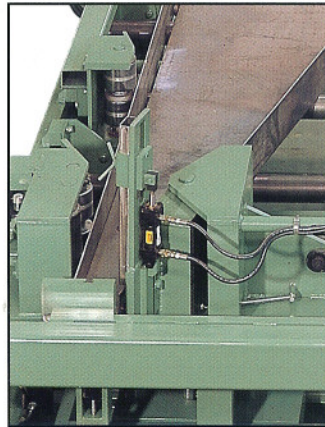
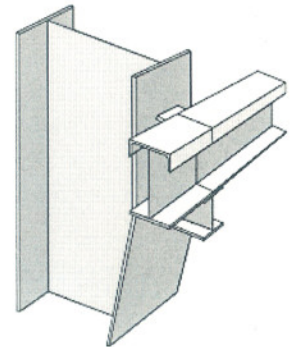
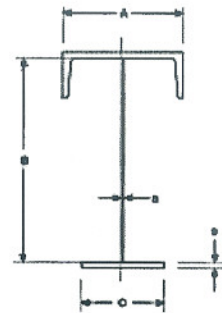
Conveyors are located at the entrance and exit of Seam Welder, Tacking Fixture and Automatic Welder, and are hydraulically operated.

The controls at each of these stations determine the movement, direction, and speed of the adjacent conveyors.

A typical layout system includes a total of 18 conveyor sections. Six are motorized, driving the rollers by means of sprockets and chains. Ten are driven, connected by chains to adjacent motorized sections. Two are idle.

Each conveyor section measures 10' in length, 94" width and 30" height. Rollers are heavy duty designed for handling heavy steel plates and are spaced on 22" centers.

Load capacity for each conveyor section is approximately 4,000 lbs. Conveyor speeds are synchronized with welder input speeds to minimize conveyor wear resulting from friction between the turning roller and slower-moving beam at the welder entrance.



## OPTIONAL FEATURES

### 1) Electronic Seam Tracking System

This system controls accurate positioning of the welding nozzle, regardless of variations in the weld joint such as warpage, misalignment, or plate thickness.

This system continuously senses the position of the joint, then translates this information into signals to control the vertical and horizontal positioning of the nozzle. This system keeps the welding arc on track to within  $\pm .010$ ".

### 2) Adjustable Drive Wheel Angle

This wheel tilt assembly allows operator to adjust the drive wheels' angle  $\pm 5^\circ$  to compensate for flange

distortion relative to the web. This distortion may occur during cooling of the weld as a result of thermal stress on the welded beam. The option is recommended for applications in which flange thickness is greater than  $1/2$ ".

### 3) Computer Control System

This option includes a computer-control system with touch-screen programming and operation. It utilizes an industrial PC and machine-interface software for user-friendly operation.

It features easily accessible diagnostics indicators, message display and custom graphics, including electrical and hydraulic schematics and functional diagrams.

Program input can be made via touch screen or keyboard.

Welding programs may be downloaded remotely from a connected PC or network. It also includes a one-day data logger to provide a record of the machine operation.

### 4) Maximum Web Size Of 84"

This option allows for the manufacture of beams with maximum size of 84", instead of the standard 72".

All elements of the system are modified to accommodate the larger web sizes.

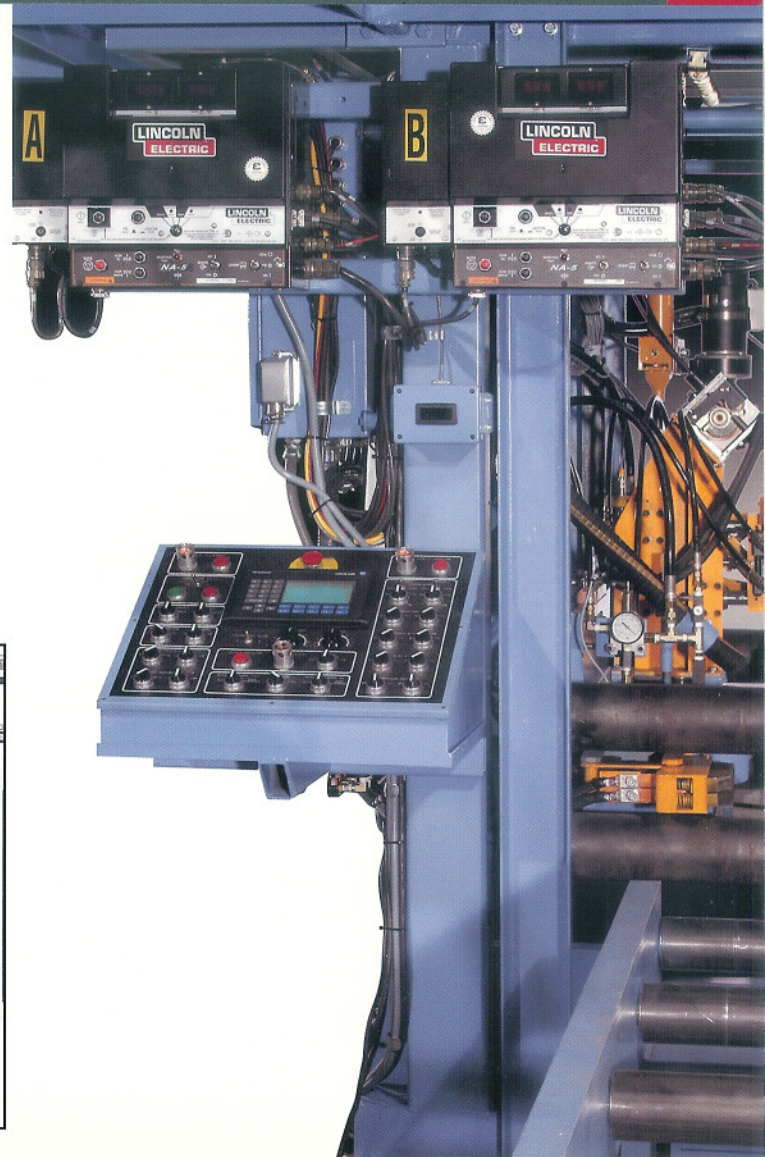
### 5) Welding Heads For Manufacturing Crane Beams

A special welding head design is available for the manufacturer of



# Standard PLC Control

## Optional Computer Control



crane beams. In crane beams, the top flange is a "C" channel with the short sides directed inwards to the beam.

### 6) Mezzanine on Main Welder

This option includes a platform with rail guards and stairs for easy access. The platform is used for storage of flux and wire and allows room for the operator to load flux hopper, and change wire drums and reels.

### 7) Flange Tilting Assemblies

This option, when incorporated in the conveyors leading to the Tacking Fixture, allows the automatic tilting of flanges to a vertical position in preparation for beam pre-assembly.

This system includes two flange tilting assemblies, one on each outbound side of the conveyors.

The Flange Tilting Assemblies can be opened to a position 37° from vertical or to a fully horizontal position depending on the material handling system used. If flanges are transferred by pushing from adjacent storage racks, the 37° open position is preferred.

If flanges are transferred by means of a gantry type loader, the fully horizontal position is recommended.

The tilt assemblies utilize the tacking fixture's hydraulic power unit. Controls are conveniently located at the tacking fixture control station.

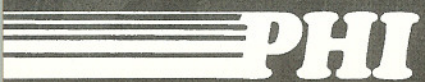
### 8) Straightening Fixture

To achieve welding of beams with minimum web size of 5", the two Welding Heads are offset. This arrangement tends to cause a deflection in the finished beam along the axis when the beams are manufactured.

To minimize this deflection, the welder includes eccentric rollers mounted on the exit side of the Drive Wheel assembly to keep the beam straight.

If further straightening is required, then an optional Straightening Fixture is provided. This fixture includes adjustable pressure rollers that straighten the beam as it exits the welder.





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