BEAMASTER WELD

DATASHEET

NO PROGRAMMING | FLEXIBLE | ACCURATE

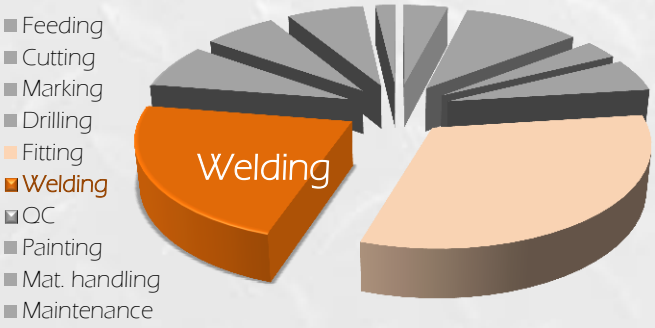
1 DESCRIPTION

1.1 What is the BeamMaster WELD

The BeamMaster WELD is a **Robotic Welding Line** specially engineered to answer all the welding needs of **structural steel fabricators**.

The BeamMaster WELD's range features a **small footprint** with complete **robotic automation.**
Our attractive prices offer to all sizes of fabrication shops a **solution to their welding production issues**.

1.2 Why invest in the BeamMaster WELD?



The typical steel fabrication shop will **spend up to 30%** of the entire shop fabrication time on **welding operations**. Along with fitting, it's the **most labour intensive operation** of the entire fabrication process.

You have likely invested in automated equipment for beam and part preparation; **it's now time** to bring your shop to the next phase: **Robotic Welding**.

1.3 Features & Benefits

AUTOMATED

No welders needed. It only takes a fitter to tack the parts in place and feed the assembly into the production zone.
The **entire welding process is automated**.

FLEXIBLE

The BeamMaster WELD handles **different weld types**. It accepts **W Beams**, **HSS profiles** and even **tapered beams**. Compatible accessories include angles, stiffeners, base plates, end plates and other standard parts.

EASY-TO-USE

With the Offline Programming Interface (OLP), **welding with the BeamMaster WELD is very easy**. Let the equipment automatically weld the repetitive production and let the experienced welders work on more challenging projects.

FAST SUPPORT

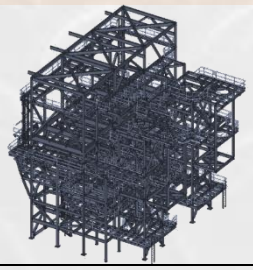
When needed, a **dedicated team of professionals** will help you maximize the power of this cutting edge technology.

Most questions and issues can be addressed within minutes using remote web support. Our qualified technicians can log in remotely and access the interface so they can see what you see.

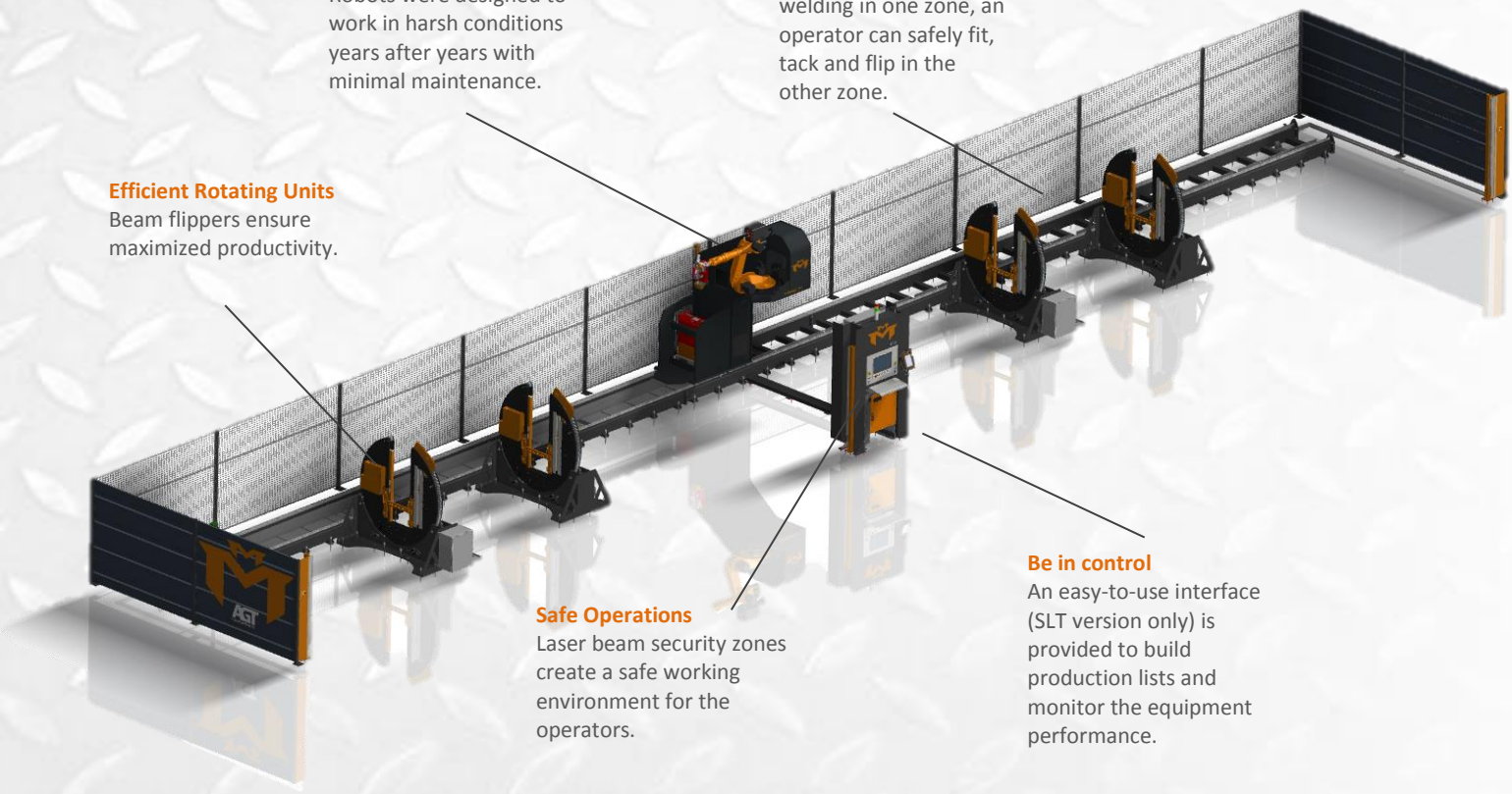
Field technicians can also be on site to ensure proper maintenance and/or repairs.

EFFICIENT

The machine is designed to fabricate most steel assemblies and accessories.



1.4 Layout



Small Footprint
Maximize your shop layout and make the most out of every square-foot.

Reliable Welding Robot
Robots were designed to work in harsh conditions years after years with minimal maintenance.

Productivity x2
While the robot is busy welding in one zone, an operator can safely fit, tack and flip in the other zone.

Efficient Rotating Units
Beam flippers ensure maximized productivity.

Safe Operations
Laser beam security zones create a safe working environment for the operators.

Be in control
An easy-to-use interface (SLT version only) is provided to build production lists and monitor the equipment performance.

1.5 Configurations

BM48

Basic unit – BM48 :

- ✓ 1 working zone
- ✓ without rotator

BM48R

Basic unit – BM48R:

- ✓ 1 working zone
- ✓ with rotators

BM48$_2$

Basic unit – BM48$_2$:

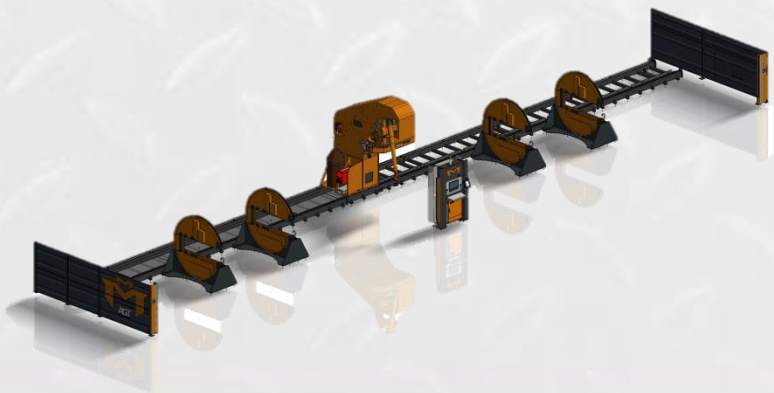
- ✓ 2 working zones
- ✓ without rotator

BM48R$_2$

Complete unit – BM48R2:

- ✓ 2 working zones
- ✓ with rotators

BM60R$_2$

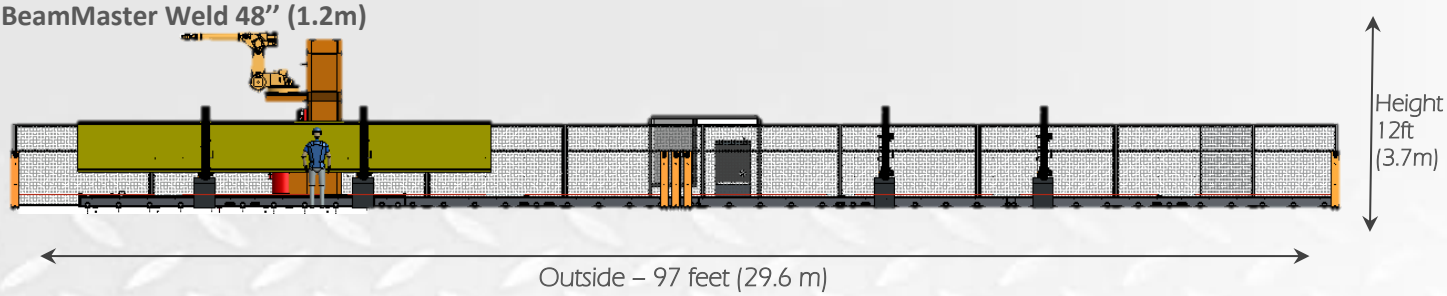


Complete unit – BM60R2 :

- ✓ 2 working zones
- ✓ with rotators

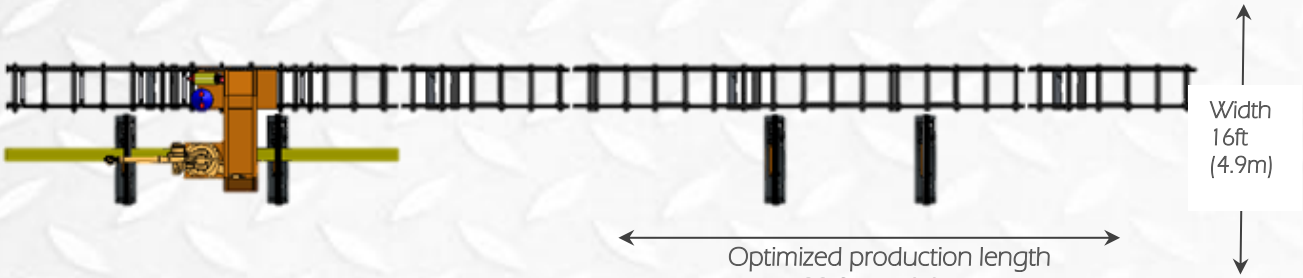
1.6 Overall Dimensions

BM48R2
BeamMaster Weld 48" (1.2m)



Outside – 97 feet (29.6 m)

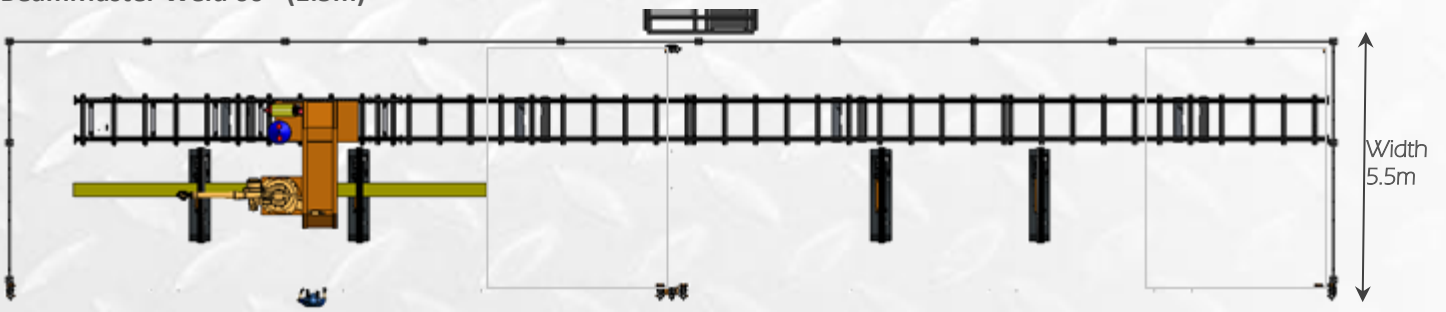
Travel Length – 86 feet (26.2 m)



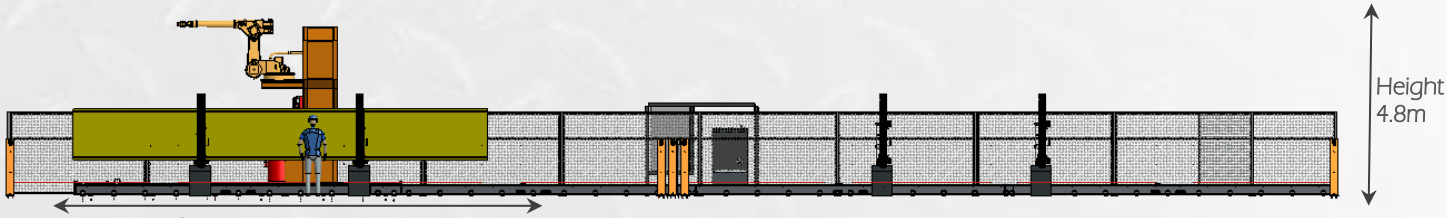
Optimized production length
33 feet (10.0 m)

BM48 length is approximately half the size in of the BM48R2*

BM60R2
BeamMaster Weld 60" (1.5m)



Outside – 29.5 m



Optimized production length
10.0 m

2 ROTATORS (OPTIONAL)

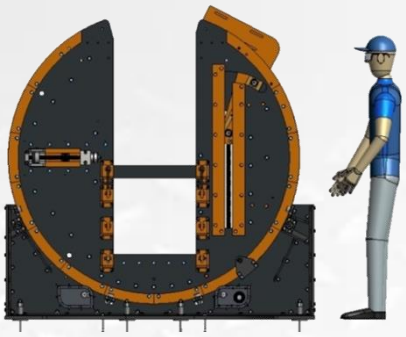
AGT Rotators can handle beams up to:

48” web and 20” flange for model 48 (1220mm wide x 510mm)
60” web and 20” flange for model 60 (1524mm wide x 510mm)

Capacity:

Per unit: 5500lb (2500kg)
Per pair: 11000lb (5000kg)

Rotation: Automatic (controlled by sequence)
Clamping: Manual or Motorized (option)
Loading: Horizontal or Vertical (conveyor, overhead crane, forklift)



3 INPUT REQUIREMENTS

Electrical	Power supply of : • 400-415 VAC, 3 phases, 50/60 Hz, 50 KVA; AND • 120 V, 1ph, 60 Hz, 15A
Pneumatic	100 psi @ 20 CFM Clean air 0,005MM Dry 99,9%, Unlubricated, 1/2” NPT
Welding Gas	85% AR-15%CO2 mix, 2x 40 CFH
Ethernet speed	Upload / Download speed at 10Mbs

4 OPERATION INTERFACE

The equipment comes with an easy to use HMI.
Among others, the operator can:

- Select new work orders
- Have a global status of all sub-modules
- Consult an alarm log
- Control the rotators

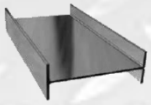
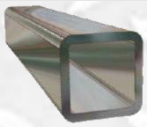
For more advanced functions, the equipment also comes with a teach-pendant.

Operations are presented to the user in a transparent manner by means of intelligent, interactive dialogs. The user always has at his disposal precisely the operator control elements that he actually needs at any given moment.

5 SUPPORTED DIMENSIONS

5.1 Types of Beams Supported

BM48

W beam			Imperial	Metric
	Section	Min.	W6 x 14	W150 x 22
		Max.	W48	W1220
	Length	Min.	12 ft.	3.62 m
		Max.	80 ft.	24.4 m
HSS closed rectangular column				
	Section	Min.	6” x 6” x 0.188	152x152x4.8 mm
		Max.	20” x 20”	558 x 558 mm
	Length	Min.	12 ft.	3.65 m
		Max.	80 ft.	24.4 m

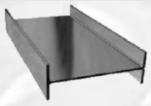
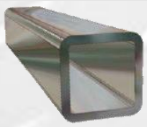
Also supported:

- ✓ Tapered Beam
- ✓ Fabricated Beam
- ✓ Any other section that fit in the zone

NOTE

- ✓ Maximum length per zone is 30 ft. (9.14 m)
- ✓ Robot programs will be zone specific over 27 ft. (8.23 m)

BM60R2

W beam			Imperial	Metric
	Section	Min.	W4 x 13	W100 x 19.3
		Max.	Up to 60” X 20”	Up to 1.5 m x 0.5 m
	Length	Min.	12 ft.	3.65 m
		Max.	80 ft.	24.4 m
HSS closed rectangular column				
	Section	Min.	6” x 6” x 0.188	152x152x4.8 mm
		Max.	60” x 20”	558 x 558 mm
	Length	Min.	12 ft.	3.65 m
		Max.	80 ft.	24.4 m

Also supported:

- ✓ Tapered Beam
- ✓ Fabricated Beam
- ✓ Any other section that fit in the zone

5.2 Beam Validation

Beam torsion and flexion compensation before welding	No
Beam torsion and flexion compensation during welding	No
Welding quality inspection (or identification)	No

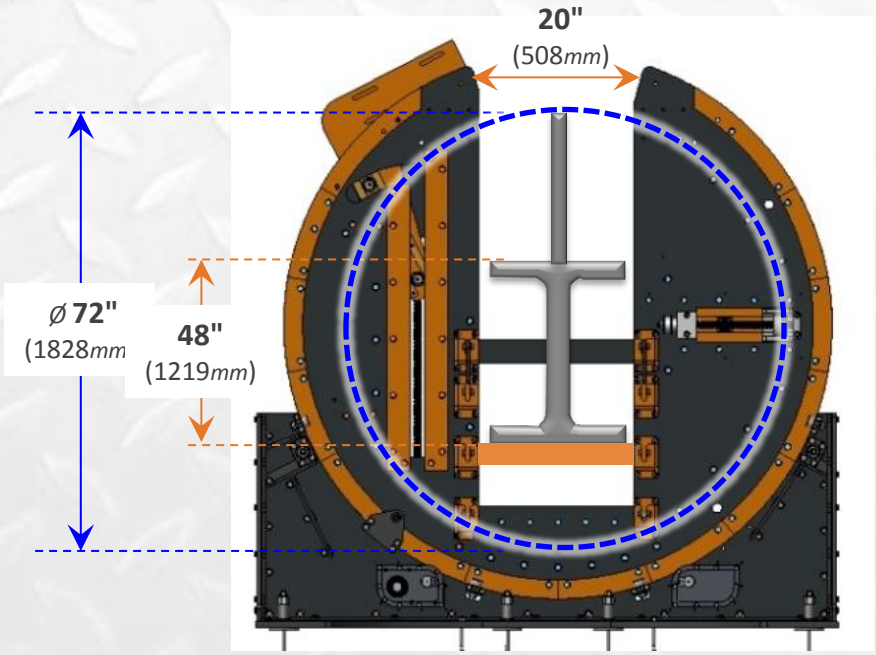
5.3 Part Tolerances

Infeed beams and sections must be of good quality and must respect the following criteria

- Flatness = up to 2mm (0.09'')
- Cut straightness = up to 2 mm (0.09'')
- Cut angle = ±2mm (0.09'')
- CAD vs Actual for all dimensions = up to 4 mm (0.16'') deviation

5.4 Assemblies

Dimensions	Length	min	12 ft.	*3.65 m*
		max	30 ft.* per station 60 ft. (will overlap on both station)	*9.15 m* *18.3 m*
	Width	Outside of main member	19"	*483 mm*
	Height	Outside of main member	19"	*483 mm*
Weight	Total	Max (Including accessories)	10 000lbs	*4 500 kg*



The current robot configuration allows to robot to reach most weld joint with the required configuration.
With 2F weld configuration, some welds might be "out-of-reach" or "impossible to do without collisions"

6 WELDING

6.1 General welding specifications

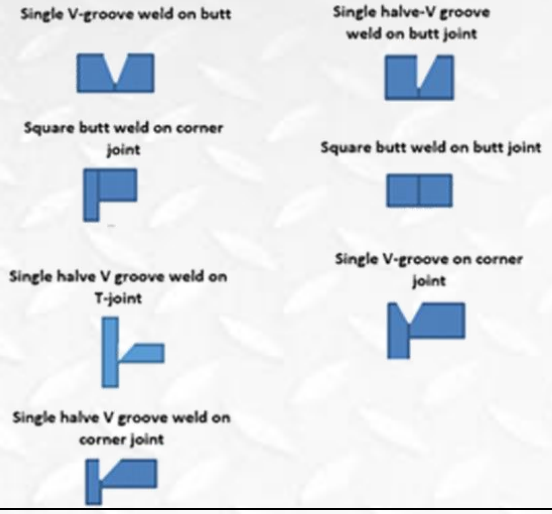
Welding equipment	Power Source Wire Feeder Welding Torch	Collision detect Torch cleaning station (reamer)
Typical welding speed – Fillet welds (2F):	17 inches/min for ¼'' weld 22 inches/min for 3/16'' weld	(7mm/s for 6.4mm fillet weld) (9mm/s for 4.8mm fillet weld)
Gap tolerances	No gap detection Maximum gap 1mm	
Joint detection	Laser Touch sensing	
Process and position	MCAW - Spray and pulse transfer – Horizontal (2F)	
Wire classification	AWS A5.18, A5.18M: E70C-6M H4 / CSA W48-06: E491C-6MJ-H4	
Shielding gas	85%Ar-15%CO2 mix	
Surface finish	All parts and beam must be clean with low scale level.	

6.2 Recommended uses

AGT includes a complete welding package that will cover most joints present in structural steel assemblies.
The document that describes those cases extensively is "TEC-AGT-216-018 Connection Type Welding Package"

6.3 Other possibilities

Table below lists available possibilities for the system. Additional development or additional equipment may be required. For more information, please contact us.

Vertical up welding (3F)	Some restrictions may apply
Gap detection & measurement prior to welding	Servo-robot sensor option for measuring the gap between plates
Assembly types	Corner, Butt joint, Edge joint
Weld types	
Additional welding Process, wire classification and shielding gas	Any combination allowing adequate performance of the equipment. Some restrictions may apply.
Weld sizes	Up to ½'' (12mm)
Number of passes (multi-pass)	>3 (Some restrictions may apply)

7 PROGRAMMING MODES

The system comes with 3 main programming modes: TeachPendant (TP), Offline Programming (OLP) and SelfLearning (SLT).

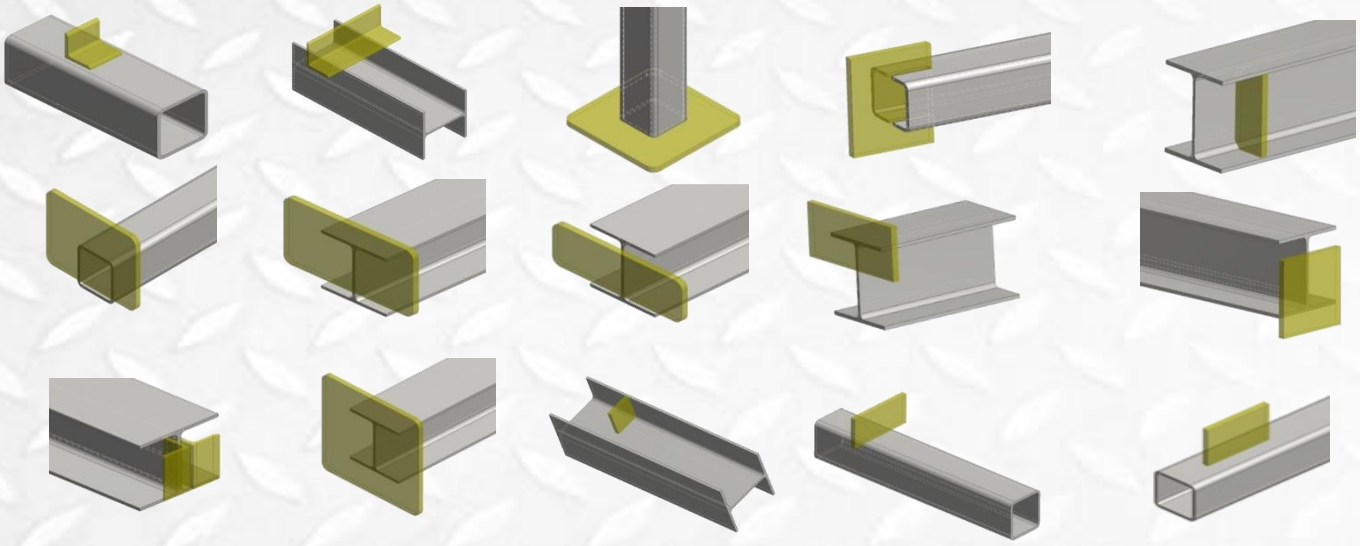
	Teach Pendant **TP**	Offline Programming **OLP**	SelfLearning **SLT**
			cortex structural
CAD			
Define welds in CAD	(CAD not needed)	(WeldingInfo cannot be imported)	Weld Info can be used later
Export geometry in 3D	(CAD not needed)	Use "Save as" in CAD	Use go.export module[1]
Export welding information from CAD	(CAD not needed)	(WeldingInfo cannot be exported)	Use go.export module
ROBOT PROGRAM CREATION			
Position part to weld	Physically in machine	Manual using Octopuz HMI	(auto-positioned)
Define Weld segments location (WHERE) **Define Weld size (WHAT)**	Manual using TP and Robot		AUTOMATIC Three possibilities: 1. Read info from CAD Only 2. Auto-generated[2] 3. Auto-generated but use CAD when present.
Teach Search Sequence			(auto-selected)
Define Toolpath (HOW)			
Define Robot Path	Manual using TP and Robot	Manual using Octopuz HMI w/virtual cell	(auto-generated[3])
Define complete sequence			
ROBOT PROGRAM VALIDATION			
Validate RobotPath	Manual using TP and Robot (Dry-Run)	Using Octopuz virtual simulator	(auto-generated. Results available in report)
Edit/Modify Welds/RobotPath		Using Octopuz HMI	If problems (collision, reach, etc.): Using Octopuz HMI
Save Robot Program		Using Octopuz Post Processor	
ROBOT PROGRAM EXECUTION			
Load part	Physically in machine		
Select robot program	Using robot Teach Pendant		Basic HMI
GENERAL			
Supports Structural Steel Assemblies	Yes	Yes	Yes
Supports Fabricated/Tapered beams	Yes	Yes	No *(Will be supported in later to come versions)*
Supports Any Assembly	Yes.	Yes	No

[1] Only Tekla (version 18 to 2017) and SDS2 (2014 and 2015) are supported
[2] Auto-generation of welds only works for specific connection types of Structural Steel. See document "Connection Types and Welding Schedules"
[3] Automatic sequence generation only includes welding 2F position (Horizontal) and sorts all welds in the longitudinal axis and welds them in order.

8 SAFETY

- Canadian safety Standard – CSA Z434-14;
- American standard ANSI/RIA R15.06-2012 ;
- Production area are in safe operation mode;
- Light Curtains ensure safe zone control from production area;

9 TYPICAL SUPPORTED CONNECTION TYPES



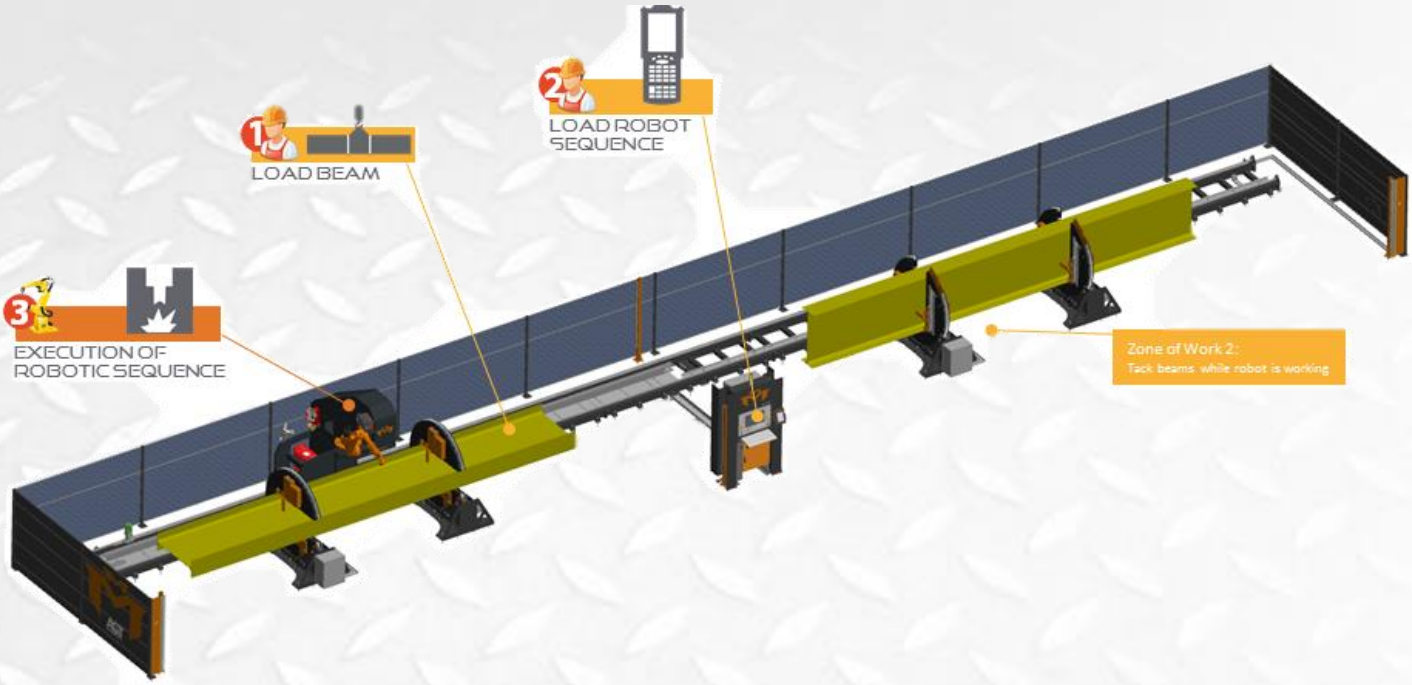
.. and more !

(See complete list in document "Supported Connection Types")

10 PRODUCTION SEQUENCE

10.1 PRODUCTION MODE

At this step, an operator needs to use the robot sequence previously created and run it.



Step		Resource	Action	Description
1.		Operator	Load the beam	The beam is loaded in the rotators ✓ Validate material in cell (quality control of raw material)
2.		Operator	Load robot sequence	Using the teach pendant, the operator loads the right robot sequence for the loaded beam assembly. ✓ Make sure the cell is ready to operate ✓ Activate security (lock the cell)
3.		Operator	Press start	The robot sequence is started
4.		Automatic	Execution of robot sequence	The entire robot sequence (including robot translations on rail) is executed for one face.
5.		Operator	Flip beam	Once the face is over, the operator needs to flip the beam to the next face
6.		Automatic	Execution of robot sequence	The entire robot sequence (including robot translations on rail) is executed for one face.
7.		Operator	Unload beam	Once all faces are done, the operator unloads the beam in zone 1 (while the robot will weld in zone 2) ✓ Quality control of welds ✓ Welding wire replacement (when needed) ✓ Monitor consumables (contact tip, diffuser, etc.) ✓ Shield gas replacement (when needed)

10.2 Operating Procedures

10.2.1 OFFLINE PROGRAMMING CONFIGURATION - INITIAL CONFIGURATION OF EQUIPMENT

An initial configuration is required to make sure that the robotic sub-routines and welding parameters are ready to be used at the offline programming time. Once it's done, those sub-routines and parameters can be used for all programming.

Step		Resource	Action	Description
1.		Technician	Development of Welding parameters	For each unique joint configuration, corresponding welding parameters must be developed and saved. The following characteristics may have an influence on the welding parameters: - Material and source (weld process, electrode, shielding gas, shielding gas flowrate, electrode diameter) - Leg size (5,6,8,10 mm) - Height above weld (0, between 0 and 4, above 4) - Joint type (Lap, T) - Surface finish (Heavy Scale, Light Scale) - Gap - Interface (Horizontal or Vertical) - Segment length (<10mm or >10mm) - Edge radius
2.		Technician	Development of Robotic Subroutines	For each unique joint, a sub-routine must be saved into a separate file. This file will contain: - the basic strategy and required robot configuration - a link to the right WeldID (developed at the previous step) This file will be used during programming time to accelerate greatly the programming time since most or all the parameters will be pre-configured.

10.2.2 OFFLINE PROGRAMMING (Manual)

At this step, a technician needs to create all the robot movements, all the welding paths and associate a welding schedule with each welding path.

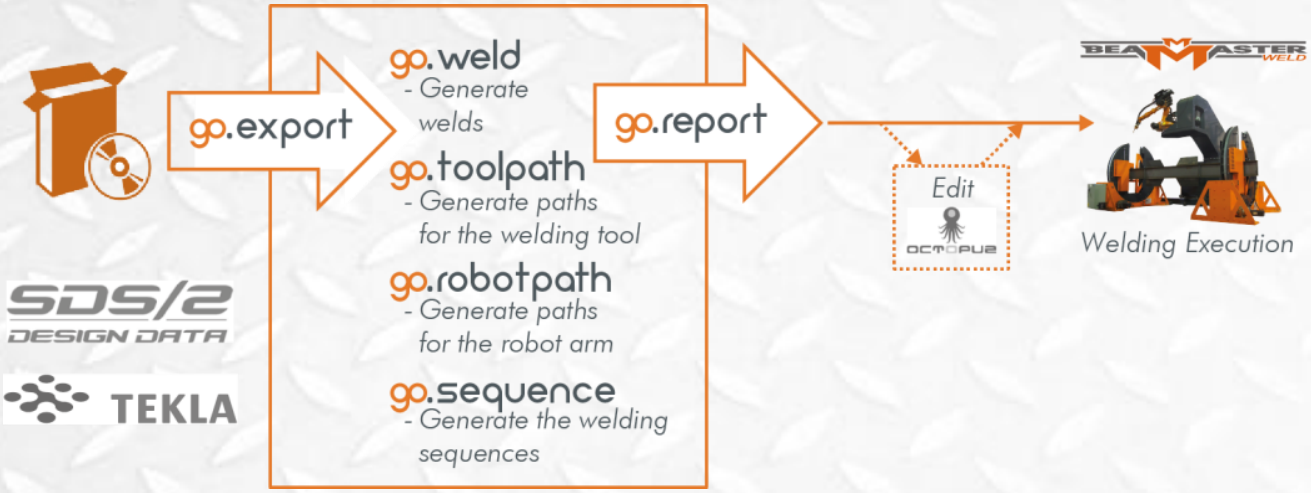
Step		Resource	Action	Description
1.		Technician	Import virtual cell	Import the 3D virtual cell of the BeamMaster WELD
2.		Technician	Import 3D model of BeamAssembly	Import the 3D model of the BeamAssembly
3.		Technician	Creation of Welding paths	For each welding path, the technician needs to: - Position the BeamAssembly - Position the welding robot on rail - Open the right "RoboticSubRoutine" - Select a base and select a wall - Validate that the robot can perform without collisions - If required: Modify robot positions and configurations
4.		Technician	Save the robot sequence	The robot sequence is saved and transferred to the robot controller.

10.3 OFFLINE PROGRAMMING (with Cortex)

cortex structural

At this step, a technician needs to review, fix and approved all robot movements, all the welding paths and associates a welding schedule with each welding path.

GENERAL FLOW



Step		Resource	Action	Description
1.		Technician	Export	Exports the entire building from Tekla or SDS2
2.		Technician	Launch Program Creation	With a few clicks, the technician selects the Assemblies to produce and starts the program creation process.
3.		Automatic	Program Creation	Automatically, the modules of the Cortex|Structural suite will AUTOMATICALLY: - Generate the welds for known connection types - Import the welds that were defined in the 3D model - Decide whether the assembly needs to be produced in 1 or 2 zones - Position the Assembly in the rotators - Generate all the joint search robot movements - Generate all the weld process robot movements - Generate all the "in-between-welds" movements - Generate all the beam flip operations - Define the joint and create/associate the righ weld schedule - Create a logical sequence for all the movements - Launch a simulation Create a simulation report
4.		Technician	Confirm validated program	Review the entire simulation using report and correct welds or robot moves if needed
5.		Technician	Save the robot sequence	The robot sequence is saved and transferred to the robot controller.

10.4 PC technical Requirements

To run Cortex|Structural and Octopuz, the PC must have the following specifications:

Operating Systems	Supports for: Windows 7 32-bit or 64-bit version Windows 8 32-bit and 64-bit versions Windows 10 32-bit and 64-bit versions **Note:** To use OCTOPUZ on 64-bit systems the compatibility mode is used for the OCTOPUZ executable.
Hard Drive	20 GB of free space (Solid State Recommended)
CPU	Intel® Core™ i5 or similar (Intel® Core™ i7 Recommended)
Memory	The minimum machine requirement is 2 GB. For the use of OCTOPUZ for component altering and large layouts we recommend a minimum of 4 GB.
Graphics	OpenGL 3.2 support with 512 MB memory. No onboard graphics. The graphics driver should support OpenGL directly to avoid performance problems.
Mouse	3-button Microsoft compatible mouse
Internet Connection	Octopuz: A network connection is required to activate and transfer the license and access the WebCat from within the software. Manual activation without direct internet is possible, but not recommended.