



LAYOUT PROJECTION SYSTEM SPECIFICATIONS



Document Number:

CDC-AGT-234-20200320-R08

NO MORE LAYOUT BOTTLENECKS



Using traditional methods, a highly trained fitter needs to carefully read a drawing, pull a tape measure and accurately mark out part positions.

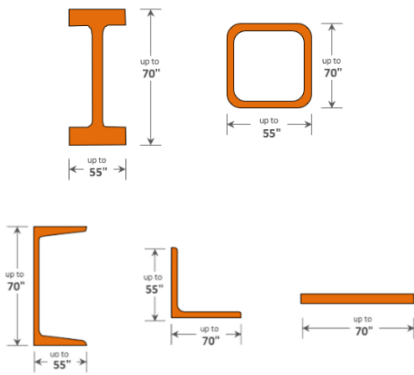
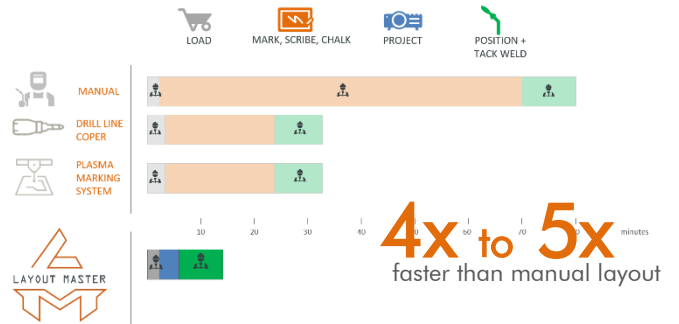
The new way?
LAYOUTMASTER
for high-resolution,
3D color projection of
all connections,
holes, part numbers
on H-Beams, HSS,
Channels, Angles,
Plates and more...



EASY SETUP
in seconds

**The FASTEST way to fit.
 No FLOORSPACE needed.**

The hunt for the best fitting solution is over. Fitting manually is slow and requires a highly trained fitter. Using a drill line or a coping robot can be slow so most fabricators won't use the feature or will mark minimal data. A dedicated marking system takes up a lot of valuable floorspace and you still need to move the beam to a fitting station after.



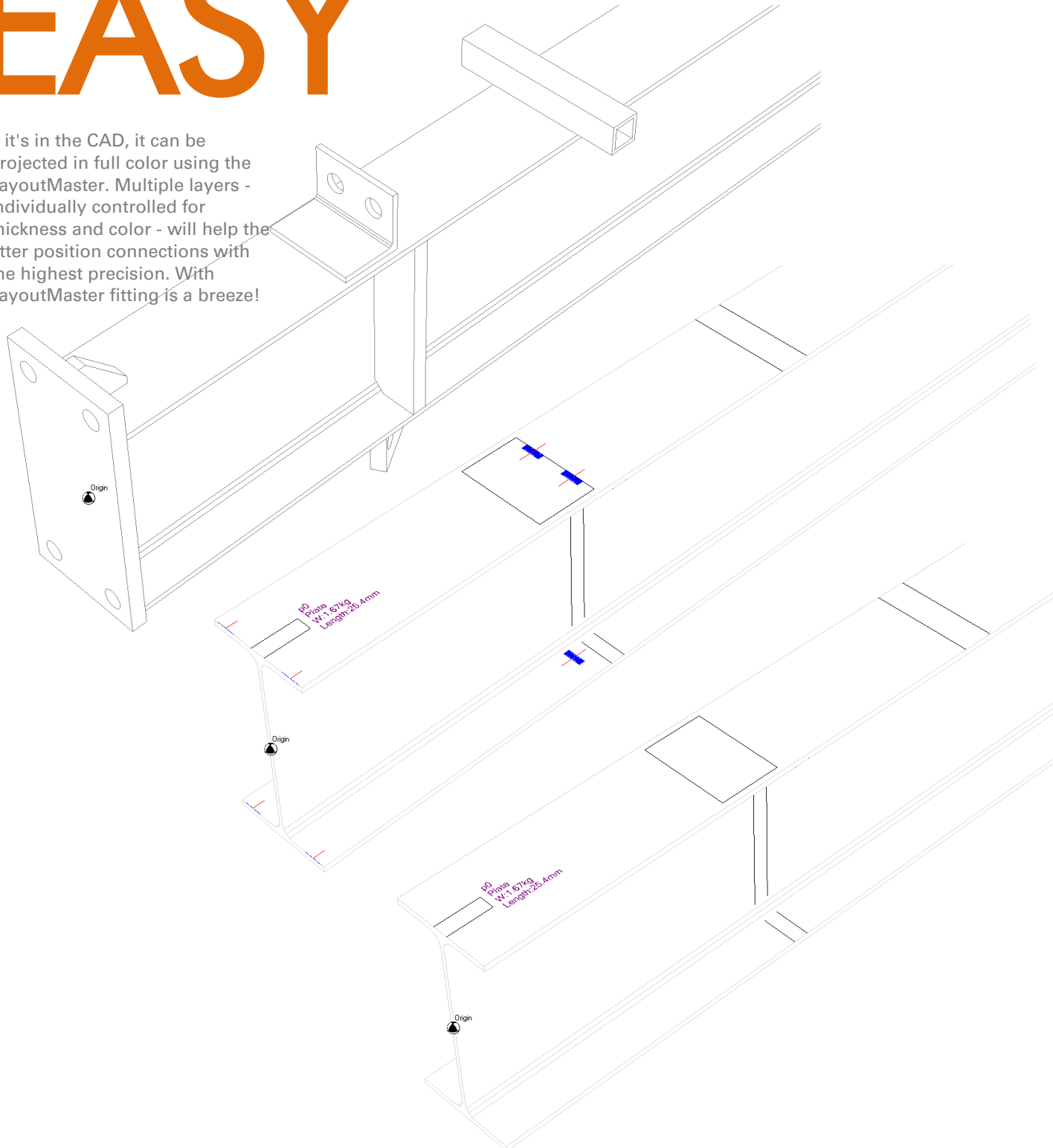
Wide Variety

LayoutMaster will project on a wide variety of profiles. The 3D projection even lets you project a part on another part - easily with great accuracy.



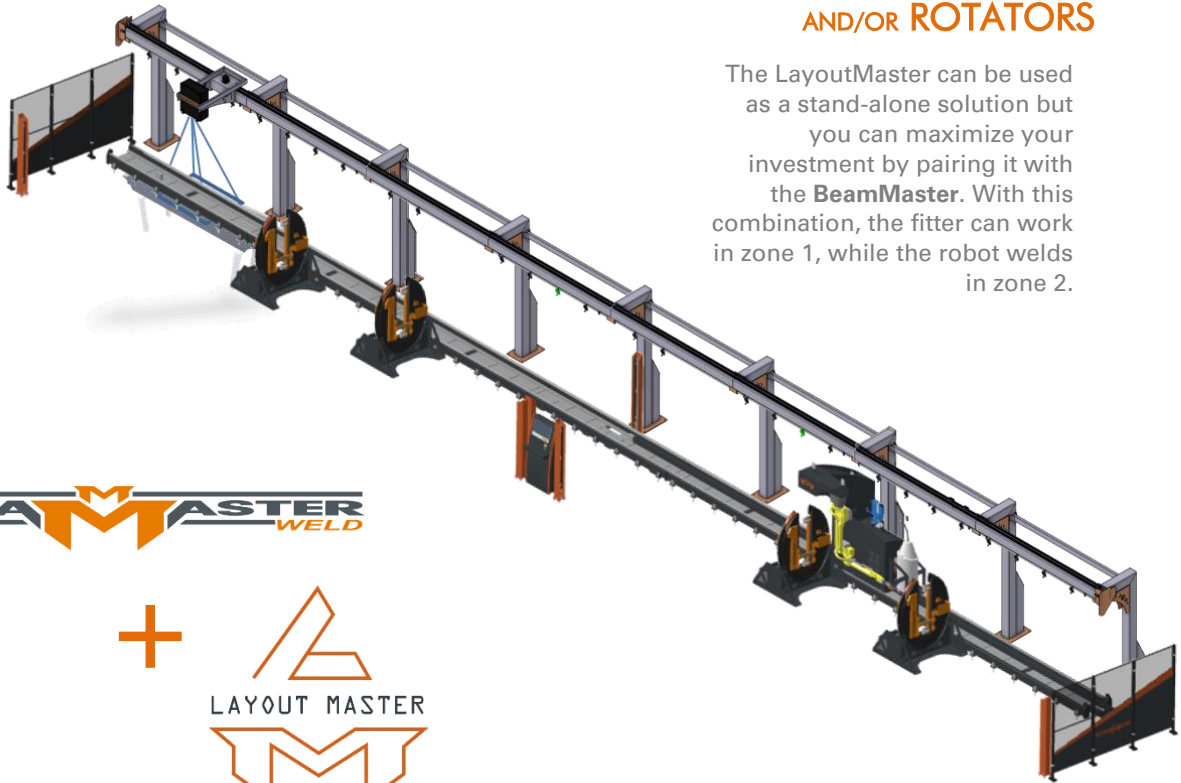
FITTING HAS NEVER BEEN THIS EASY

If it's in the CAD, it can be projected in full color using the LayoutMaster. Multiple layers - individually controlled for thickness and color - will help the fitter position connections with the highest precision. With LayoutMaster fitting is a breeze!



MAKE IT A COMBO COMBINE WITH THE BEAMMASTER AND/OR ROTATORS

The LayoutMaster can be used as a stand-alone solution but you can maximize your investment by pairing it with the **BeamMaster**. With this combination, the fitter can work in zone 1, while the robot welds in zone 2.



ONE
WELDER

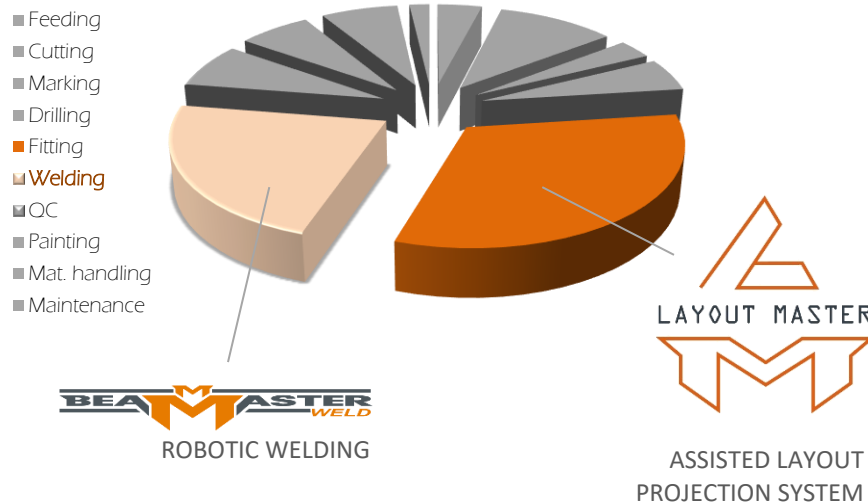


Team of
eight (8)
FITTER /
WELDER



1 OVERVIEW

1.1 WHY INVEST IN THE LAYOUTMASTER FITTING PROJECTION SYSTEM?



The typical steel fabrication shop will **spend between 20 & 30%** of the entire shop fabrication time on **fitting operations**. Along with welding, it's the **most labour-intensive operation** of the entire fabrication process.

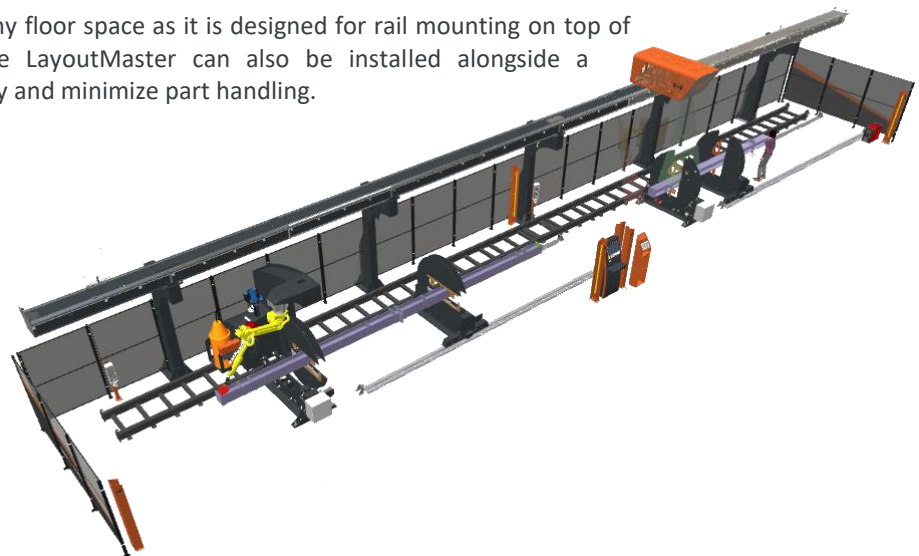
You have likely invested in automated equipment for beam and part preparation; **it's now time** to bring your shop to the next phase: **Assisted Fitting**.

1.2 WHAT IS IT?

The LayoutMaster is a full-color laser projection system that will project all the information that an operator needs to precisely tack-weld connections on the beam or on other connections.

Compared to traditional fitting where a qualified fitter needs to read and understand the assembly drawing, pull-out the measuring tape and mark the beam with a chalk, the LayoutMaster will project complete and comprehensive information so that an operator with limited training can align the connection with the projected line and tack weld it in place.

The LayoutMaster doesn't take up any floor space as it is designed for rail mounting on top of your fitting and welding bays. The LayoutMaster can also be installed alongside a BeamMaster to maximize productivity and minimize part handling.



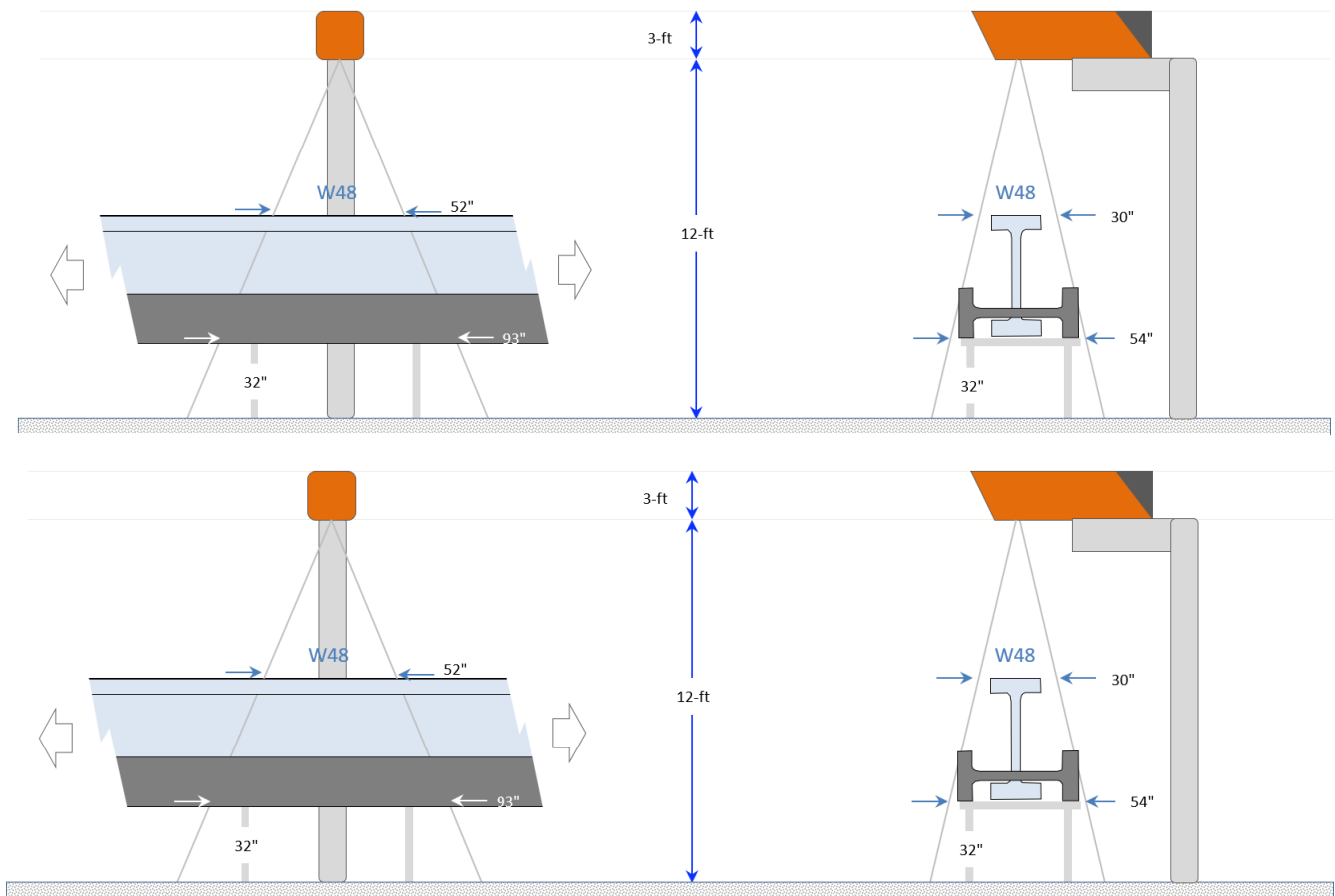
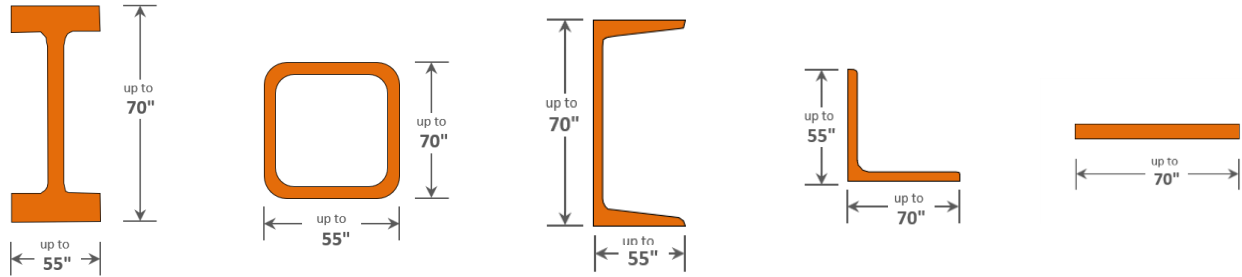
1.4 CONNECTIONS

Will project FULL COLOR data on almost ANY connection types



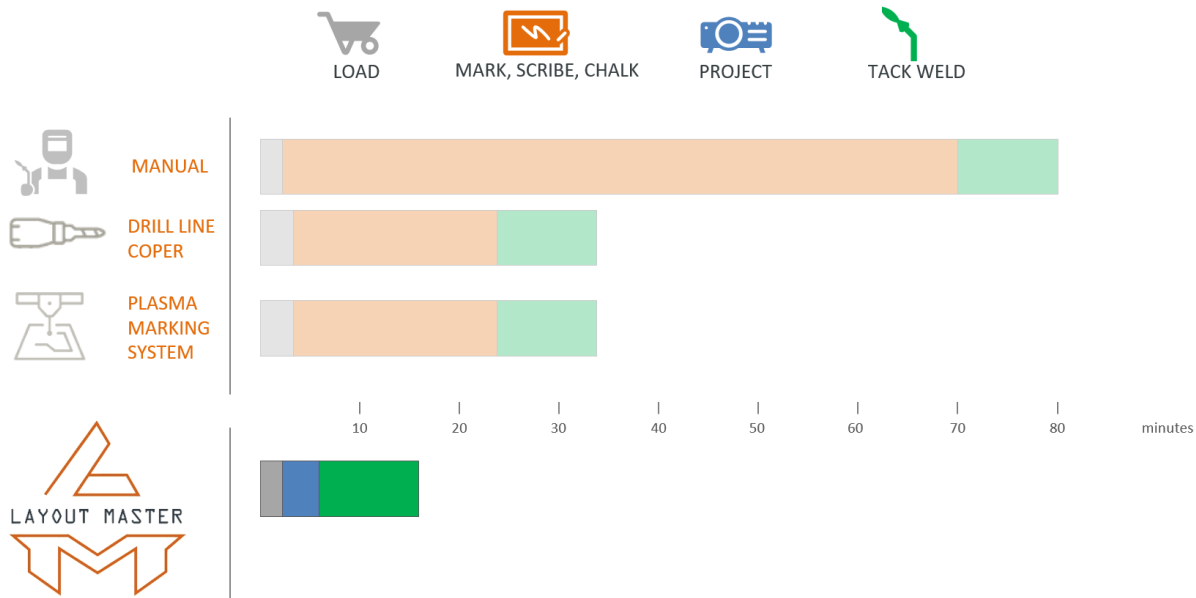
- Web Stiffeners
- Welded Splice Plate
- Base Plates
- Gusset Plates
- Shear Tabs /Fin Plates
- Cap Plates
- Flexible End Plates
- Welded Angle Seats
- Bearing Pads
- Welded Beams to Columns
- Haunched Beam End Plates
- Welded Flange Plates
- Uniform Force Bracing Connections
- Moment Connections
- And Many More

1.5 CAPACITY

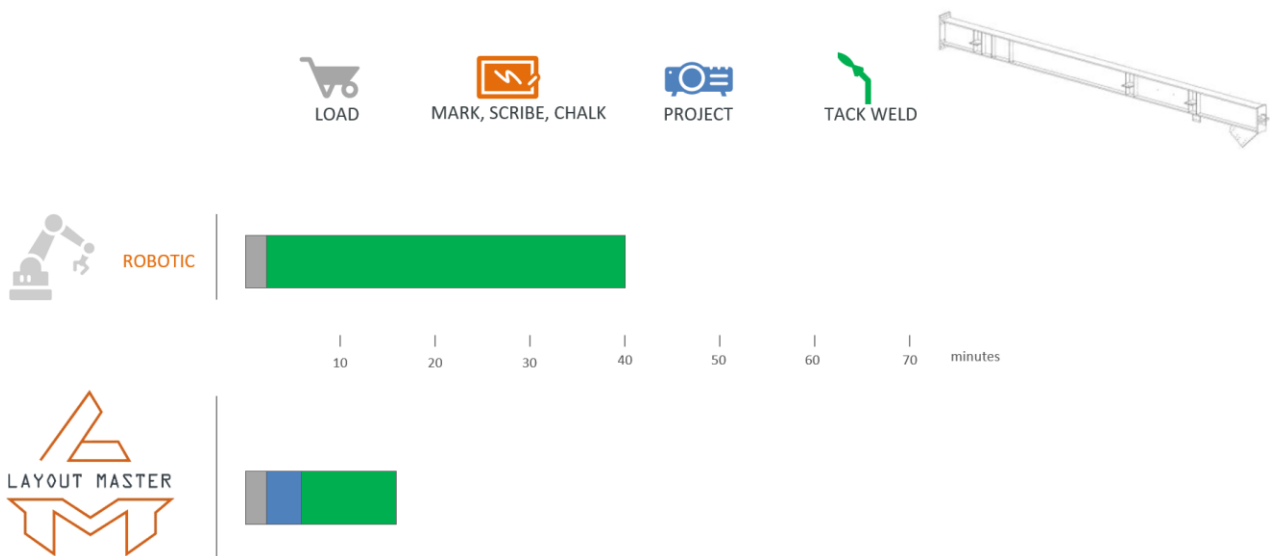


1.6 SPEED





The LayoutMaster is fast! Compared to other marking systems that require more time and manipulation, the LayoutMaster instantaneously projects precise information on the beam. No need to wait for a process to end or to load/unload other equipment that takes valuable floorspace.



When compared to robotic fitting, not only is the LayoutMaster faster but it represents **10% of the cost** of a robotic fitting solution... and an operator is still required to feed parts to the robot.



1.7 COMPARISON WITH OTHER METHODS

	 MANUAL	 DRILL LINE / COPER	 DEDICATED WRITING EQUIPMENT	 LAYOUT MASTER
EASE OF USE				
NO Measuring tape required	✗	✓	✓	✓
Full Color Projection/Marking	✗	✗	✗	✓
Speed NOT affected by number of connections	✗	✗	✗	✓
PLANT				
NO Floorspace	✓	✓	✗	✓
Low Material Handling	✓	✓	✗	✓
Standalone (will not slow other process)	✗	✗	✓	✓
NO Consumables	✗	✗	✗	✓
Beams, Tubes, Channels up to 70" (and more)	✗	✗	✗	✓
Angles, Plates up to 70" (and more)	✗	✗	✗	✓
Miscellaneous assemblies	✗	✗	✗	✓
PERFORMANCE				
Superior Accuracy	✗	✓	✓	✓
Superior Repeatability	✗	✓	✓	✓

1.8 CONFIGURATIONS

The LayoutMaster is fully configurable to fit your need.

At its core it includes

- One (1) Laser Full-Color projection head Assembly
- A 40-ft (12-m) rail comprised of four (4) 10-ft (3m) modules
- A set of four (4) standard rail support columns (one every 10ft (3m))
- One HMI console that includes:
 - o A rugged, detachable, WI-FI Touch Screen tablet for operation and layer selection.
 - o A charging dock station for easy charging of the tablet.
 - o An industrial 8-button Remote Radio Control.
- Cortex for LayoutMaster software to convert Tekla and SDS2 model to projection models

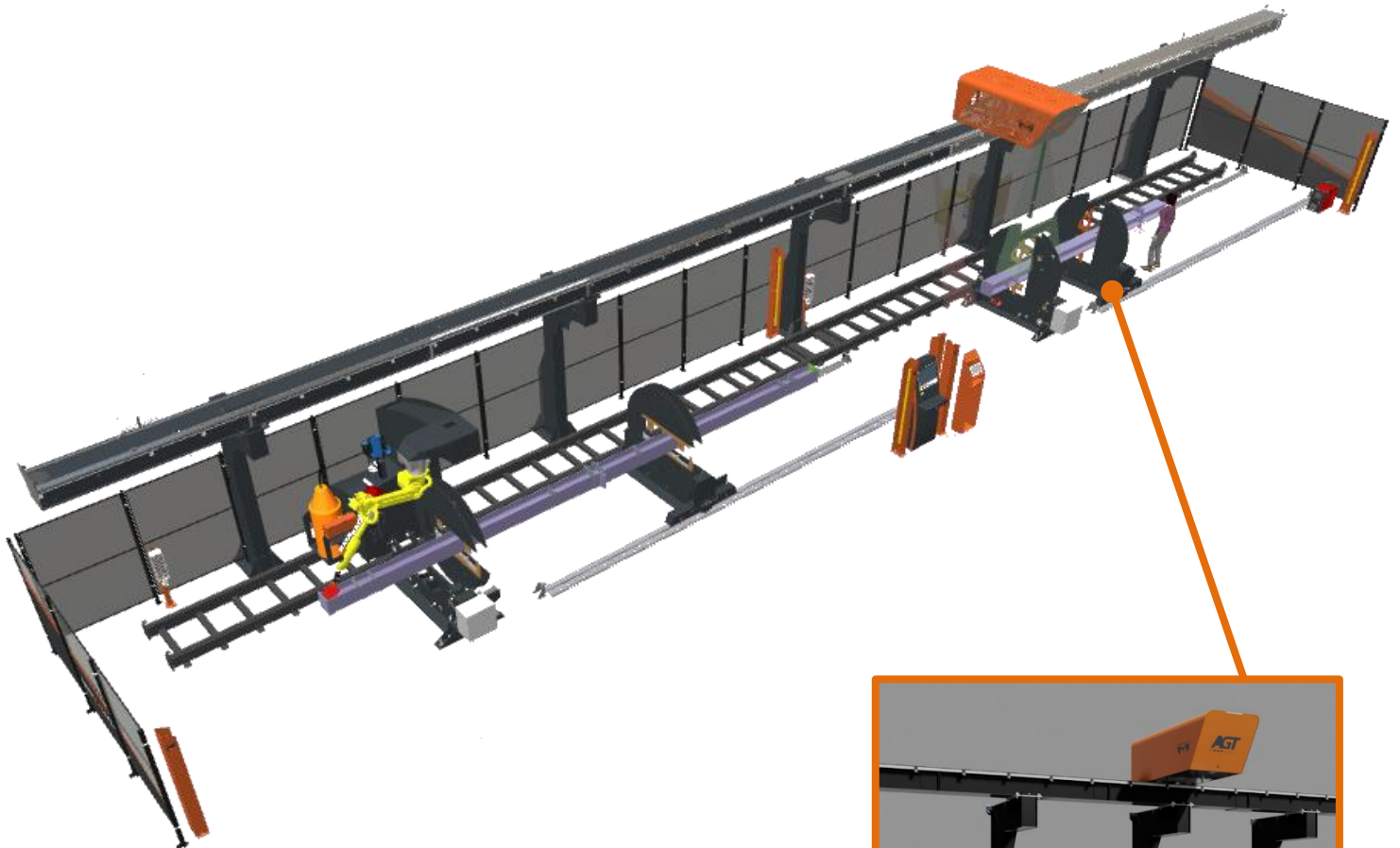


1.8.1 Configuration examples

1.8.1.1 Stand-Alone



1.8.1.2 With BeamMaster Weld



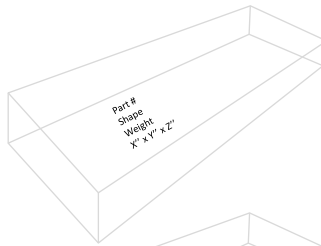
2 PROJECTION INFORMATION

2.1 GENERAL CONCEPT

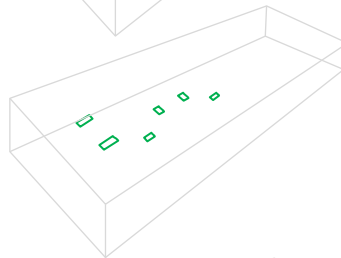
2.1.1 3D Layers

Depending on your preferences, the LayoutMaster comes with a set of 3D Layers. Each layer represents a specific set of information that can be projected on the beam (Beam 3D outlines, connections on the main member, part information, welding information, etc.)

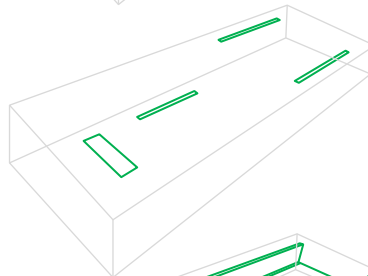
Layer:
Part Info (Current
Accessory)



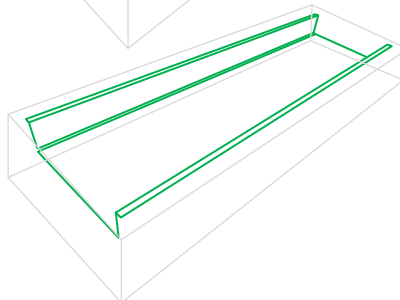
Layer:
All Holes Outline On Beam



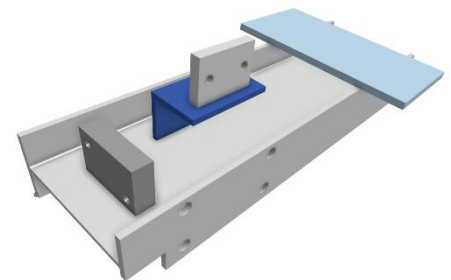
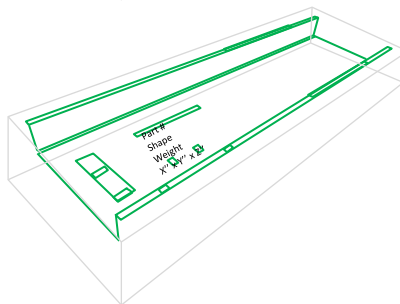
Layer:
All Connections on Beam



Layer:
3D Beam Outline



All Active
Layers



Each layer can be individually customized for:

- Line Thickness
- Color

2.1.2 Layer Groups

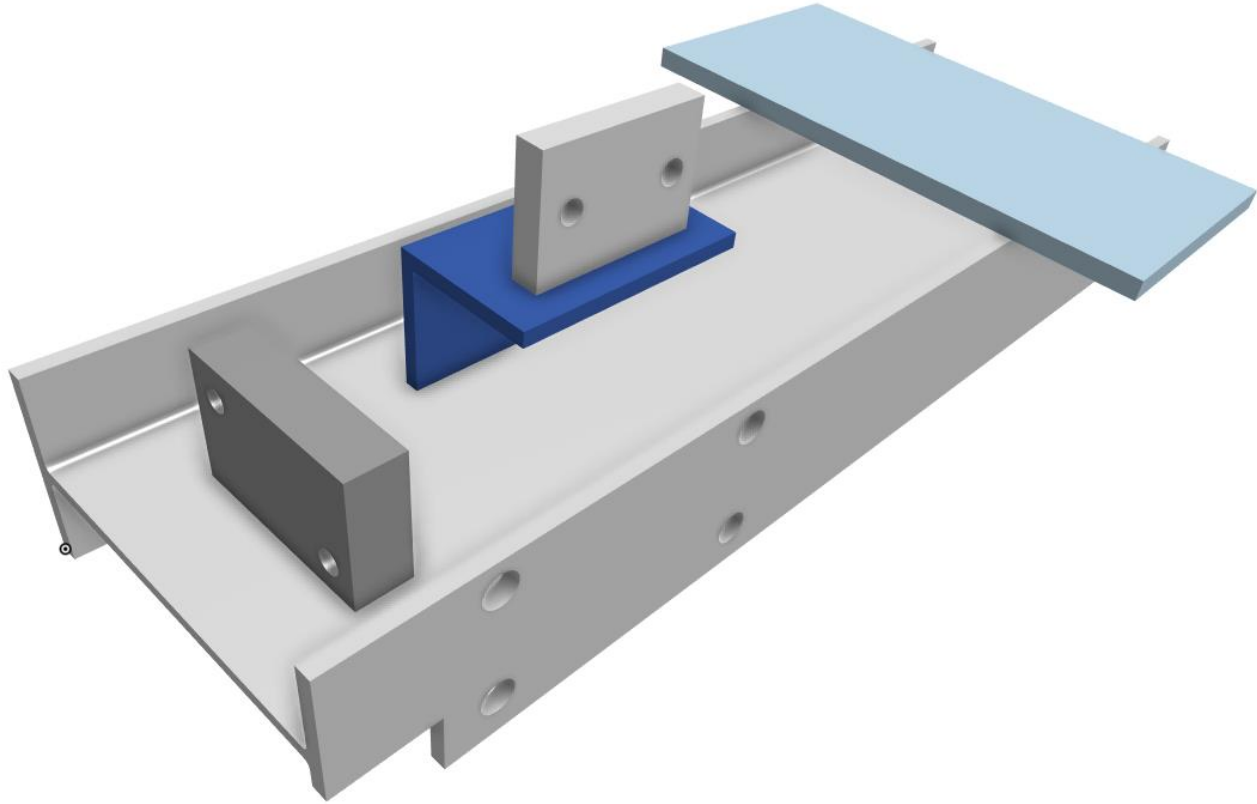
Since there are many layers to choose from, the operator can create Layer Groups, name them and associate them to a Shortcut Key.

When defining a layer group, the operator can also decide the Z-order of layers (i.e. what layer should be on top of what layer)

2.2 LIST OF LAYERS AVAILABLE






Consult ANNEXE 1 for a list of all Layers Available

As a reference, we will use this beam that contains parts with holes, part-on-part, and different scenarios.



3 DELIVERABLES

3.1 MATERIAL

Item	Description ¹	Qty
1	Projection Trolley - Includes: <ul style="list-style-type: none"> ○ Laser Color Projector ○ Wide-Angle Lenses ○ Ventilation unit ○ Industrial PC ○ Wifi network components ○ Bus-bar powered 	 ✓ Included
2	Rail sections - 40-ft (12 m) - Servo-driven - Can be incremented in 10-ft (3m) increment up to 12 sections.	 ✓ Included
3	HMI - To have access to all commands - Pedestal included - Detachable Wireless Tablet - Dock station for easy recharge and at desk operation	 ✓ Included
4	Remote Control - To have access to the most popular controls available on the tablet - Industrial grade - Waterproof - Wireless	 ✓ Included
5	Rail support - Standard Columns - One (1) required for every 10-ft (3m) section - Four (4) included for 40-ft rail - Customer can supply his own design and rail can be fixed to customer design	 ✓ Included

¹ Image for visual reference only

3.2 SOFTWARE

Item	Description	Qty
1	<p>Cortex for LayoutMaster License (Core Software)</p> <ul style="list-style-type: none"> - Perpetual License for 1x PC - Includes plugins for multiple PC: <ul style="list-style-type: none"> o Tekla o SDS/2 o IFC (Advanced Steel, others) 	<p style="text-align: center;">✓</p> <p>Included</p>
2	<p>Cortex for LayoutMaster (Annual Maintenance)</p> <ul style="list-style-type: none"> - The version of Cortex that comes with the equipment will never expire - To get upgrades, new features and offline support, you need to pay the annual maintenance. - During the first year, all upgrades and updates are included with systems - One-year from the delivery date, the Annual Maintenance fees is due (not mandatory). 	<p style="text-align: center;">✓</p> <p>1 year Included</p> <p><i>Optional Annual Maintenance fee</i></p>



3.3 TRAINING



The following training is included with the LayoutMaster.

Description	AGT Responsibility	CLIENT Responsibility
-------------	--------------------	-----------------------

1. TRAINING

Training courses:

Description	Location	Duration		
LayoutMaster Operation Training (8h)	Onsite	1.0 d	✓	Included
LayoutMaster Job Planner (4h)	Onsite	0.5 d	✓	Included
LayoutMaster Maintenance (2h)	Onsite	0.25 d	✓	Included

Living Expenses (Transportation, Lodging, Food, etc.) (for included hours)		✗ Not Included
Training - Any additional hours		✗ Not Included

Summary of content

Title:

Part #:

Schedule:

Location:

Prior courses required:

Duration

Description:

LayoutMaster Operation Training

50-FOR-10

Mandatory training. Must be completed prior to machine installation. Included

On-site (with live trainer)

(none)

8 hours

This course is designed for fitters. It is divided into two (2) 4h-sessions.

A full license of Cortex will be installed on the tablet at the customer's location.

Course can be taken by a maximum of 4-persons

Throughout the course, students will be able to use the equipment to practice.

At the end of this course, students should be able to:

- Load jobs and beams
- Set the origin of a beam
- Use the tablet to do all functions
- Use the remote control to do the most common functions
- Understand layers and layers groups
- Align lasers each time the projector moves
- Customize the fitting environment

3.4 LABOUR (TESTS, APPROVAL, INSTALLATION, COMMISSIONING)

Description	AGT Responsibility	CLIENT Responsibility
2. TRANSPORTATION		
Transportation from AGT's premise to client's plant		✗ Not Included
Unloading and transportation to final location		✗ Not Included
Provide weights and dimension and attachment details	✓ Included	
3. INSTALLATION (AT CLIENT'S FACILITIES)		
Installation <i>Includes:</i> <ul style="list-style-type: none"> - One (1) Installation Supervisor to manage client's installation team - Mechanical and Electrical installation of entire system <i>(1) Might be less depending on configuration (length, customer support, etc.)</i> 	✓ Included 24 hours⁽¹⁾	
Living Expenses (Transportation, Lodging, Food, etc.) (for included hours)		✗ Not Included
Installation - Any additional hours		✗ Not Included
Work permit, visa or any administrative fees for foreign workers (if required)		✗ Not Included
4. COMMISSIONING (AT CLIENT'S FACILITIES)		
Commissioning <i>Includes:</i> <ul style="list-style-type: none"> - One (1) Automation Specialist on-site - Trials and tests on complete system - Final adjustments - Signature of document by client for specifications approval 	✓ Included 16 hours	
Living Expenses (Transportation, Lodging, Food, etc.) (for included hours)		✗ Not Included
Commissioning - Any additional hours		✗ Not Included
Any additional permits (if required)		✗ Not Included
5. DOCUMENTATION		
AGT's Operation & Maintenance Manual (Online)	✓ Included	
Original Equipment Manufacturer Operation & Maintenance Manual(s)	✓ Included	

3.5 LABOUR (OTHER)

Description	OCEAN/AGT Responsibility	CLIENT Responsibility
1. SAFETY		
Safety analysis of AGT equipment	✓ Included	
Compliance to other Local Norms		✗ Not Included
2. FABRICATION AND ASSEMBLY		
Purchase of components	✓ Included	
Fabrication and assembly on AGT shop floor	✓ Included	
3. CIVIL WORKS		
Provide equipment descriptions, such as: dimension, weight, trench size, etc.	✓ Included	
Design and civil works at the client's plant, as required		✗ Not Included
4. SERVICES		
Electric supply connections		✗ Not Included
Ethernet and Internet communication network connections (Available bandwidth of at least 10 Mbits/sec). Warranty is void if the Ethernet Connection not available.		✗ Not Included
5. SPARE PARTS		
Supply of spare parts A list of recommended spare parts will be provided at the beginning of the project. Customer is responsible to provide critical spare parts prior to system commissioning		✗ Not Included
6. MISCELLANEOUS		
Update of client installation / floor plan drawings (if required)		✗ Not Included
Modification or special preparation on parts supplied by client (parts should be supplied ready for welding)		✗ Not Included
All required project drawing and data		✗ Not Included
7. WARRANTY		
Warranty for a period of 1 year or 2,000 hours	✓ Included	
Manufacturers warranties apply	✓ Included	

3.5.1 CAD Input



cortex
structural
PLUGIN

cortex
structural
PLUGIN

IFC
EM11

IFC
EM11

MAIN MEMBER TYPE				
W-Beam	✓	✓	✓	✓
HSS	✓	✓	✓	✓
Channel	✓	0	✓	✓
Fabricated Beam	✓	0	✓	✓
GENERAL FEATURES				
Supports Coped beams	✓	✓	✓	✓
Can Read Holes	✓	✓	✓	✓
WELDING INFORMATION				
Can read...				
...Weld Position	✓	✓	0	0
...Weld Size	✓	✓	✓	✓
...Multi-Pass information from CAD	✓	✓	✓	✓
...Stitch Welds from CAD	✓	0	0	0
Cortex can generate				
...Welds in Catch All mode	✓	✓	✓	✓
...Stich Welds	✓	✓	✓	✓
...Welds between coped section and accessories on IBeam	✓	✓	✓	✓
...Welds between coped section and accessories on HSS	✓	✓	✓	✓
DELETE				
...Accessories in Cortex	✓	✓	✓	✓
...Welds in Cortex	✓	✓	✓	✓

LEGEND

- ✓ Supported
- 0 Not included (but technically possible to add in future releases)
- ✗ Not supported

NOTE:

Please contact us for SDS2², Tekla³, Advanced Steel, Tekla or Solidworks versions that are supported

² SDS2 versions supported: Current version (2018), dating back to "Version 2014"

³ Tekla versions supported: Current version (2018), dating back to "Version 20.0" are supported.

4 INPUT REQUIREMENTS

	Equipment	Voltage	Freq	Phases	
Electrical	AGT Main Electrical Panel	208 VAC +/- 10%	50/60 Hz	3	
Ethernet speed	Upload / Download speed at 10Mbps				
Operating Temperature	32°F to 104°F (0°C to 40°C)				

5 CORTEX FOR LAYOUTMASTER

5.1 WHAT IS IT

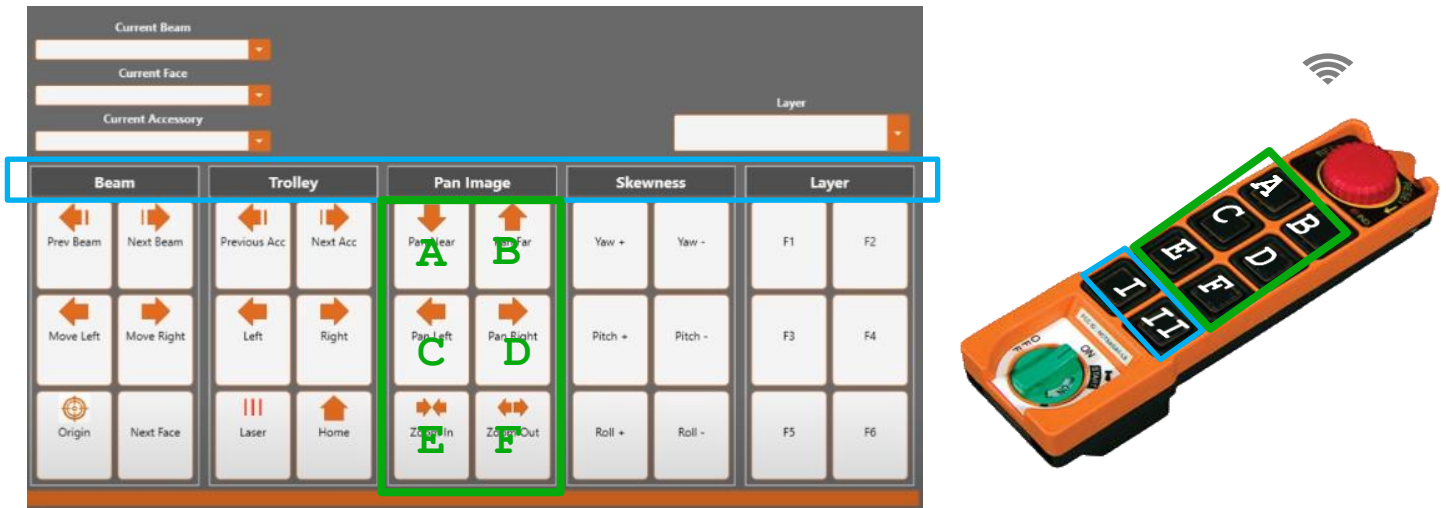
Cortex for LayoutMaster extends the capacity of Cortex Structural software to generate all the information needed by the fitter to properly fit without any paper or tablet drawing. The position of accessory is calculated and precisely projected in relation to the beam's origin.



Cortex for LayoutMaster is fully configurable to match the requirements of every fabricator.

5.2 SCREENS

5.2.1 Main Operating Page

This page is available on the tablet. It is designed to mimic the rugged remote control that is used to operate the LayoutMaster system. All operations are available on the tablet. The most popular operations are available on the remote control.



Function	SubFunction	Description	Remote Control	Tablet
Modes	Change Mode	Will select the active mode.	Press  to change mode (going LEFT) Press  to change mode (going RIGHT)	Press on the section header to select the right mode.




























Function	SubFunction	Description	Remote Control	Tablet
Beam Mode	Previous Beam	The current projection will be switched to the previous beam from the Beam Manager list.		
	Next Beam	The current projection will be switched to the next beam from the Beam Manager list.		
	Move Left	The projection of the current beam will be virtually moved to the left .		
	Move Right	The projection of the current beam will be virtually moved to the right .		
	Origin	Once the end of the virtual beam matches the real beam, clicking Origin will set the zero.		
	Next Face	Click to project the next face of the current beam.		
	PROJECTOR	Previous Connection	PRESS & RELEASE: Will put the PREVIOUS connection as the CURRENT connection. ("Jog Left or Right" needs to be pressed for the projector to move on top of it)	
Next Connection		All layers pointing to "Current", "Next" and "Previous" connections will be updated. PRESS & RELEASE: Will put the NEXT connection as the CURRENT connection. ("Jog Left or Right" needs to be pressed for the projector to move on top of it)		
Jog Left		All layers pointing to "Current", "Next" and "Previous" connections will be updated. PRESS & RELEASE If next connection is LEFT, it will slowly move and stop centered on top of current connection.		
Jog Right		PRESS & HOLD Will jog the projector trolley LEFT. It will stop on the current connection. PRESS & RELEASE If next connection is RIGHT, it will slowly move and stop centered on top of current connection.		
Show Lasers		PRESS & HOLD Will jog the projector trolley RIGHT. It will stop on the current connection.		
Home		Toggles to show reference (RED) Lasers ON & Off		
		Home	PRESS & RELEASE Sets the destination to HOME ("Jog Left" needs to be pressed for the projector to move Home)	

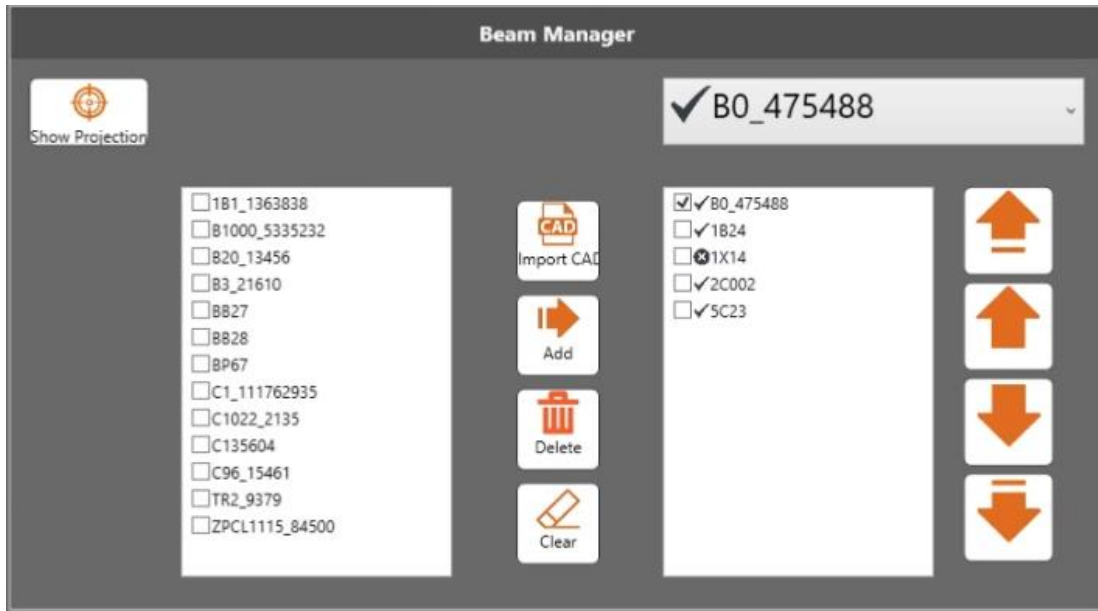
IMAGE	Pan Near	Will move the virtual image closer to the operator as he faces the beam.	A
	Par Far	Will move the virtual image away from the operator as he faces the beam.	B
	Pan Left	Will move the virtual image LEFT.	C
	Pan Right	Will move the virtual image RIGHT.	D
	Zoom In	Zooms the virtual image (from the projector) closer (image will appear larger).	E
	Zoom Out	Zooms the virtual image (from the projector) farther (image will appear smaller).	F



Function	SubFunction	Description	Remote Control	Tablet
TILT	Yaw +	Rotates the virtual image Clockwise around the X-axis (parallel to the rail)		
	Yaw -	Rotates the virtual image CounterClockwise around the X-axis (parallel to the rail)		
	Pitch +	Rotates the virtual image Clockwise around the Y-axis (perpendicular to the rail)		
	Pitch -	Rotates the virtual image CounterClockwise around the Y-axis (perpendicular to the rail)		
	Roll +	Rotates the virtual image Clockwise around the Z-axis (floor to ceiling axis)		
	Roll -	Rotates the virtual image Counterclockwise around the Z-axis (floor to ceiling axis)		
LAYERS	Group F1	PRESS ONCE: Shows Layers from Group F1 PRESS AGAIN: Hides Layers from Group F1		
	Group F2	PRESS ONCE: Shows Layers from Group F2 PRESS AGAIN: Hides Layers from Group F2		
	Group F3	PRESS ONCE: Shows Layers from Group F3 PRESS AGAIN: Hides Layers from Group F3		
	Group F4	PRESS ONCE: Shows Layers from Group F4 PRESS AGAIN: Hides Layers from Group F4		
	Group F5	PRESS ONCE: Shows Layers from Group F5 PRESS AGAIN: Hides Layers from Group F5		
	Group F6	PRESS ONCE: Shows Layers from Group F6 PRESS AGAIN: Hides Layers from Group F6		

5.2.2 Beam Manager

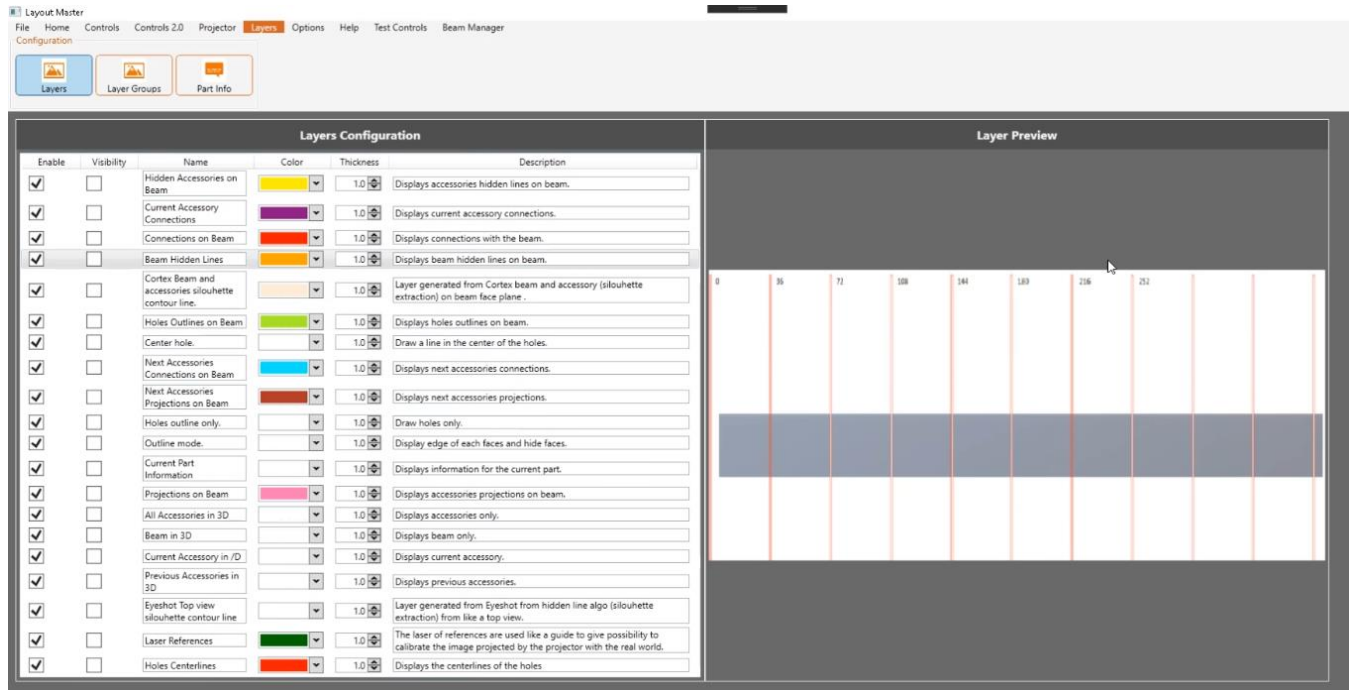
Use this screen in order to build the list of Beams to fit.



5.2.3 Layers Parameters

Using this interface, the administrator of the LayoutMaster can control many aspects of layers available:

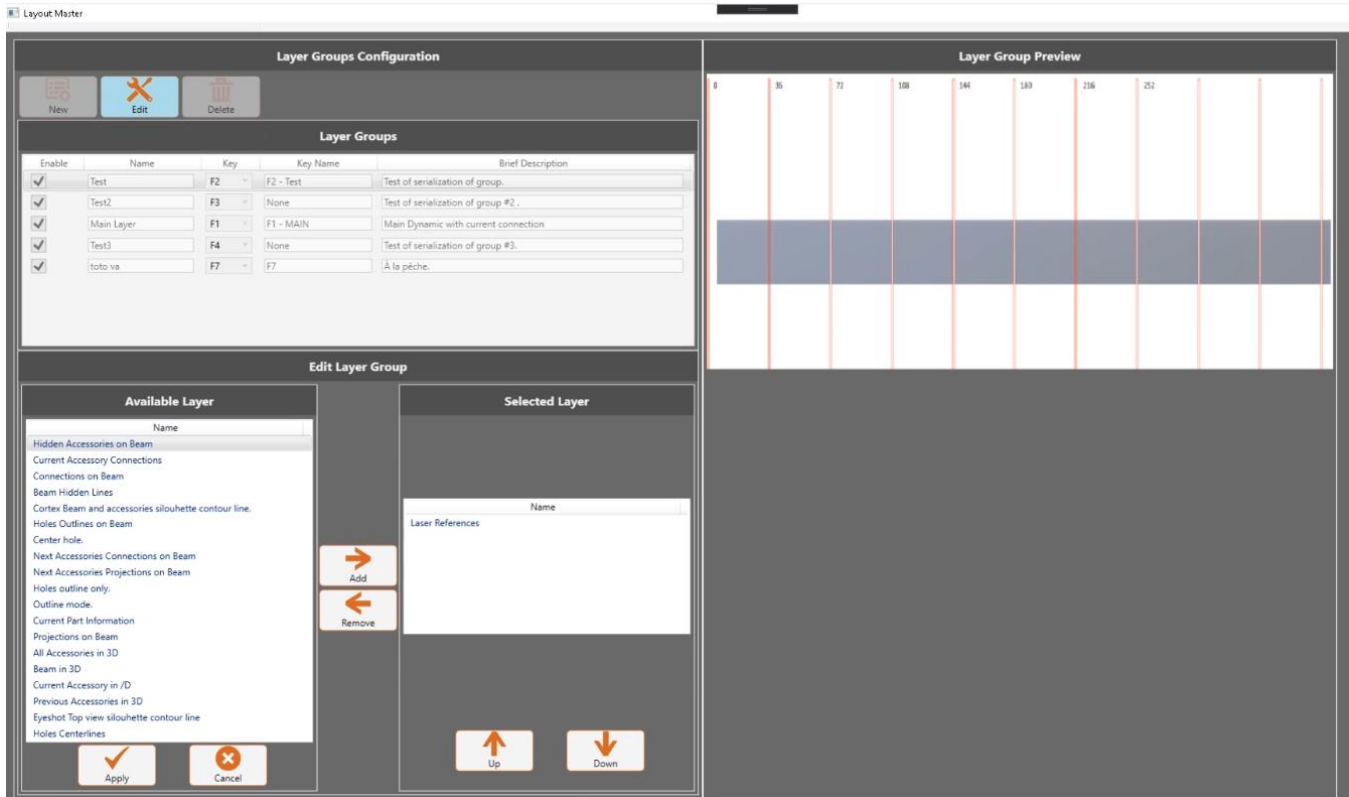
- **Enable:**
 - o Checked: Layer is enabled (active) and can be used in Layer Groups
 - o Not Checked: Layer is disabled (not active) and cannot be part of any Layer Groups.
- **Visibility:**
 - o Checked: Layer is visible in the current projection
 - o Not checked: Layer is not visible in the current projection
- **Name:**
 - o Describes the content of the layer
- **Color:**
 - o Sets the color for the selected layer
- **Thickness**
 - o Sets line thickness (in pixels). One pixel is approx. 1/32" (or 0.5 mm)
- **Description:**
 - o Displays a more detailed description of each layer



5.2.4 Layer Groups

With this page, you can create an unlimited number of Layer Groups.

A Layer group contains 1 or many ordered layers and can be associated with a Key (from F1 to F12)



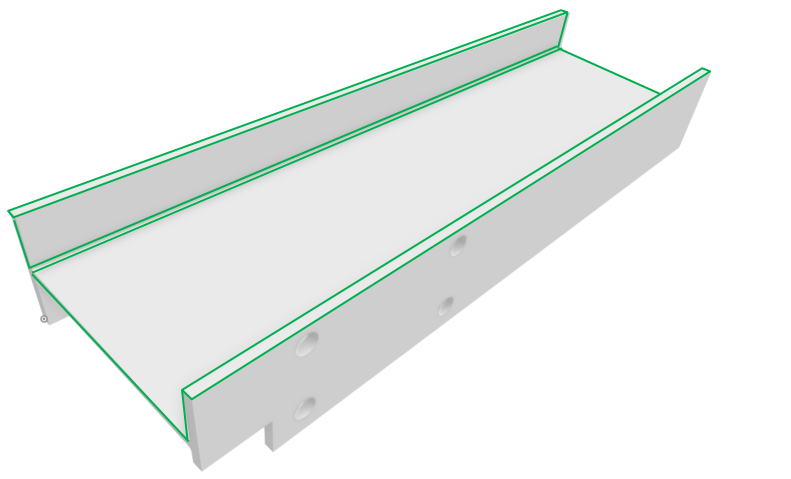
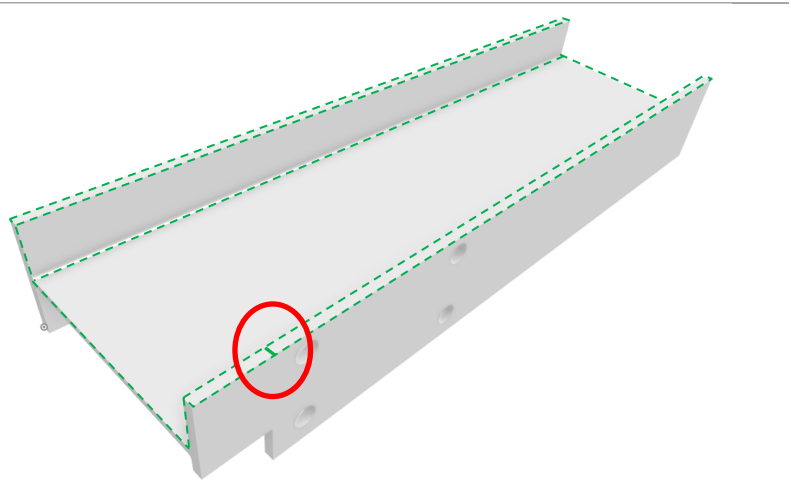
The screenshot displays the 'Layout Master' software interface, divided into three main sections:

- Layer Groups Configuration:** Contains a table of existing layer groups.

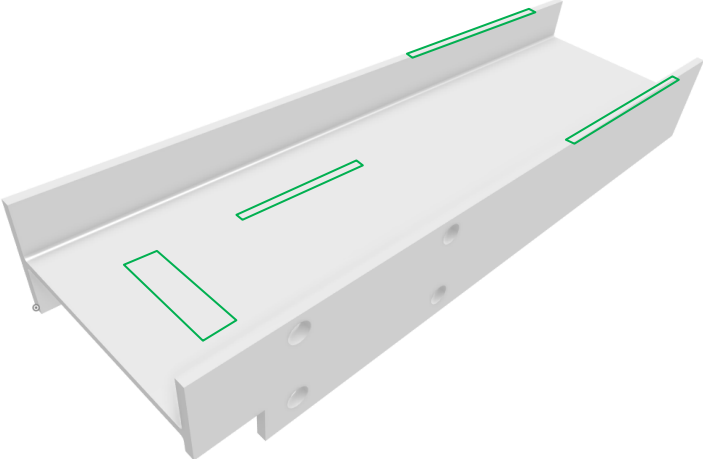
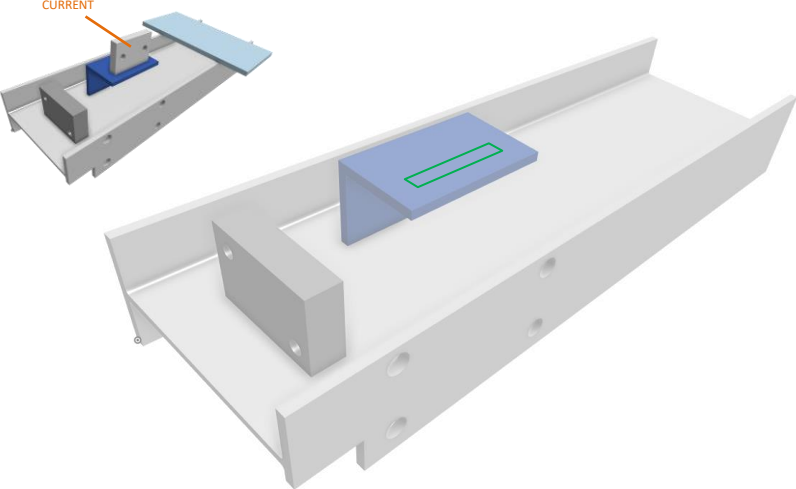
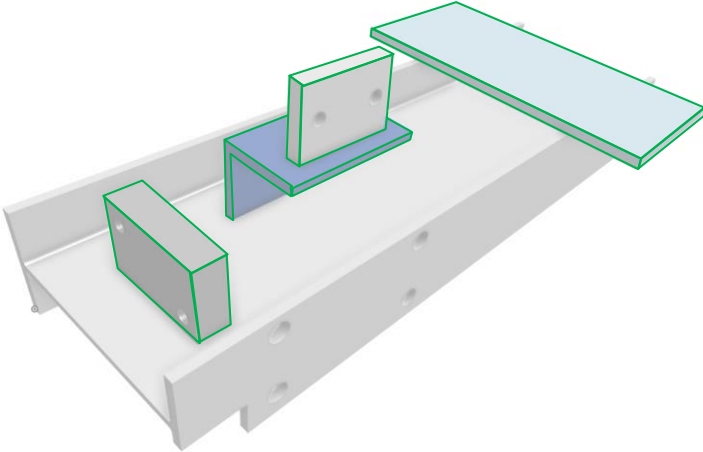
Enable	Name	Key	Key Name	Brief Description
<input checked="" type="checkbox"/>	Test	F2	F2 - Test	Test of serialization of group.
<input checked="" type="checkbox"/>	Test2	F3	None	Test of serialization of group #2.
<input checked="" type="checkbox"/>	Main Layer	F1	F1 - MAIN	Main Dynamic with current connection
<input checked="" type="checkbox"/>	Test3	F4	None	Test of serialization of group #3.
<input checked="" type="checkbox"/>	toto va	F7	F7	À la pêche.
- Edit Layer Group:** Features two lists: 'Available Layer' (listing various beam and accessory options) and 'Selected Layer' (currently empty). It includes 'Add' and 'Remove' buttons between the lists, and 'Up' and 'Down' buttons at the bottom for reordering. 'Apply' and 'Cancel' buttons are at the bottom left.
- Layer Group Preview:** A visual representation of a layer group, showing a grid of vertical lines (representing layers) and a horizontal bar (representing a group) spanning across them.

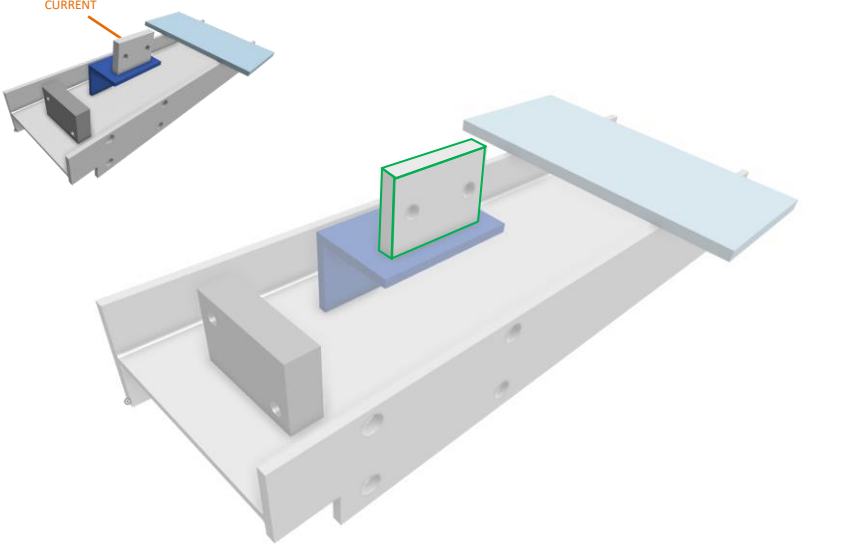
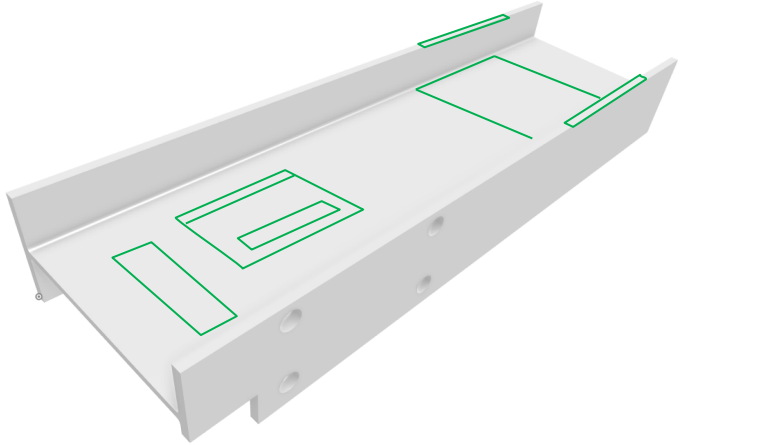
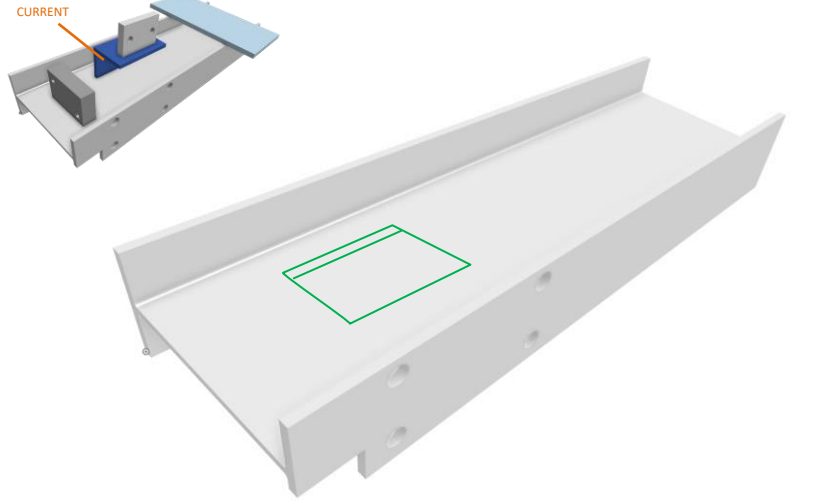
6 ANNEX 1

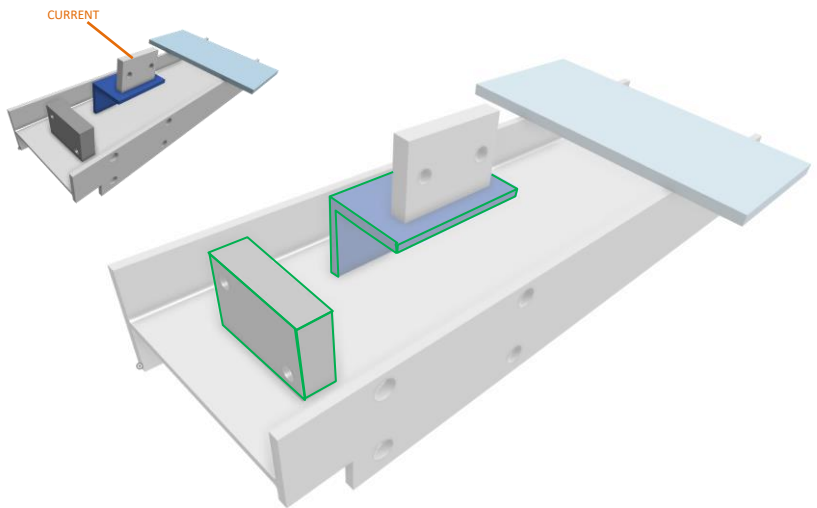
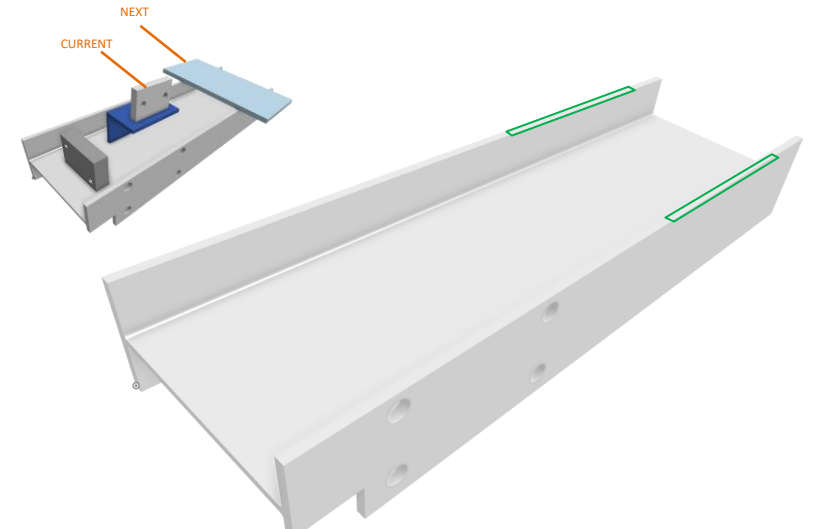
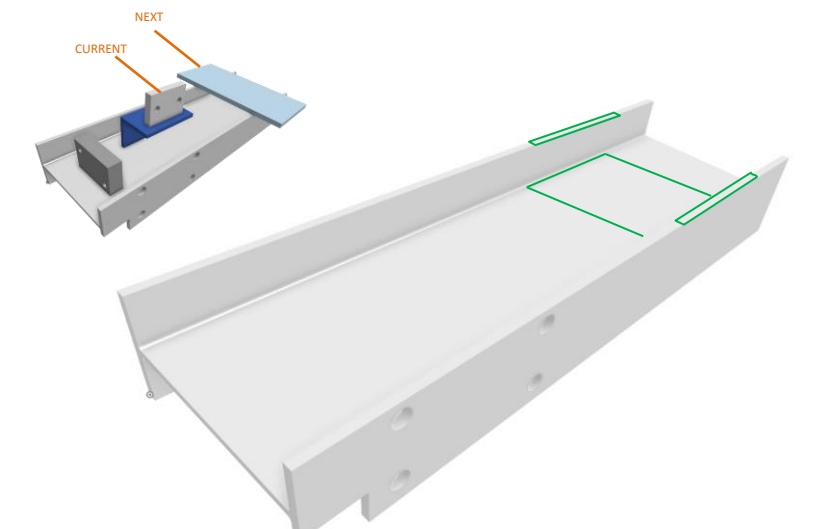
6.1.1 Beam Layers

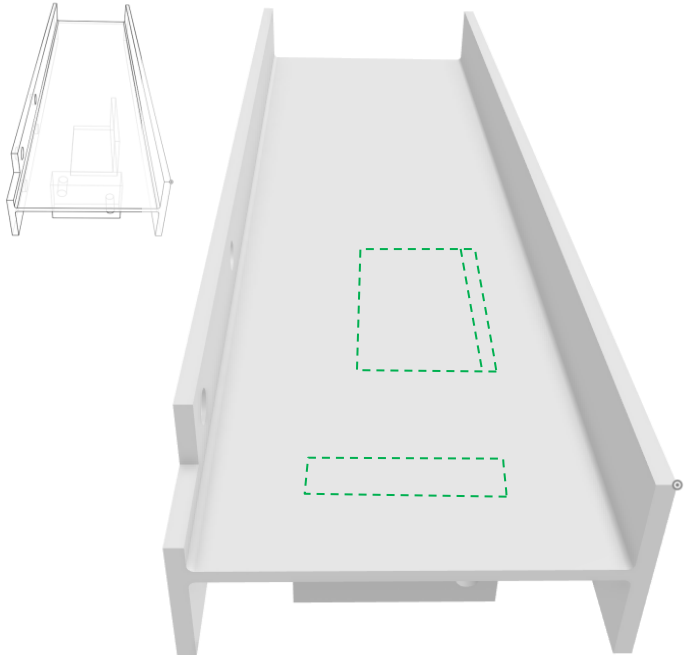
	Name	Description	Example
1.	Beam 3D	3D of the visible surface of the Beam	
2.	Beam Hidden	Hidden lines of the beam projected on visible surface of the beam	

6.1.2 Connections Layers

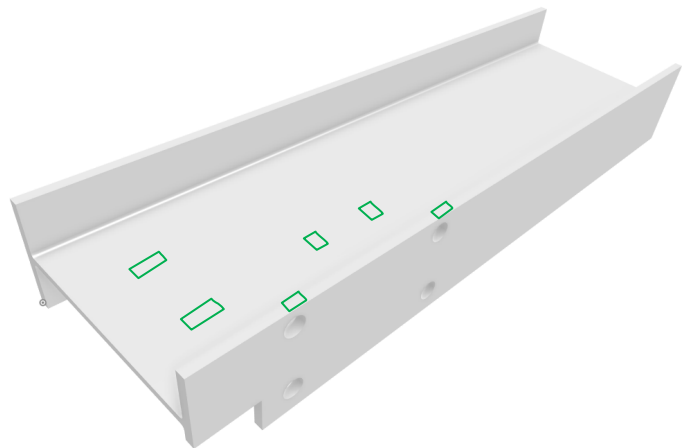
Name	Description	Example	
3.	Connections on Beam - ALL	All intersection between accessories and visible surface on beam	
4.	Current Connections on mating surface	All intersection between current accessory and his mating surface with previous accessories	
5.	3D Connections - ALL	3D of all visible accessories	

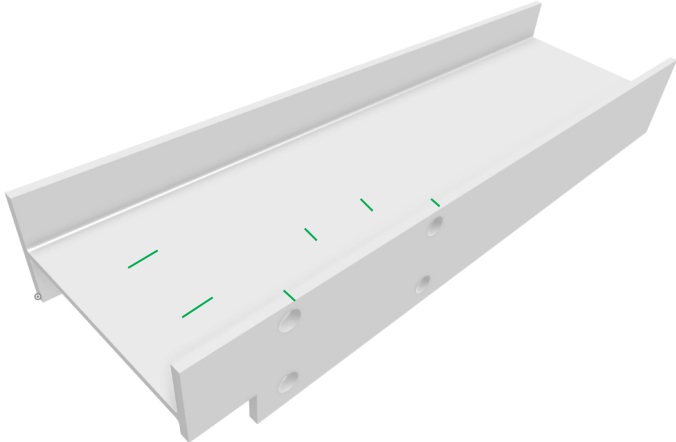
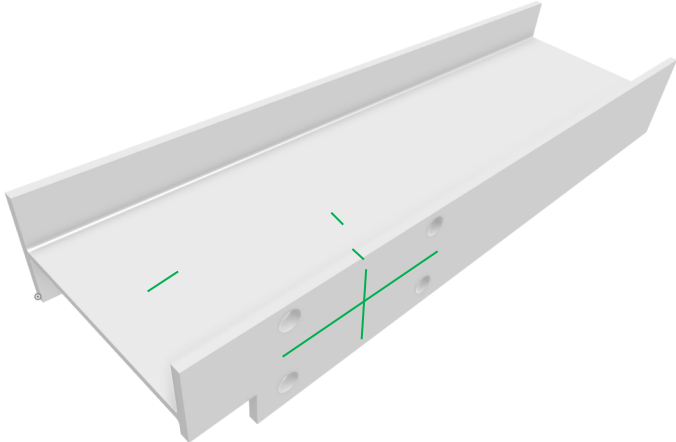
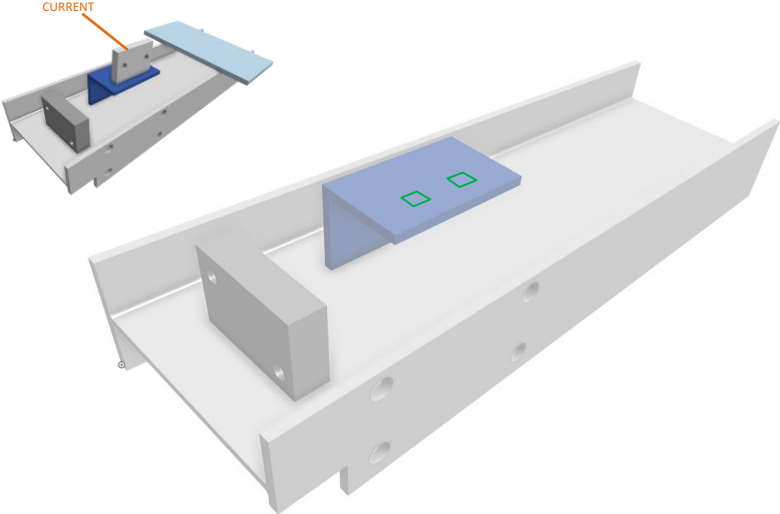
Name	Description	Example
6. 3D Connection - Current	3D of the current selected accessory	
7. Projections on Beam - ALL	All outlines of all visible accessories projected on the visible surface of the beam	
8. Projections on Mating Surface - ALL	All outlines of current accessory projected on its mating surface	

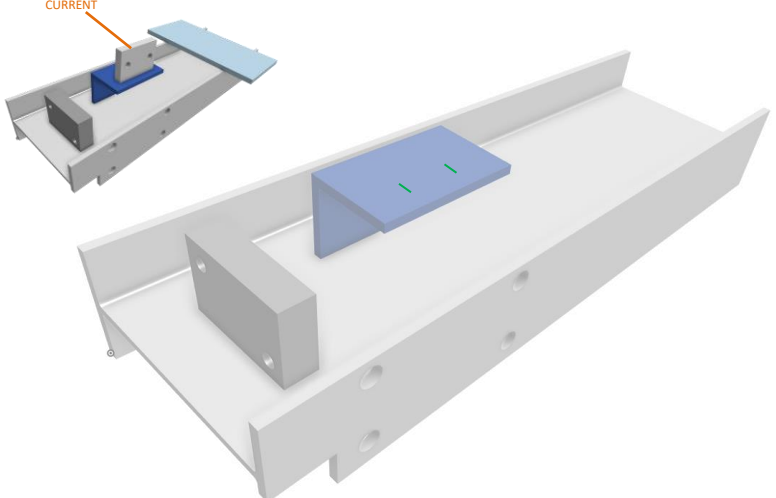
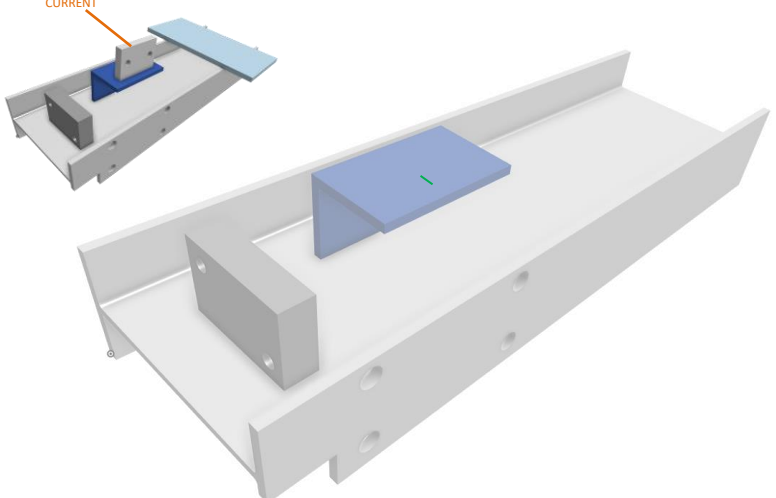
Name	Description	Example
9. 3D Connections - PREVIOUS	All accessories before the current one are 3D.	
10. 3D Connections - NEXT	Same as Connections on beam but only for the accessories after the current ones.	
11. Projections on Beam - NEXT	Same as projection on Beam but only for the accessories after the current ones.	

Name	Description	Example
12. Hidden on beam - ALL	Projection hidden outline of visible accessories on visible beam surface	

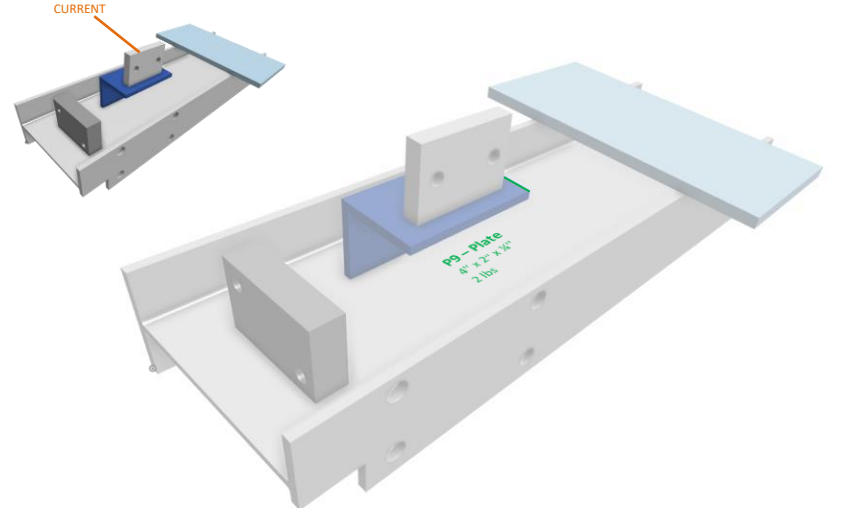
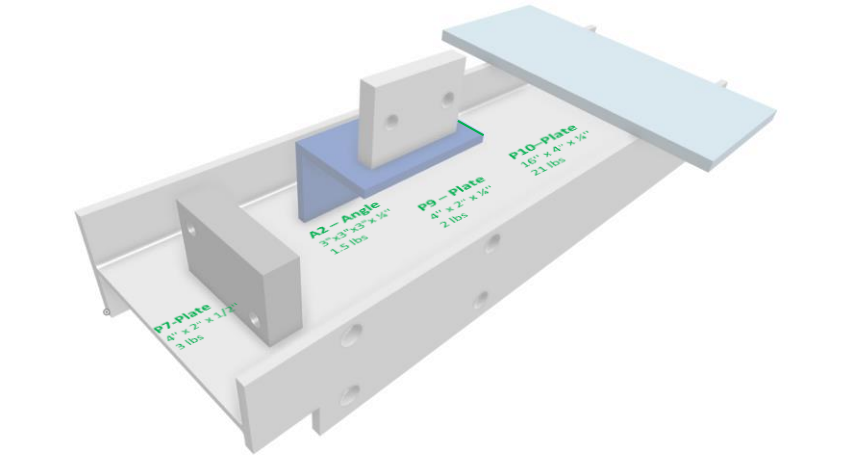
6.1.3 Holes Layers

Name	Description	Example
13. Holes Outlines on Beam - ALL	Projection of the holes outline of visible parts on visible beam surface	

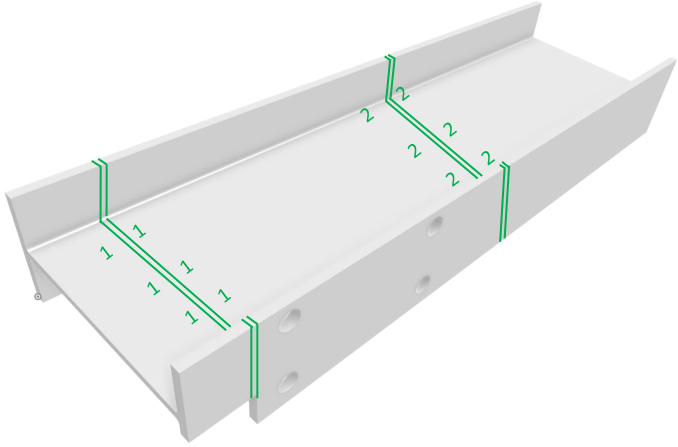
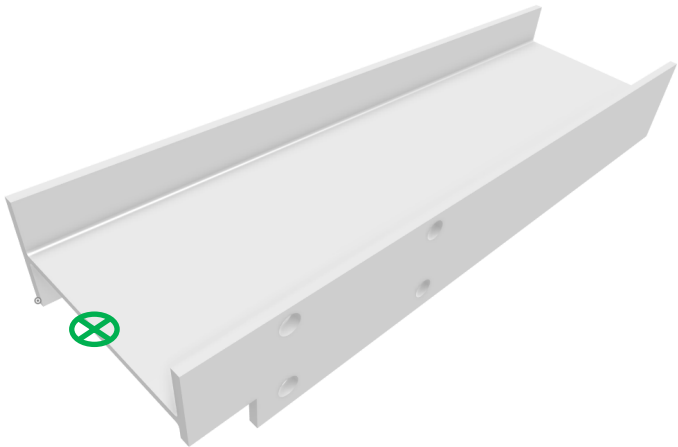
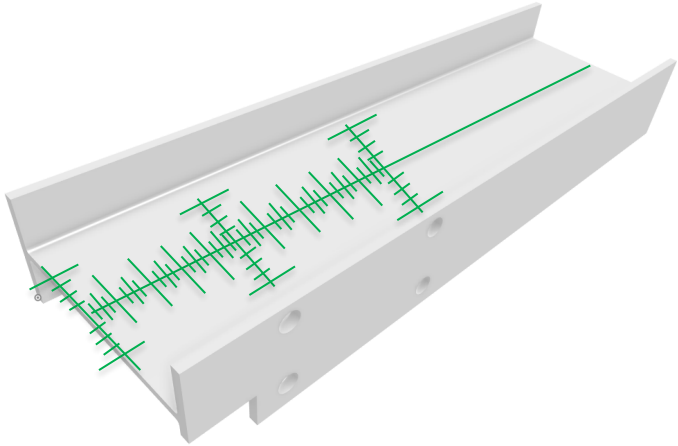
Name	Description	Example	
14.	Holes Centerlines on Beam - ALL	Projection of the holes center lines of visible parts on visible beam surface	
15.	Holes Group Centerlines on Beam - ALL	Projection of the center line of a group of holes of visible parts on visible beam surface	
16.	Holes Outlines - Current	Projection of the holes outline of current accessory on mating surface	

Name	Description	Example
17. Holes Centerlines - Current	Projection of the holes center lines of current accessory on visible mating surface	
18. Holes Group Centerline - Current	Projection of the center line of a group of holes of the current accessory on mating surface	

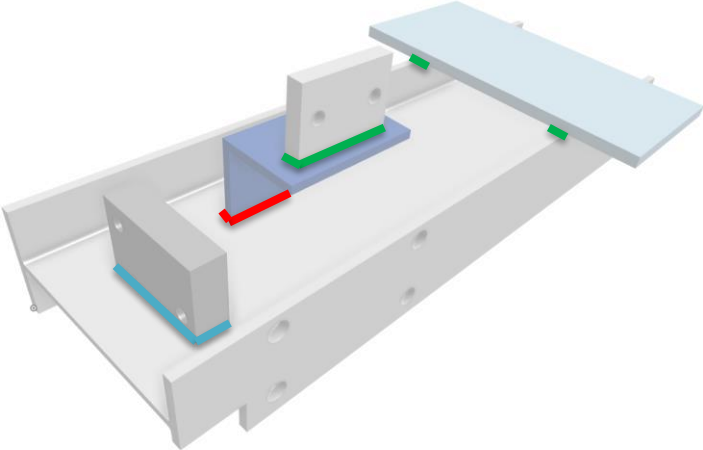
6.1.4 Part Information Layers

Name	Description	Example
19.	Part Info - Current Projection of the current part info on an open area on the mating surface	
20.	Part Info - All Projection of all parts info on open areas of the beam main surface	


6.1.5 Alignment Tools Layers

Name	Description	Example
21. Laser	Intersection of all laser plan with the visible surface of the beam	
22. Beam Origin	Beam Origin projected on the visible beam Surface	
23. Ruler	2D ruler/grid defined in option file	

6.1.6 Weld Layers

Name	Description	Example
24. Weld Segment	3D of all weld segment not simulated (BLUE)	
25. Weld Segments - ALL - PASS	3D of all weld segment pass on simulation (GREEN)	
26. Weld Segments - ALL - FAIL	3D of all weld segment failed on simulation (RED)	

6.1.7 Other Layers

Name	Description	Example
27. Image	<p>Image to display on the top main surface.</p> <p>Can be used for additional instructions, warnings, Add 3D isometric view</p>	



MAKING ROBOTIC WELDING ACCESSIBLE
TO ALL FABRICATORS