

How Virtual Templating with Laser Projection Technology Streamlines Welding Assembly & Manufacturing

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The FARO Tracer^{SI} Laser Projector allows companies to speed up processes, minimize the use of templates and tools, eliminate human errors and improve production quality

Main risks of using manual methods or physical templates

The FARO Tracer^{SI} Laser Projector is a virtual templating, positioning and in-process verification solution, ideally suited to streamline welding processes and increase production throughput. The system helps avoid making mistakes that typically occur when deploying physical templates or manual measuring methods.

For basic welding jobs, companies often rely on blueprints, tools and tape measures to build and weld the parts. However, when using unreliable, conventional tools, there's a high risk of mistakes being made and – at the end – having to break the parts loose, which is expensive and extremely time consuming. It may take two minutes to weld a part to the wrong place, but it can take 10 to 30 minutes (5-15 times longer) to grind the weld and break it loose. Sometimes, even this is not possible, so instead of costly rework there is a more costly scrap event.

Large volume and complex welding projects present multiple opportunities for errors: parts located on the wrong positions or sides, or symmetrical parts being welded on backwards because holes are offset, etc. Additionally, when using manual methods and physical templates, full inspections are performed after the assembly process and mistakes become evident only after the welding has been carried out and completed; with conventional tools, there is no effective way to understand if something is welded properly or not along the way.

All these elements lead to additional work (rework), costs (new materials, working hours and scrap) and, of course, loss of productivity. Rework “kills” any forward momentum.



The Tracer^{SI} is a 3D Laser Projector with advanced laser imaging for guided assembly and in process verification.

Introducing welding with FARO Tracer^{SI} Laser Projector

Coupled with BuildIT Projector Software, the FARO Tracer^{SI} is the ideal tool to tackle welding projects in an effective and efficient way.

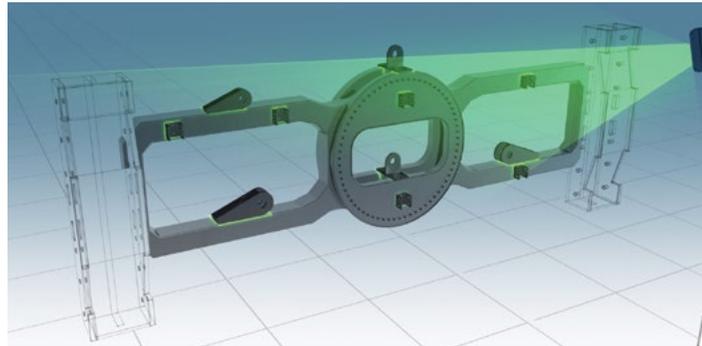
The Tracer^{SI} accurately projects a laser line onto a surface or object, providing a virtual template that operators and assemblers use to quickly and accurately position components with absolute confidence. Laser templates are created using 3D CAD data, enabling the system to visually project laser outlines of parts, artifacts, or areas of interest. The result is an efficient and accurate solution for guided alignment and assembly.

Tracer^{SI} offers Superior Positional Accuracy, which allows for accurate and highly repeatable placement of assembly items or weldments from a range of 1.8 – 15.2m.

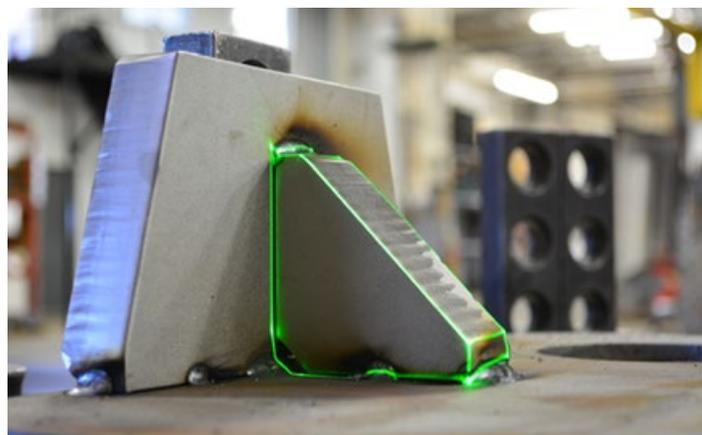
What the FARO Tracer^{SI} does

Thanks to its high-resolution image scanning capabilities throughout its entire projection volume, the setup of the Tracer^{SI} Laser Projector-guided welding project is fast and easy: the Tracer^{SI} is the first solution of this kind that fully supports hands free, feature-based alignment. This allows operators to align to the holes or corners on the part directly, with no need for additional cameras, setup, or targets. This targetless, feature-based alignment is extremely useful especially for welding projects with large and complex assemblies.

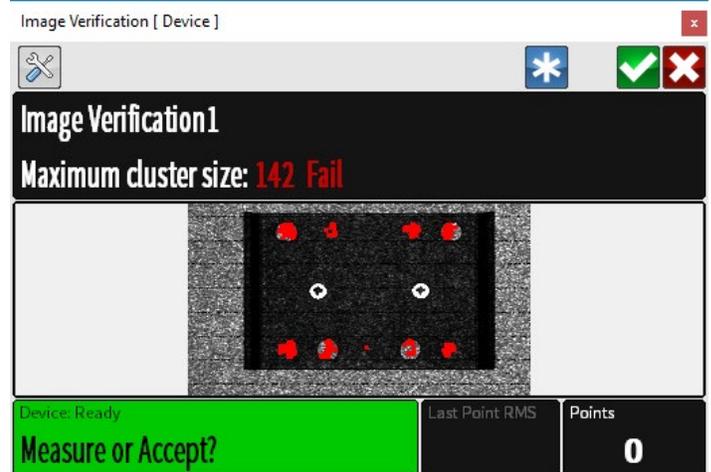
The FARO Tracer^{SI} laser projections guide operators sequentially, showcasing where to place every part or component (even the weld bead – which allows additional time and effort to be saved), through each and every step along the way. They can accurately place the parts to be welded correctly (in the lines), with the proper alignment so that it becomes very easy to weld exactly where the parts need to go on the first try.



3D laser projection is accomplished by steering a single laser beam onto contoured 3D surfaces for assembly applications.



The Tracer's laser projections guide operators sequentially, showcasing where to place every part or component, through every single project phase.



BuildIT Projector is a modern and intuitive software solution used to plan, generate and operate FARO Tracer workflows.

Once the part is welded, it's possible to move to the next part with confidence: the FARO BuildIT Projector software will guide the operator through the entire assembly process. The ability to properly sequence welding projects is particularly important because it enables the operator to minimize warpage and distortions that could be a problem in welding assemblies.

Laser projectors are not only useful to have proper alignments, they also show the right positioning of specific features – such as holes – of the part to be welded. This way users can, for example, project the features of a machined part to be sure the holes are shown in the right position, with the right diameter and orientation, thus eliminating the risk of employees welding on incorrect positions.



The FARO Tracer^{SI} Laser Projector is the ideal tool to tackle welding projects in an effective and efficient way.

Benefits

Applying laser projection and virtual templating technology and using the guided assistance of the FARO Tracer Laser Projector allows companies to dramatically reduce manufacturing rework and increase throughput.

First of all, the Tracer uses CAD files to provide a virtual templating solution, which eliminates the need for manual tools and physical templates: While manual tools such as tape measures can easily generate mistakes, manufacturers can also avoid the time and expense associated with designing, building, using and maintaining large, heavy templates, which also require a lot of space to be stored.

Especially in instances of complex welding projects, the Tracer system saves a significant amount of time: for example, a frame can have up to dozens of ‘trinket’ parts to weld on, and each individual part requires a dedicated manual measurement/alignment (e.g. with chalk), while the Tracer needs only a few minutes for set up and to start projecting. In many instances, when conventional tools are used for part placement, the measurement process takes more time than the actual welding.

The overall quality improves due to the laser projector system’s accuracy and repeatability which dramatically diminishes the risk of human error and costly scrap during assembly. Because operators are guided step by step by virtual templates, quality assurance takes place during the welding process and not afterwards, when the welding job has already been completed.

Moreover, the Tracer^{SI} enables In-Process Verification (IPV) which allows manufactures to detect the presence/absence of features, evaluate placement & alignment. IPV can be performed at various points throughout the welding and assembly sequence. If a part is placed incorrectly, IPV can identify the problem so that the welder can take appropriate corrective action before investing more effort in producing what would become a flawed assembly. Tracer^{SI} can also perform Foreign Object Debris (FOD) detection. These are two additional capabilities that can dramatically improve the efficiency of welding projects by proactively identifying non-conformance, enabling real-time corrective measures, and eliminating costly scrap / rework.

An additional advantage using the Tracer is that, in cases of engineering changes, companies just need to load the new CAD data into the BuildIT Projector Software: days of physical template rework and costs are replaced by less than an hour of time loading the new model into the program. This is particularly advantageous for manufacturers that do a lot of custom or ‘one off’ manufacturing.



Industrial welding shop deployment. The Tracer is rugged for the production floor, with a dust-sealed industrial enclosure

Finally, training employees on manual methods – including blueprints, tape measures or chalk – and correct usage of physical templates to set parts in right positions for welding can create ongoing challenges. On the other hand, the FARO Tracer Laser Projector is very simple to understand and use. The software’s user-friendly interface minimizes both the time and expertise required for operation, eliminating the need for high skilled workers and costly training. Tracer system allows all operators to layout and assemble their work packages at the same level and speed as the system takes the guesswork out of the process; operators just follow the sequential projections.

Thanks to all these attributes, manufacturers boost confidence that their welding projects can be completed efficiently and on time: with the FARO Tracer^{SI} welding and assembly processes are significantly accelerated while parts are welded as designed.

Summary

The FARO Tracer^{SI} Laser Projector assists operators during welding projects, allowing them to avoid mistakes that could result in expensive rework and wasted time. The system guarantees operators will make the best use of their time by simply following the right sequence for aligning, welding and assembly of their parts. The combination of accurate laser projection and image scanning establishes a new industry standard for repeatable laser-guided assembly.

A FARO Tracer^{SI} Laser Projector solution for templating allows welders to spend less time measuring, less time doing rework (or scrapping) and more time doing what they need to be doing – welding.

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