



Laser Projection Technology: How to Reduce Non-Conformances, Streamline Production, and Eliminate Templates and Hard Tooling

As Published in Composites for Manufacturing, July 3, 2017 | Roger Waldock, FARO® Technologies with Mike Welsh, Mike Welsh Communications

Global 3D Measurement Leader, FARO® Is Helping Its Customers Project Assembly Success with Its FARO Tracer™ Laser Projector. Composites in Manufacturing Reports.



Figure 1: Tracer™ Laser Projector

In industries such as the aerospace, automotive, and heavy equipment manufacturing sectors, the accurate positioning, alignment and assembly of large, cumbersome components is a regular and often problematic requirement.

A common misconception is that the larger the component becomes, its precision specification declines proportionally. Although in some cases this can be correct, in many instances the need for high levels of precision when assembling large components is critical. For instance, an inaccuracy of just 1mm when assembling two prefabricated elements, related to large objects, such as ship's hull or aircraft fuselages, would result in massive deviations from their design intents and in inaccuracies measured in centimeters at their extremities.

To help ensure the correct assembly of large, heavy components, manufacturers often use physical templates or hard tooling. Although these aids are useful for series production situations, the considerable time and costs involved in producing templates or hard tooling for the manufacture one-offs, or for mixed or short production runs, can be a time-consuming and cost-prohibitive process.

The Line of Sight

With the intention of reducing the expensive delays associated with the alignment and assembly of large components, to help improve process precision, and to negate the need for physical templates and hard tooling, FARO recently launched the Tracer™.

The Tracer™ Laser Projector accurately projects a 0.5mm wide laser line onto a 2D/3D surface or object to provide a virtual template that enables operators and assemblers to quickly and accurately position components with absolute confidence. The clearly defined laser template is created with the use of a 3D CAD model, enabling the system to visually project a detailed laser outline of parts, artefacts, or areas of interest. The result is a virtual and collaborative 3D template that is able to streamline a wide range of assembly and production applications, improve productivity and improve companies' accuracy and quality functions. The system features accurate, variable and long-range projection to cover an envelope of up to 50 x 50 feet and has a 3D projection range of 6 to 50 feet.

FARO's Tracer™ uses Advanced Trajectory Control (ATC) to deliver fast projection. ATC provides superior dynamic

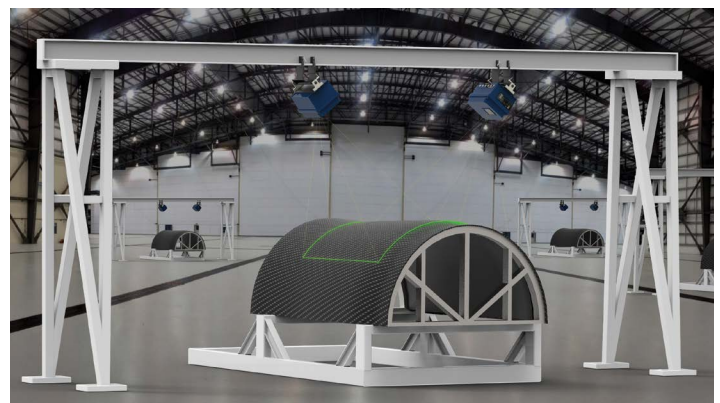


Figure 2: Two Tracer™ projectors projecting onto an engine nacelle for ply layup in a composites clean room

accuracy and a rapid refresh rate which minimizes flicker. Photogrammetric targets are used to enable the best fit alignment of the projected image onto the surface or object, thereby allowing the projected image to be consistent with the CAD model.

For larger assemblies and for use in space-constrained areas, multiple Tracer^M projectors can be controlled from a single workstation to provide large-scale virtual templates in one coordinate system. The risk of human error and costly scrap during assembly is significantly reduced, in addition, manufacturers are able to avoid the time and expense associated with using large, heavy templates.

Catch Some Rays

The FARO RayTracer Software Suite – containing the RayTracer Operator and RayTracer Administrator programs, operates the Tracer^M projector. Customers may also choose to use additional software packages that can directly create projection files for the Tracer^M.

RayTracer Administrator organizes and streamlines processes for factory operators. It is intended for use by manufacturing process engineers who prepare laser projection jobs by selecting, organizing, and storing necessary data into one or more RayTracer databases. RayTracer Administrator is used to set up a RayTracer database, manipulate its components, configure jobs and control parameters, edit projection data and reference tool data, create user names and passwords, and more. Its easy-to-use interface allows multiple document handling, copying and pasting, layered tree structure viewing, and other options.

RayTracer Operator is an intuitive and user-friendly program that enables the projection of 3D templates. Designed for use in manufacturing environments, specified user access levels as well as predetermined sequences of operating steps help impose strict production rules on the work process. Projection data and control parameters are stored in a RayTracer Database. Personnel running RayTracer Operator can retrieve and execute pre-configured jobs from a RayTracer database, but cannot change the content.

The early sales success of FARO's Tracer^M has resulted in the system being adopted by a range of customers involved in the precise assembly of large components. Within the composites industry the Tracer^M is proving ideal for use in tasks such as hand ply lay-up, mandrel tracking and lay-up and for use on Advanced Fiber Placement (AFP) machines.

Aerospace applications include system bracket placement, rib and stringer placement, for use on click-bonds and stand offs and for fastener or drill location. In addition, Tracer^M can be applied to paint templating and masking tasks.

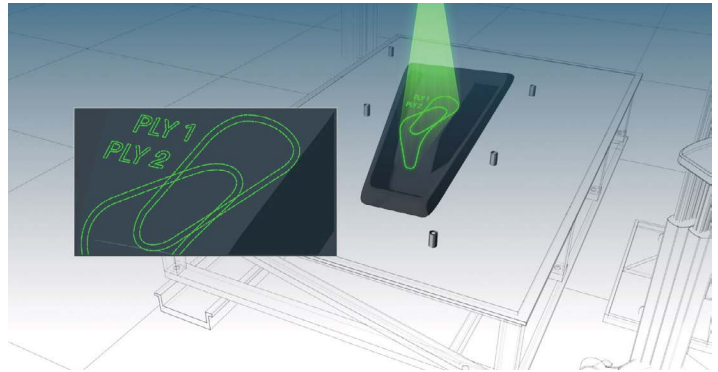


Figure 3: Tracer^M projection of multiple plies onto a composites mold

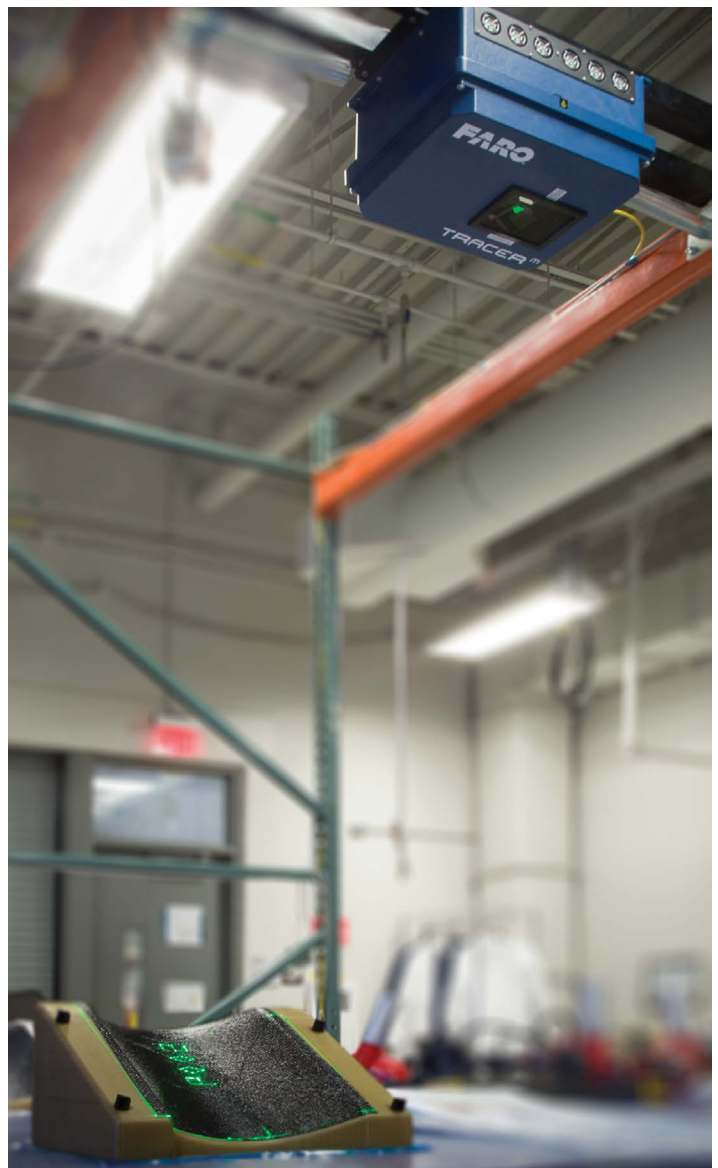


Figure 4: A Tracer^M projecting onto a winglet mold for laser-guided layup in a composites assembly facility



Figure 6: Welding and heavy equipment manufacturing applications

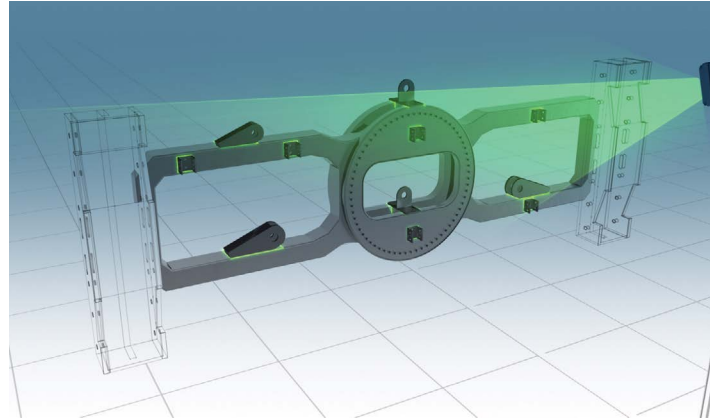


Figure 7: Assembly applications

The Tracer[™] is used in the automotive and heavy equipment sectors for applications, such as weld stud/block location, precision table applications and for factory floor and production line layouts and for fencing and robotic station arrangements.

“As the ability to guide assembly process sequences and to accurately locate and orientate components is a common requirement, FARO Laser Projectors are used extensively throughout the world and throughout a range of industries,” explains Roger Waldock, Director of Sales, Laser Projection Solutions. “Having witnessed demonstrations of the new Tracer[™] in action, early users of the advanced FARO system have calculated their return on investments by considering the advantages gained by eliminating costly non-conformances, streamlining their production processes and the elimination of previously-used costly templates and hard tooling.”

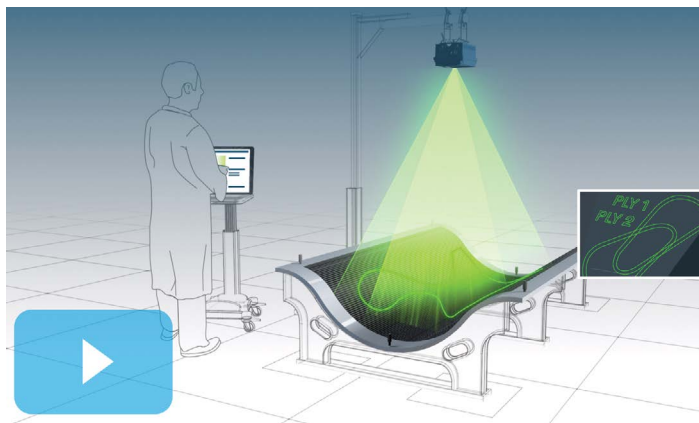


Figure 5: Click above to watch short videos on the many applications where Tracer[™] can be utilized



Figure 6: Click above to watch a three-minute demo video on FARO's Tracer[™] Laser Projection System

FARO Technologies
250 Technology Park | Lake Mary, FL 32746
www.FARO.com
(800) 736-0234

View more of FARO's whitepapers at www.faro.com