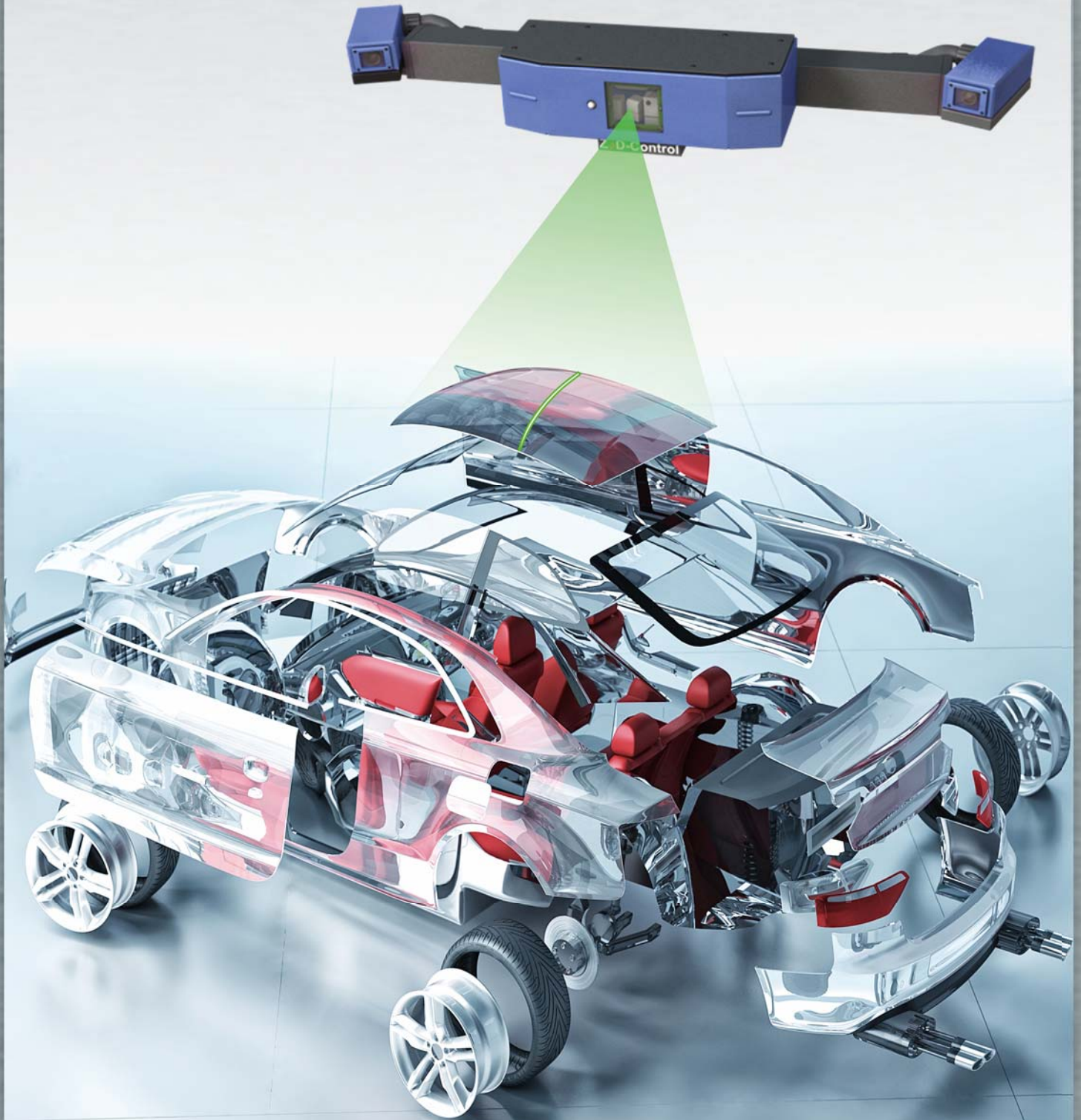


Z-LASER

Intelligent Solutions in Light



AUTOMOTIVE

Z-LASER is your specialist for innovative laser applications in industry and trade!

For 30 years, **Z-LASER** Optoelektronik GmbH in Freiburg, Germany has been developing and manufacturing laser systems for positioning applications in various industries.

The highly complex manufacturing and handling processes of the automotive sector require the support of modern and sophisticated technologies:

- *Laser based measuring and projection systems serve as an instrument for target-performance comparison or as an optical guiding system through assembly processes.*
- *Structured laser light for triangulation sensors for use in automated optical quality inspection*
- *Laser modules are used for positioning, e.g., for the repeating and exact placement of labels.*

Together with our highly knowledgeable experts, we can assist you in developing your customized **Z-LASER** solution. Our dedicated sales team can provide expert guidance for the selection of the appropriate equipment as well as for highly customized laser modules!

30 years of industry experience are at your disposal!



Z3D



- Laser projection system for large and complex 2D and 3D projections with the addition of camera based 3D measurement verification
- Markerless measuring of the work piece
- **Target-performance comparison: direct tracing of defective areas via laser projection on the work piece!**
- Manufacturing support via template projection
- Accuracy up to 1/10,000 of the measuring range
- Production support and optimization
- Worker guidance by projecting references, buttons, etc. directly onto the work piece.

Laser projector LP



- Laser projection system for large and complex 2D and 3D projections
- Wide fan angle enables large areas of operation
- Red or green fiber coupled laser source
- Data transfer via Ethernet, PLC, serial

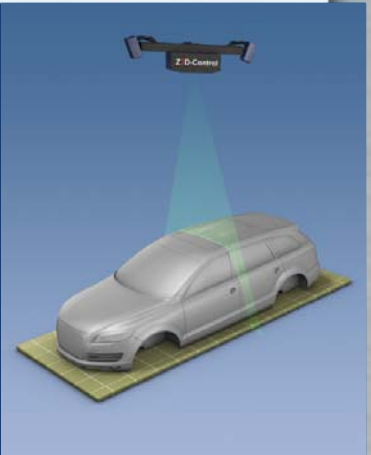
Laser modules



- Output power: 1mW-6.000mW
- Wavelength: 405-830nm (red, green, blue, infrared)
- Points, Gaussian and uniform lines, multi lines, dot matrix, crosshairs, other projections on request
- Projection dimensions: down to $<6\mu\text{m}$ ($1/e^2$) line width
- Simple hand focusing
- Analog intensity setting and TTL-modulation
- Supply voltage: 4,5-30VDC

Z3D surface scan

The technical base for the Z3D surface scan is a laser projection stereo camera system. A software package for the processing of the scan data is optionally available. Thanks to a special calibrating procedure, a great variety of work pieces can be captured quickly and precisely without needing reference markers. The laser supported scan allows the admission of structurally poor and uncooperative surfaces. As an example even glowing steel can be measured before forging.



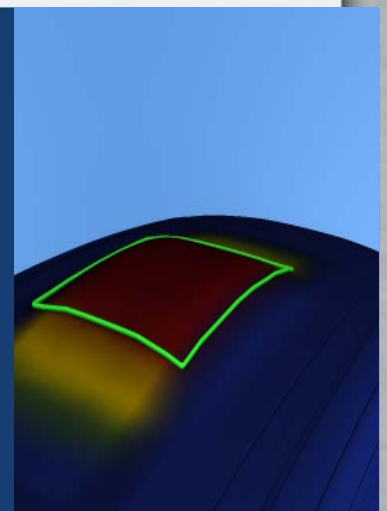
Z3D target-performance comparison

The scanned surface is virtually represented in the form of a three dimensional point cloud. The optionally available software package matches this point cloud with the CAD model of the work piece (alignment) and calculates, based on that data, possible deviations of the point cloud from the CAD model (target-performance comparison). Areas which extend the defined range of tolerance are marked by a polyline which is projected directly onto the work piece.



Z3D CAD-CAM link

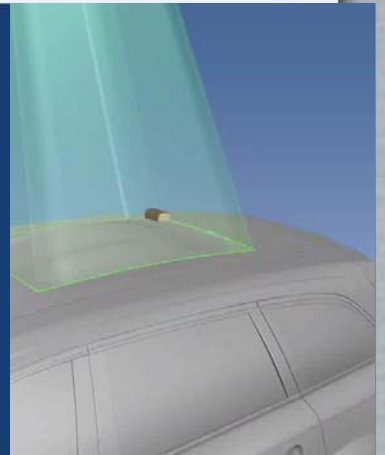
The Z3D also provides the option to derive geometrical CAD models on the basis of the stereometrically generated point cloud. These geometrical CAD models can be integrated into the production process (i.e., the extraction of navigation lines towards the process center).



Z3D projection

If the work piece deviates from the CAD target model, the Z3D detects these parts and marks their contours with a laser line. The worker gets an exactly located area where to carry out the correction.

Assembly positions of mounting parts and their corresponding CAD models can be displayed via laser projection too. After assembly, the system checks the completeness and the position preservation of the mounting parts. In another step, missing or wrongly positioned parts are visualized. These capabilities guarantee an increase in efficiency and a cost reduction in the production process.

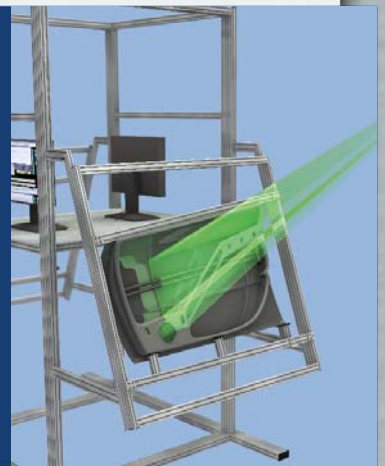


Assembly, display and control

The interior equipment of passenger cars often require complicated and manual assemblies e.g., car door assembly. Here the laser projectors guide the worker through each step of the production process: they show him where to take which parts and components, how many of them, and where to mount them. Thus even highly complex cabling operations can be considerably accelerated.

Furthermore, instruction texts can be displayed and critical spots or defective parts can be marked. This means a reduction of the training time for new employees while simultaneously improving quality control.

By projecting a red area, the laser projector can also contribute to the safety of the entire manufacturing process.



Caravan

In the manufacturing of caravans, the wall and ground elements are built according to the sandwich construction method. Laser projectors are used for the positioning of assembly elements like mountings, strut, and electric wiring. The data for each assembly element is stored on a separate graphical layer, so they can be projected consecutively as assembly progresses.

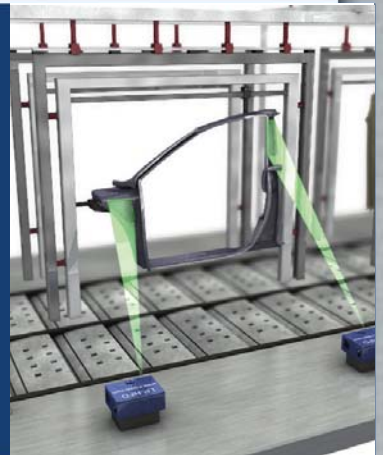
Usually two laser projectors with green beam sources are used per work bench.



Car body construction: CFRP

In electric vehicles the weight-bearing parts like the vehicle frame are made out of carbon fiber reinforced plastic.

Single frame parts are either laminated or produced using the wrapping method. Before any CFRP components are assembled, the connecting areas must be cleaned manually. The laser projector shows the worker the cleaning areas as a polygon directly on the connecting work areas.

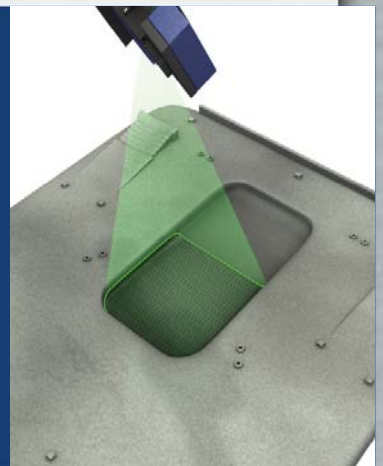


Positioning: CFRP

During the handling of fiber composite materials, the precise projection of alignment patterns can bring great benefits to the production process and increase the product quality. The laser projector shows the outline of each fiber mat directly in the form and enables a quick and easy positioning and alignment of layers.

In addition to the reduction of production time the learning phase of new employees or model changes are significantly facilitated.

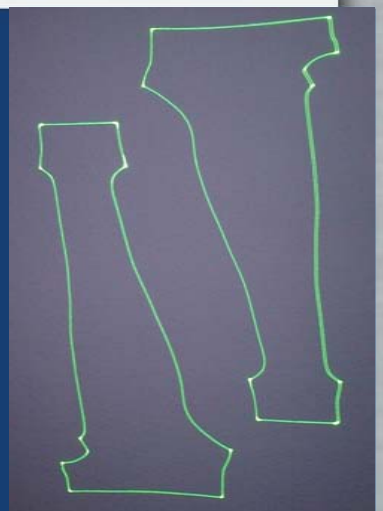
Also parts can easily be positioned and aligned in carbon fiber components by laser projectors. This eliminates otherwise needed templates, which are expensive in creation, need bulky storage, and are elaborate to modify. A laser projector only needs a rapid change in the drawing!



Cutting and labeling of CFRP parts

The manual cutting can be substantially simplified by the projection of the target contour on CFRP mats, as it makes stencils and the drawing of the cutting contour obsolete. The worker just follows the laser projection with his cutting tool.

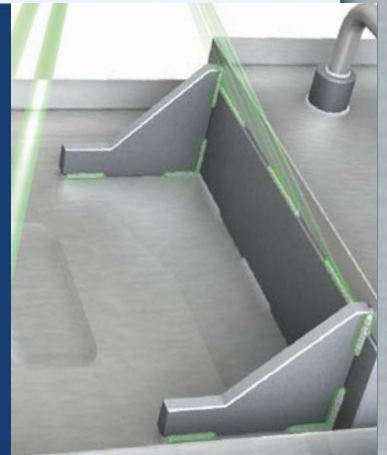
Before the cutting process can proceed they must first be provided with a barcode label. Thus the target positions of the labels are projected on the cutting surface to aid the worker in placing the labels correctly. As the labels are perfectly placed, the automatic capture via barcode reader is guaranteed.



Welds

For car body construction the high precision in welding the steel parts is especially important. With the help of the laser projection on the work piece, the actual weld seams can be checked for correctness and completeness.

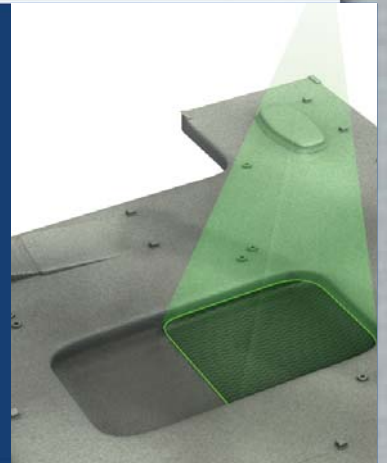
This is also valid for welding spots which must be checked for completeness and correct position.



Damping mats

To avoid disruptive oscillations in the vehicle, for example in the trunk or the vehicle tank area, damping mats are laid out.

For the exact positioning of these mats, laser projectors are of great use. Lasers can indicate the outlines of the mat in the required area, which facilitates the alignment and subsequent gluing of the mat.



Windshield

Manual windshield gluing requires the swelling tape and the glue trace to be placed within a strictly defined area. For optical quality reasons, the corresponding markers on the glass pane are being less and less used. A laser projection of the target outline for the swelling tape and the glue trace provides the worker with an efficient tool that is easy to handle. By using laser projection, the complicated and cost-intensive application of stencils can be avoided.



Tire profile

A tire profile depth of at least 1.6 mm is compulsory in Germany. However at a 3 mm tire profile depth, the tire reaches an efficiency of only approx. 70%. Therefore, more and more garages are installing automatic measurement stations. This is based on a laser triangulation system which can measure the profile depth quickly, precisely, and regardless of the lack of contrast, while the car drives past the 3D scanner. The 3D scanner projects a highly precise laser line onto the tire tread which is detected by the camera. As the tire moves through the laser line, the laser line changes shape and interruptions of the projected laser line occur. These interruptions are then computed into a height profile. Thanks to the strong light intensity of the laser, the measurement can be performed even in running traffic.



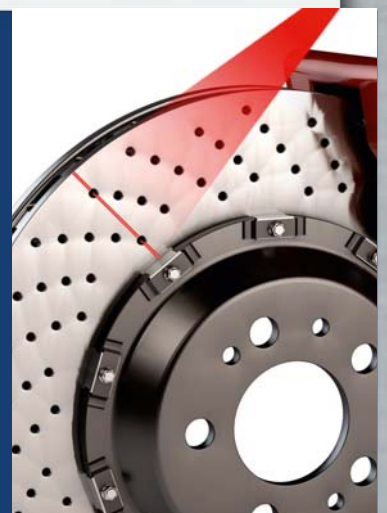
DOT code

The DOT code is an alphanumeric code located on the sidewall of the tire. It documents the tire's production data. This identification number has to be scanned during the automated assembly and the final control of the tire. Due to the lack of color contrast between the DOT code and the tire, as well as high tact rates, laser triangulation sensors are used for reliable number identification. An image processing system records a red laser line projection in the measuring area. When the DOT code passes the laser line, its height profile gets recorded, which afterwards can be decoded into the tire's production data.



Brake discs

Innovative image processing systems assure that only absolutely perfect brake discs leave the factory. For the detection of errors in the surface (e.g., cracks, dents, bumps), laser triangulation sensors are used. Blue or red laser lines are projected on the surface and are recorded/analyzed with a 3D camera based scanner system. The test object is being rotated under the projection. In case of a defect, surface changes in shape or interruptions of the projected line occur and can be translated into 3D coordinates. The comparison of these coordinates with the target specification is the base for the good/no good decision.



Door gap

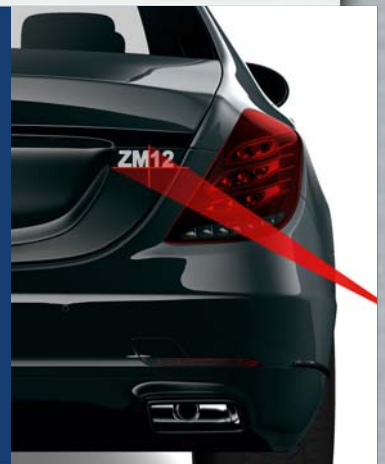
In this application laser triangulation sensors are used to verify the door gap measurement. A laser line is being projected onto the area of the gap. On the basis of several known parameters (i.e., the line length at the working distance), an automated calculation of the distance between the body components is possible. This measurement is carried out either for the whole gap or for several defined points. Stationary as well as flexible manual sensors can be used. In contrast to the use of physical feelers, the touchless door gap measurement via laser avoids damages of the body surface.



Adjustment of components

When small components must be re-assembled by hand with an exact positioning, inside or outside of the vehicle, point or line lasers provide valuable assistance to the assembler.

With crosshair lasers you can achieve placement repeatability for all types of labels or codes, which as a result can be scanned fast, easily, and reliably.



Adjustment of backup cameras

Assisted passenger car parking has become a popular feature via sensors or cameras. Specifically calibrated line lasers provide precise adjustment for the car's cameras. For example, the laser is flanged to the sensor module being installed and indicates alignment on the calibration wall by means of a red line.



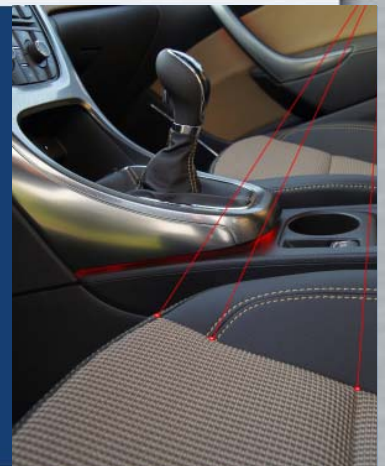
Interior

Modern car interiors use high-quality textiles and expensive materials like leather and wood. For the desired appearance to succeed, a precise seam alignment is important. Laser projectors indicate seam lines or even complete outlines of patterns for the covers of the interior door panels, consoles, and steering wheels directly on the component. With this non-contact optical positioning support the adjustment of the materials is considerably simplified. Also the critical control areas of the pattern are directly projected onto the material.



Seat covers

The cutting of high-quality materials or leather parts is carried out on cutting tables where a laser line guarantees the exact adjustment of the parts. For checked materials an additional crosshair laser can be used. While sewing the parts together a line laser indicates the seam course. In the final step, simple point lasers help to pull the seat cover perfectly onto the car seat; they indicate curved seam courses or the "seam corners".



Car ceiling

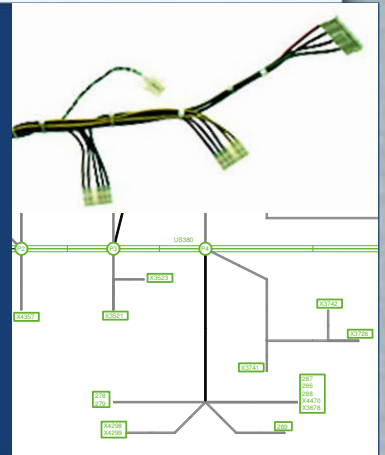
Before the assembly of the roof ceiling can occur, holding clamps and cable harnesses for the interior lighting have to be placed in their proper positions. For that purpose the laser projector indicates their exact position on the bottom side of the roof ceiling and thus simplifies the assembly.

The laser projector loads the wiring diagram data either via a CAD file or through a simple and repeatable projector teaching procedure based on an original work piece.



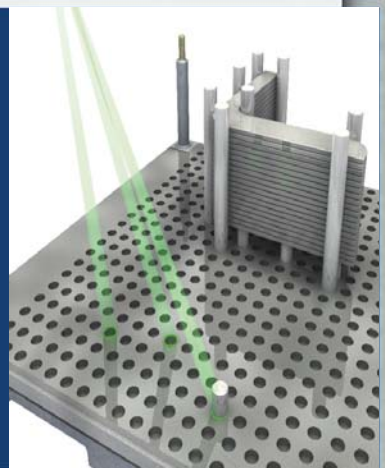
Wiring assembly

Laser projectors guide the worker through the routing of cable harnesses, for example on car ceilings. The visual navigation via laser projection shows the exact correct position of the wire and the socket thus considerably reducing the training time for small and medium batches. Only after repeated assemblies of cable harnesses will the worker reliably remember all the correct positions. With a laser projection system, the routing diagram as well as the correct positions for electrical connectors can be indicated. With this method the worker is visually guided through the production process.



Board positioning

After the stamping process, the stamped work pieces are stored on metal palettes where they must not slip or drift. Due to the variety of the formed parts, the palettes must be individually adapted to the shape of the stamped work pieces. This adaption happens by means of rods, which are placed into holes located in the palette according to the shape to be stored. Laser projection helps to place the rods quickly and correctly, so the work pieces are stored in a secure way.



Logistics

In order to guarantee the dispatch of the correct spare parts, a faultless picking process is necessary. Although the needed information is displayed on a monitor, the pickers can make mistakes due to tiredness or lack of concentration. By using a laser projector, picking quality of 100% can be achieved as the part to be picked is unambiguously highlighted by the laser projection. Additionally, this optical assistance allows for higher flexibility in staff assignment.



Made in Germany



Z-LASER

Intelligent Solutions in Light



We are available for you around the world. You will find our international representatives online at:
www.z-laser.com

Z-LASER sets industry standards. By continually investing in the corporate infrastructure, **Z-LASER** has cultivated a leading market position in various industries for over 30 years.

Z-LASER has been certified to ISO 9001 since 1997. Quality audits of important industrial quantity buyers are performed regularly. To ensure we earn the high quality label "Made in Germany", each laser is subjected to stringent controls.

"The fascination of the perfect light inspired me 35 years ago to make the laser my passion."

In the beginning, simple wood positioning applications in sawmills were realised with He-Ne gas lasers, which were initially built in my living room. Today, I take pride in watching the 6 axis optical machines in our clean room that produce eye-safe high-end laser modules e.g. for the automotive industry.

From the early years on, all team members support the idea not to supply the arms industry."



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