

**LEISTER**

LASER PLASTIC WELDING

# Laser Textile Welding

Innovative  
and flexible.

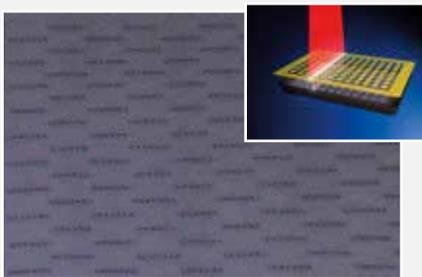
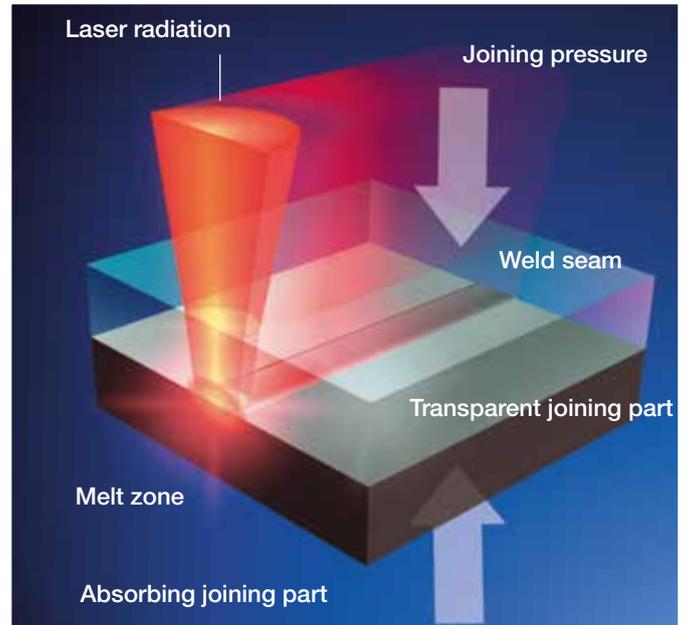


**We know how.**

## Basic principle laser transmission welding

Most synthetic fibers in textile industry are made out of thermoplastic polymers and can be welded therefore.

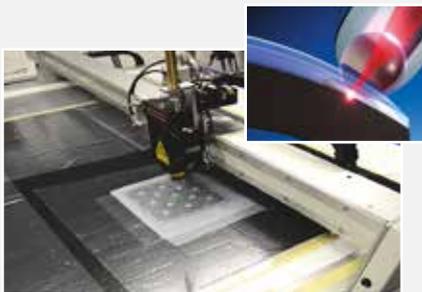
In laser transmission welding of thermoplastics a part transparent to the laser and one absorbing are joined together. The laser beam penetrates through the transparent material and impinges on the absorbing material, which melts due to the absorbed laser energy. By the applied external clamping force the transparent material is in physical contact with the absorbing one and melts as well. The polymer melts mix and solidify to a firm bond as soon as the laser leaves the area. Due to the precisely irradiated laser beam the melting zone in the weld seam is only small without impairing nearby material or the outer surfaces of the part.



Laminating of fabrics with a line-shaped laser and pattern by mask

## Laser laminating of textile fabrics

In the manufacturing of textile fabrics laser transmission welding can be utilized for laminating different layers together instead of adhesive. Especially with thin breathable membranes the technique has advantages as the melting zone is only thin and no mechanical force impact damages the membrane. Also no section of the breathable membrane is blocked like with adhesive. Also lamination of insulation layers on textile, local reinforcement pads or hook-and-loop fasteners (e.g. Velcro) is possible. The line-shaped laser beam is incident to create full-faced laminates or a shadow mask creates a laminating pattern.



Laser welding on a modified cutting table (source EMPA)

## Laser seaming in two dimensions (2D)

With laser welding of textiles stitch-free seams can be created, which are more flexible and have a softer touch than thread based seams. To obtain waterproofed joins no additional tape is necessary to seal holes from needle. In contrast to other welding techniques in laser transmission welding the heat is generated in the middle of the material layers exactly where it is needed for joining. Like this the visible surface of the textiles is less impaired and due to the absent mechanical vibrations thin membranes are not damaged. For seaming the GLOBO optics proved to be the most suitable approach. The glass ball or roller focuses the laser beam on the weld seam and presses the materials together. For small two-dimensional work-pieces (up to 300x400 mm) a turn-key system from Leister can be readily deployed. For larger formats the integration of the GLOBO on a cutting table is advantageous.



Prototype of roller optics in C-frame sewing machine (source Schips AG)

## Laser seaming three dimensional (3D)

For seaming of three dimensional geometries, as for example in the apparel industry, the processing on a flat table is not sufficient anymore. Either the GLOBO optics is moved with a robot in all directions and tilting angles while tracing the seam on a 3D-mold, which fixes the textiles as well. Or the GLOBO optics is mounted at the place of the sewing head into a conventional C-frame sewing machine. The textiles are guided manually into the joining region and the transport itself is provided by the soft rubber role pressed against the glass roller of the optics head.