

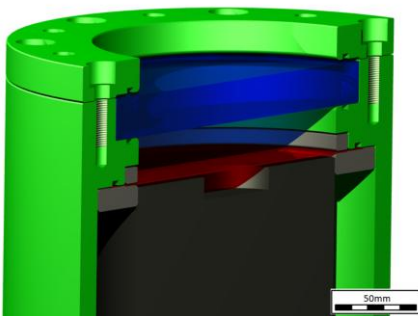
# Highlight

Aachen,  
April 17, 2012

## New concepts for flexible clamping jig

**For laser polymer welding of 3D components, a major challenge is to setup a shape-flexible clamping jig. Main application of such jigs will be polymer welding in remote configuration, characterised by high optical transmittance, avoiding air gaps and mechanical stress of clamped and welded polymer parts.**

Figure 1:  
3D modell of clamping jig element, based on pressurized chamber, separated by glass (blue) and a flexible membrane (red), transparent for 1...2µm laser wavelength.

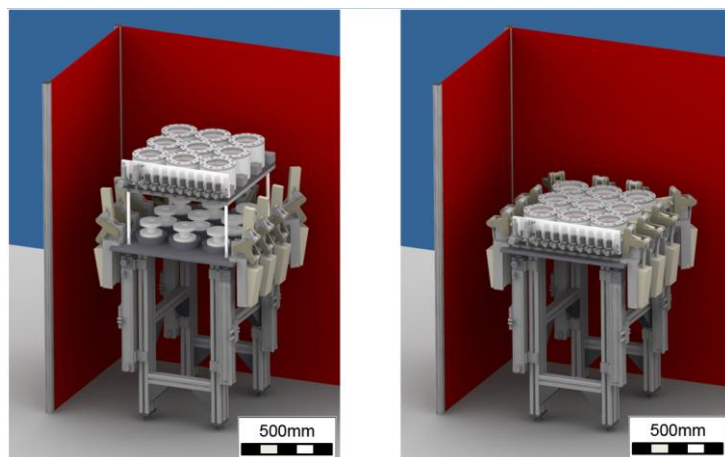


To find an appropriate clamping jig solution, the development procedure follows guideline VDI 2221 "Systematic approach to the development and design of technical systems and products".

The result is a clamping system consisting of nine autonomously pressurized chambers (Figure 2). In order to surround and to clamp 3D surfaces, a transparent and flexible membrane is chosen (Figure 1). The selection of nine round glass panes is based on an agreement between thickness and workspace of the specific chambers. The nine chambers are connected to a common frame due to the demand of parallel machining. For the interlock strong clamping elements are necessary.

Furthermore, it is essential to use an adapted sample mount to avoid membrane damaging in the boundary area of the polymer part. In case of a damaged membrane the design allows easy exchange.

Figure 2: 3D model of clamping system consisting of 9 autonomously pressurized clamping jig elements



**Contacts at Fraunhofer ILT**

Dr. Alexander Olowinsky  
Phone +49 241 8906-491  
[alexander.olowinsky@ilt.fraunhofer.de](mailto:alexander.olowinsky@ilt.fraunhofer.de)

Dipl.-Phys. Gerhard Otto  
Phone +49 241 8906-165  
[gerhard.otto@ilt.fraunhofer.de](mailto:gerhard.otto@ilt.fraunhofer.de)

Fraunhofer Institute for Laser Technology ILT  
Steinbachstrasse 15  
52074 Aachen, Germany  
Phone +49 241 8906-0  
Fax +49 241 8906-121  
[www.ilt.fraunhofer.de](http://www.ilt.fraunhofer.de)

