



USE OF SOLDERING TECHNOLOGIES IN FIBER ASSEMBLY

Task

In addition to being used in space applications, soldering technologies for optical components are becoming increasingly important in many industrial applications. The active soldering technology developed by Fraunhofer ILT will be used to assemble fibers without the need of fluxing agents; moreover, the assembly takes place without an intermediary layer. In addition to developing the assembly process, the institute will investigate relevant beam properties in order to determine the effects of the soldering process on the properties of the fiber.

Method

With suitable active solders, fibers can be mounted on metallic and non-metallic substrates under ambient conditions. First, a process is used to wet the fiber and the surface of the substrate quickly and completely; this wetting process does not require a metallic intermediary layer. Soft solders are used advantageously to reduce thermally induced stresses.

Results

Fraunhofer ILT has been able to demonstrate the use of this innovative soldering technology in fiber assembly. Optical measurements show that in polarization-maintaining fibers, the thermally induced stresses have little effect on the beam properties of the fiber. Another advantage is the high thermal conductivity of the interface. Compared to conventional types of mounting, such as gluing or clamping, soldering technology is better able to transmit higher optical powers. The mechanical strength of the solder joints was proven by tensile tests.

Applications

Thanks to the new assembly design with active soldering, the process of fiber assembly can be made more economical and efficient. In addition to robust, temperature-resistant connections, which are free of organic materials, the innovative soldering technology makes it possible to construct long-term stable, complex laser systems for use in industry and research.

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1 Metal-fiber solder joint.

2 NA measurement of a soldered fiber.