



## NEW ASSEMBLY AND ADJUSTMENT CONCEPT FOR OPTO-MECHANICAL COMPONENTS

### Task

In addition to being used for space, soldering technologies are becoming increasingly important for optical components in industrial applications. In this project, Fraunhofer ILT's active soldering technology was used to connect optical components with multilayer ceramics, developed by Fraunhofer IKTS, through flux-free joining without an additional intermediate layer. An inductive heat supply heated the solder layer without contacting it and adjusted the optical components in the solder.

### Method

When suitable active solders are used, metallic and non-metallic materials can be joined in an atmospheric environment. To begin with, a process wets the surface with the solder quickly and completely. To join components with very different coefficients of thermal expansion, process temperatures below 300 °C and, thus, soft solders are advantageous. The non-contact, local heat coupling by means of induction makes it possible to achieve adjustment tolerances of the optical components below 10 µrad.

### Results

Fraunhofer ILT has used active soldering processes to produce assemblies of optical, ceramic and metallic components. These are characterized by a high tilting stability of < 10 µrad in the temperature range from -40 °C to +60 °C. The quality of the solder joints was verified in shear tests.

### Applications

Thanks to this new assembly and adjustment concept with active soldering and inductive heat supply, the design of optical assemblies can be made more economically and efficiently. Precise adjustment of optical components enables not only robust, temperature-resistant and organically free solder joints, but also the construction of long-term stable, complex laser systems for use in industry and research.

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1 Multilayer ceramic glass connection.

2 Assembly process by means of inductive heat supply.