depending on the desired lens unit and parameters. The substantially cylindrical tubes and the spacers are inserted into the mount housing (housing) and fitted one after the other. Defects due to improper assembly or due to irregularities in the spacers etc. can occur in the process, this ultimately leading to adjustment defects and therefore to image defects etc. as a further consequence. These defects are transmitted from lens to lens through the entire lens unit of the objective.

Embodiments of the invention seek to provide a solution for constructing and fitting an objective which has lenses with a low degree of self-centring, that is to say lenses with a first surface and at least one second surface which have approximately the same radius of curvature, such that assembly defects can be minimized or possibly even compensated for.

According to a first aspect of the present invention, there is provided a lens system comprising:

a first optical assembly which is mounted in a first objective housing and comprises at least one first lens, wherein the first lens has at least a first surface and a second surface with approximately the same radii of curvature; and

a second optical assembly which is mounted in a second objective housing and comprises at least one lens, wherein the first and the second objective housing are connected to one another in a connecting region,

wherein that lens in the first objective housing which is directly adjacent to the connecting region is the first lens, and

wherein the connecting region is configured to allow a spacer element to be installed between the first objective housing and the second objective housing in order to change an axial distance between the first objective housing and the second objective housing.

The approach described here is based on the knowledge that there is no or at least a very poor degree of self-centring in the case of lenses with a first surface and a second surface which have approximately the same radius of curvature. The solution is distinguished in that, owing to the two-part design of the objective housing, the connecting region which is produced as a result can be used in order to equalize or compensate for existing manufacturing defects.

According to the invention, the technical feature "approximately the same radius of curvature" is understood to mean that the radii of curvature differ by a maximum of 10 per cent, preferably by less than 5 per cent, particularly preferably by less than 1 per cent.

In a further embodiment, the first lens is in the form of a meniscus lens with a concave surface as the first surface and a convex surface as the second surface.

According to a second aspect of the present invention, there is provided a lens system comprising:

a first optical assembly which is mounted in a first objective housing and comprises at least one first lens, wherein the first lens comprises a planoconvex or planoconcave lens; and

a second optical assembly which is mounted in a second objective housing and comprises at least one lens, wherein the first and the second objective housing are connected to one another in a connecting region,

wherein that lens in the first objective housing which is directly adjacent to the connecting region is the first lens, and

wherein the connecting region is configured to allow a spacer element to be installed between the first objective housing and the second objective housing in order to change an axial distance between the first objective housing and the second objective housing.

Meniscus and planoconvex or planoconcave lenses are particularly well suited for use in laser material processing.

In a further embodiment, the first objective housing is detachably connected, in particular screwed, to the second objective housing. The first objective housing can be disconnected from the second objective housing particularly quickly by virtue of a detachable connection, in particular by virtue of a screw connection.

The distance between the first and the second objective housing can be controlled by installing the means between the first objective housing and the second objective housing. Therefore, any imaging defects can be corrected.

In a further embodiment, there are means in order to connect the first objective housing to the second objective housing in a first position and at least one second position which differs in azimuth from the said first position. In particular, asymmetric aberrations can be compensated for by rotating the two housing parts with respect to the original position.

According to a third aspect of the present invention, there is provided an optical system for laser material processing, wherein the arrangement comprises:

a laser beam source for emitting a light bundle; and

the lens system as defined in the first or second aspects above for focusing the light bundle onto a processing plane.

Patent claims

1. A lens system comprising:

a first optical assembly which is mounted in a first objective housing and comprises at least one first lens, wherein the first lens has at least a first surface and a second surface with approximately the same radii of curvature; and

a second optical assembly which is mounted in a second objective housing and comprises at least one lens, wherein the first and the second objective housing are connected to one another in a connecting region,

wherein that lens in the first objective housing which is directly adjacent to the connecting region is the first lens, and

wherein the connecting region is configured to allow a spacer element to be installed between the first objective housing and the second objective housing in order to change an axial distance between the first objective housing and the second objective housing.

2. The lens system according to Claim 1, wherein the first lens comprises a meniscus lens with a concave surface as the first surface and a convex surface as the second surface.

3. A lens system comprising:

a first optical assembly which is mounted in a first objective housing and comprises at least one first lens, wherein the first lens comprises a planoconvex or planoconcave lens; and

a second optical assembly which is mounted in a second objective housing and comprises at least one lens, wherein the first and the second objective housing are connected to one another in a connecting region,

wherein that lens in the first objective housing which is directly adjacent to the connecting region is the first lens, and

wherein the connecting region is configured to allow a spacer element to be installed between the first objective housing and the second objective housing in order to change an axial distance between the first objective housing and the second objective housing.

4. The lens system according to any one of the preceding claims, wherein the first and the second objective housing are detachably connected to one another, in particular screwed together.

5. The lens system according to any one of the preceding claims, further comprising connecting means arranged to connect the first objective housing to the second objective housing in a first position and at least one second position which differs in azimuth from the said first position.

6. An optical system for laser material processing, wherein the arrangement comprises:

a laser beam source for emitting a light bundle; and

the lens system according to any one of the preceding claims for focusing the light bundle onto a processing plane.