

Fields of application for laser beam polishing of optical glasses

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Conventional manufacturing of freeform optics is expensive and elaborate. The laser beam as a polishing tool offers the possibility to produce optical surfaces fast and effective. [1] [2]

The aim of new research on laser beam polishing of optical glasses is to achieve a polished surface finish irrespective of the surface geometrics. The carbon dioxide laser is applied to process pre-machined specimen with different roughness's. During the polishing process an infrared camera is necessary to monitor the temperature on the surface. An annealing process reduces the process-related tensions. In addition, the cleaning process is investigated to minimize the surface damages. To characterize the surface topographic a white-light interferometer and a stylus instrument are applied.

Laser beam polishing of minerals glasses such as N-BK7[®], BF33[®] and fused silica enables surface roughness of less than $R_a < 5$ nm by form maintenance. By means of self-design setup, the adaption of laser beam polishing on glass cylinders, lenses or freeform is possible. As a result a parallel laser beam with a diameter of 12.65 mm is applied to process tilted surfaces up to 45°. With a laser parameter modulation, the angle-dependent absorption depending on the intensity of the laser radiation is considered.

The picture shows a laser beam polished lens surface made of optical glass N-BK7[®].



1. Bliedtner, J., Müller H. and Barz A.: "Lasermaterialbearbeitung, Grundlagen- Verfahren- Anwendungen- Beispiele " Carl Hanser Verlag , 2013. - ISBN 978-3-446-42168-4.
2. Hecht, K.: "Entwicklung eines Laserstrahlpolierverfahrens für Quarzglasoberflächen“, Dissertation, Ilmenau, Universitätsverlag Ilmenau

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