Autonomous processes in the optical alignment of ADAS camera for mass production in the automotive industry

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Advanced Driver Assistance System (ADAS) technologies for the automotive industry require highly reliable vision systems and optical sensors. As these systems continue to evolve, image processing systems that enable better optical performance are required. Increasing pixel numbers and larger areas of the camera sensor in combination with decreasing F-numbers of the objective lens lead to higher demands for the optical alignment of these systems.

The production processes include the active alignment of the objective lens and the attachment of the lens by thermobonding systems with accuracies below 2µm. The former must be performed at the shortest cycle times for high production yield. The latter must be taken into account during alignment in such a way that adhesive shrinkage during thermal curing can be compensated for in order to obtain the optimum alignment result for the end product.

This paper describes the latest achievements in actively aligning a lens and camera sensor for ADAS applications at optimal image quality. Through the use of machine learning tools and adaptive control, processes are optimized to achieve the requirements of lowest production times with optimal precision.