

ProCam and CamTest by Trioptics

Precise camera module manufacturing and 100 % testing technology for ADAS or lidar applications

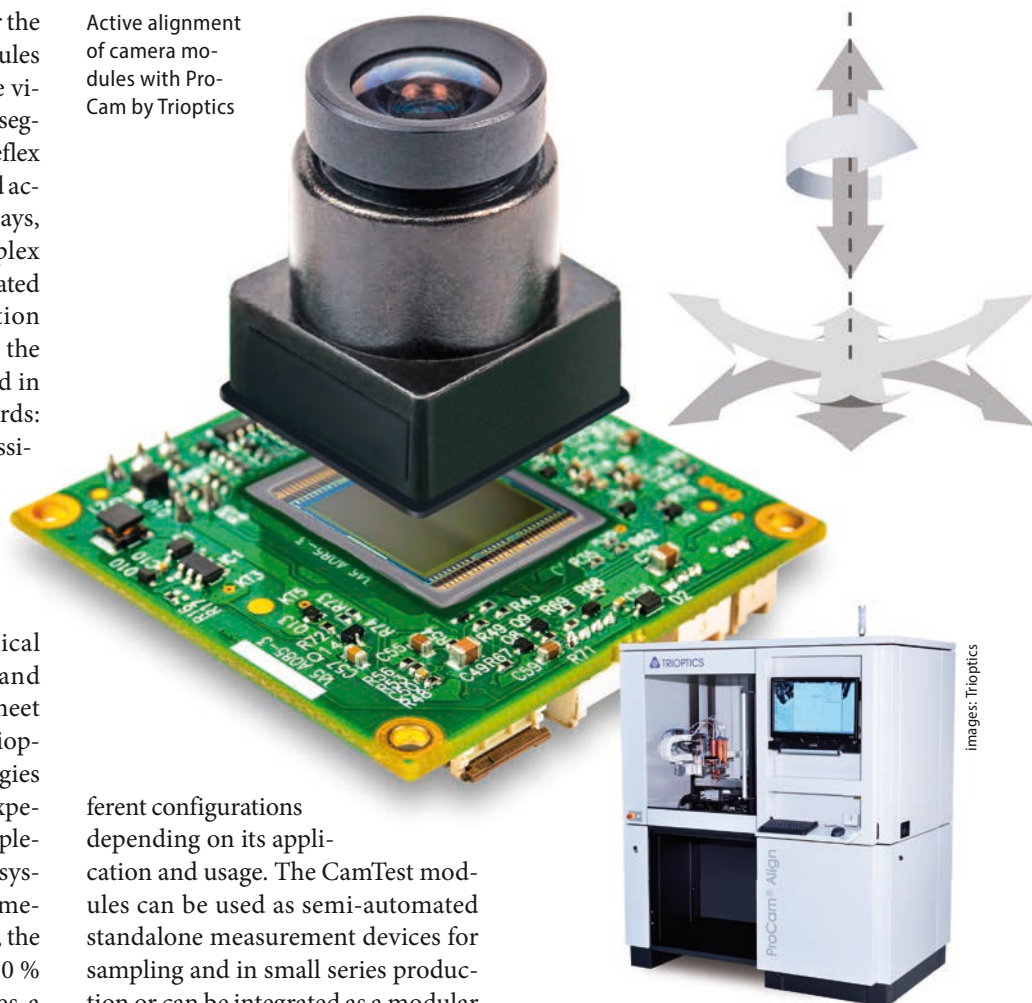
Previously, the requirements for the image quality of camera modules were primarily determined by the visual requirements of the consumer segment of photography (e.g. digital reflex cameras, smartphone cameras, and action and drone cameras). Nowadays, the increased demand for complex camera systems used in safety-related and automated object recognition and classification, for instance in the safety & surveillance business and in the automotive industry (keywords: autonomous driving and driver assistance systems), results in new and higher requirements for the characterization of the image quality and the assembly of camera modules.

The entire test chain for optical systems, sensor components, and complete camera systems must meet these new requirements. Here, Trioptics offers the matching technologies and benefits of its many years of experience in optical testing and complements this by new measurement systems for opto-electric and opto-mechanical parameters. In particular, the automotive industry requires a 100 % testing technology that achieves a high degree of reproducibility and accuracy in volume production with the shortest possible cycle times. For this purpose, Trioptics has developed test systems that allow to determine the most important measurement parameters in a reproducible way and with the shortest measurement time as an end-of-line (EOL) test integrated in fully automated production lines.

Optical characteristics (such as distortion, vignetting, and image contrast / MTF), opto-mechanical characteristics (such as the focus position of the image sensor in relation to the lens, the bore sight, or the roll angle), and opto-electric characteristics (such as defective pixels, image noise, linearity, or color reproduction) are measured with Trioptics CamTest modules. The system is available in several dif-

ferent configurations depending on its application and usage. The CamTest modules can be used as semi-automated standalone measurement devices for sampling and in small series production or can be integrated as a modular set up in a fully automated production line for high-volume manufacturing.

Trioptics also offers solutions for the critical challenge of active alignment and series production of high-precision optical sensor systems. Tight mechanical machining tolerances are required to achieve the requested imaging quality. Only a controlled automated manufacturing process which combines all required production steps in one system assures accurate, repeatable, and fast camera module alignment and assembly. Automated active alignment approaches help to optimize production efficiency i.e. higher product quality and higher yield at lower production costs. With ProCam Trioptics offers a complete solution to actively align, assemble, and test complex camera modules in



images: Trioptics

order to control and overcome critical issues. The ProCam Align Smart is a compact system for sampling and small series production, and with ProCam Inline Trioptics provides a fully automated system for 24/7 high-volume manufacturing and testing of precise camera modules.

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