



A new optical standard for industrial imaging

ProCam® Align Smart – A success story
in collaboration with Allied Vision

 **Allied Vision**

High image quality essential for machine vision

High and consistent image quality is a critical factor in machine vision applications, as it is the key to reliable results. Variances along the optical axis between the lens and the sensor have a detrimental effect on the image quality. In addition, with larger sensor areas, the tilt of the sensor board relative to the optical axis has an increasingly large impact on high image quality across the entire field of view. Allied Vision offers its customers a solution with active alignment technology: the selected lens is optimally aligned with the corresponding Alvium camera using the ProCam® system from TRIOPTICS GmbH.

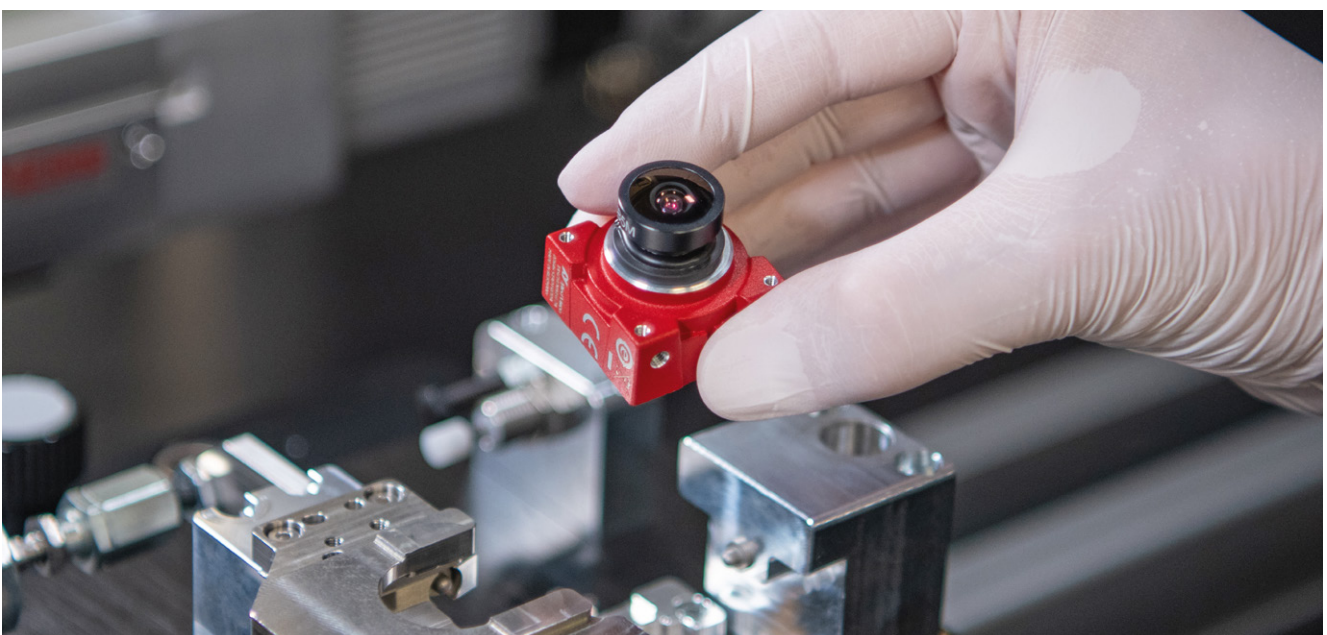
Manual alignment is not an option for high volume production

Since the launch of Allied Vision's Alvium camera platform, there has been a sharp increase in the number of customer projects where material costs are a key factor, or a camera needs to be integrated into compact end-user devices - or both. In these cases, an Alvium camera with an M12 S-mount lens is a good

choice. However, the low-cost M12 lenses have correspondingly large mechanical tolerances, which pose a challenge to the overall design along the optical axis.

For prototypes and small annual production runs of a few hundred systems, manual alignment would still be feasible. However, this is not a viable approach for larger production volumes because manual alignment is too time-consuming and therefore too expensive, and it does not ensure consistent product quality.

An important factor along the optical axis between the sensor board and the object to be inspected is the precision of the lens. Any deviation from the optimum line can distort the results and lead to a loss of information. Depending on the direction and strength of the deviation, various effects (blurring, rotation, loss of focus) can occur, reducing the validity of the application. If these aberrations are also constantly changing, for example because vibrations change the position of the lens, it is almost impossible to perform a demanding inspection task on the basis of the images produced.

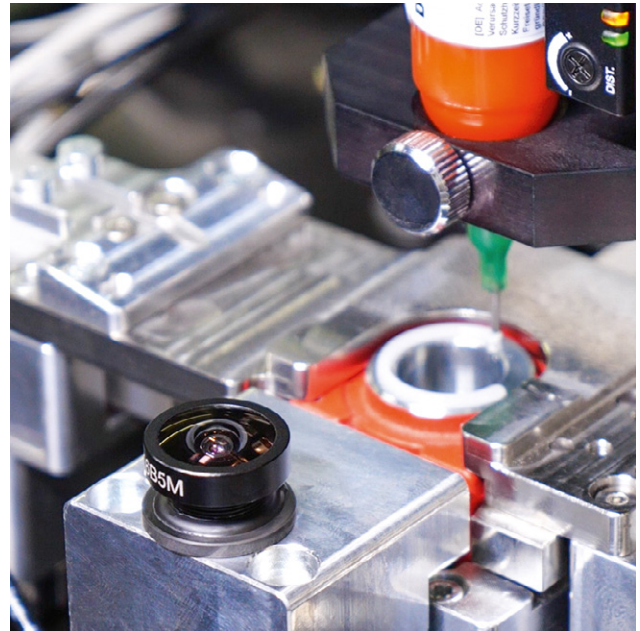


Optimised Alvium camera module after active alignment with the ProCam® system

Manual alignment when mounting the lens would require significant time and effort. It is also not possible to immediately check the desired effect, let alone easily reproduce it. However, the cost of a dedicated alignment system is disproportionate to production volumes for many system manufacturers. Even the choice of more expensive high-quality C-mount lenses, which offer greater accuracy and reliability, is often rejected for financial reasons.

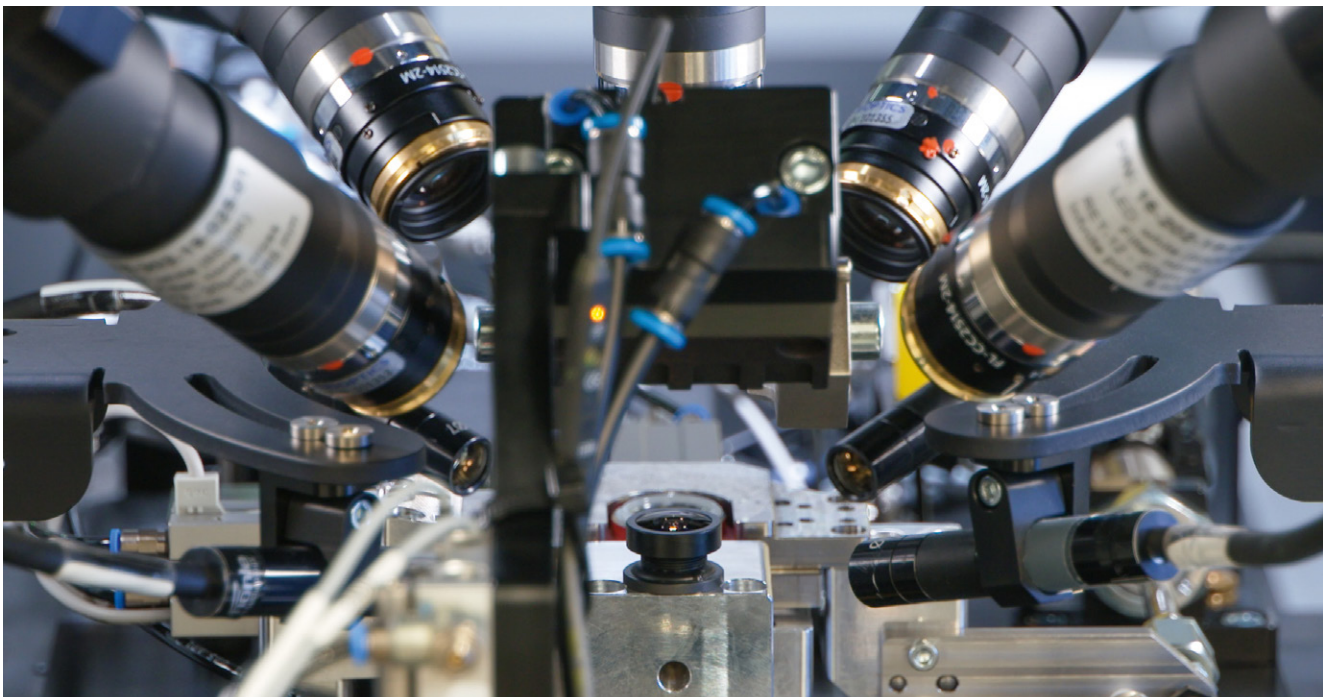
Flexible, automatic alignment optimises the optical performance of camera modules

As the alignment has to be set specifically according to the optics and customer requirements, Allied Vision was looking for a flexible system that could also achieve a high throughput. The solution was found in TRIOPTICS. The versatile ProCam® Align Smart system optimises the optical performance of camera modules through active alignment. This eliminates the need for a threaded lens mount and allows the optics to be moved and adjusted in all the degrees of freedom required for optimum image quality in all axes.



Automatic application of adhesive

When the sensor is active, 5 targets are used to align the top and bottom left and right corners of the sensor, again using the centre pixel of the active sensor surface as the reference point. Once the ideal position is achieved, a special adhesive is applied and cured. This creates a self-contained system from the sensor board to the lens, which, thanks to the clean

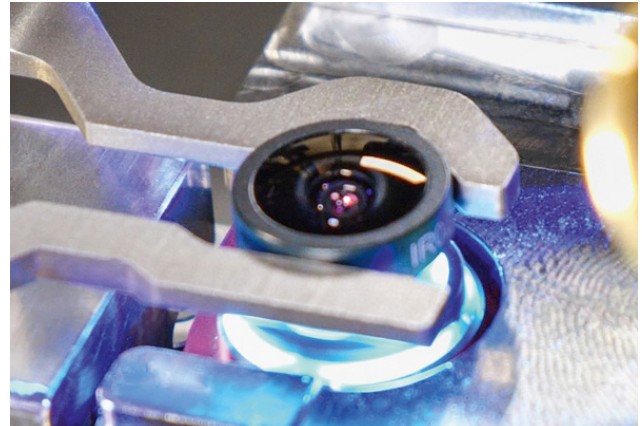


Assessment of image quality, lens alignment and focus position using motorised focusing collimators

room conditions, contains no contaminants and is protected from them in the future.

With this manufacturing solution, Allied Vision reduces the complexity of the customer's production process, especially for larger production volumes, and simplifies it by taking over a quality-relevant process step.

The exact alignment of the lenses ensures consistently high precision, enabling the cameras to deliver high-quality images. This eliminates unwanted effects such as blur, focus drift and major variances in the generated images. Optimally aligned from sensor to lens, S-mount lenses are also an attractive alternative to more expensive C-mount lenses.



UV-curing after active alignment

With TRIOPTICS, Allied Vision has found a competent and reliable partner to advise, assist and support them in optimising the optical performance of their Alvim cameras.



From left to right: Sönke Tanz (TRIOPTICS GmbH) and Lars Schüler (Allied Vision Technologies GmbH) in front of the ProCam® Align Smart System



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