OPTO ENGINEERING
THE TELECENTRIC COMPANY

3D OPTICS
AOI application notes

SCHEIMPFLUG OPTICS FOR 3D MEASUREMENT

MCSM1-01X is a MACRO lens expressly designed for 3D measurement and imaging applications where the object plane is not perpendicular to the optical axis.
A precise built-in adjustment mechanism allows to accurately meet the Scheimpflug condition and to image tilted planes in perfect focus. The tiltable mount is compatible with any C-mount camera since it complies with the 17.52 mm back focal length.

LTPRSM Series are LED Pattern Projectors specifically designed for the most demanding 3D profiling and measurement applications. LTPRSM pattern projectors integrate a precision tilting mechanism based on the Scheimpflug criterion to ensure that patterned light is properly and homogeneously focused across the entire sample surface. The internal focus mechanism ensures that the projected light path is effectively coupled to the pupil aperture of any C-mount lens.

TCSM Series is a unique family of bi-telecentric lenses for extremely accurate 3D dimensional measurement systems. All TCSM lenses are equipped with a high-precision Scheimpflug adjustment mechanism that suits any type of C-mount camera. Besides achieving very good focus at wide tilt angles, bi-telecentricity also yields incredibly low distortion. Images are linearly compressed only in one direction, thus making 3D-reconstruction very easy and extraordinarily accurate.

NEW

Opto Engineering offers a variety of optical components dedicated to the 3D measurement and inspection of components.

This paper has the objective to show you possible applications for electronic components and board automated optical inspection (AOI).

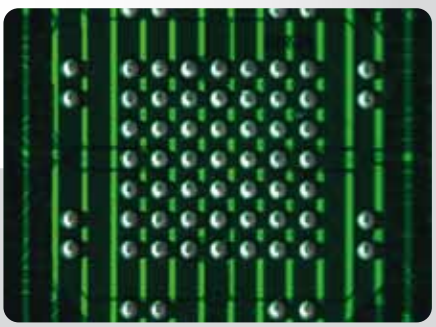
Contact us for more information and to get support for the development of your inspection system with these new unique optics.

Examples of Application

example

BGA integrity and alignment control

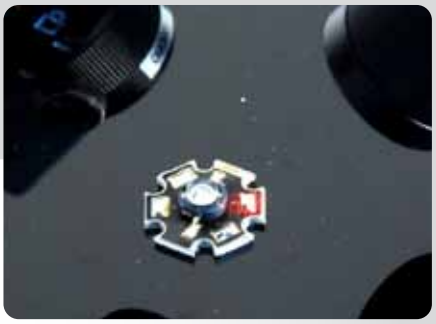
A telecentric lens images a Ball Grid Array illuminated by a Scheimpflug Pattern Projector. The projection is made of perfectly parallel stripes whose pitch is the same as the BGA in order to detect defective or missing balls. The Scheimpflug projection makes the line undistorted and perfectly in focus on the component surface.

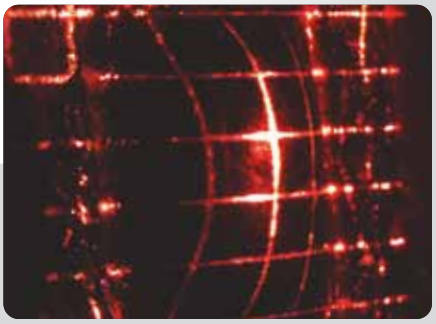


example

Soldering Paste 3D Shaping

A 3D pattern projector illuminates a solder paste ball by means of a macro lens. A red light grid covers the paste showing its shape in 3D. A Scheimpflug Macro lens is then used to image the object without losing the best focusing conditions over the entire surface where the paste has ben deposited.





example

Component Height Measurement

A Macro lens illuminates with a thin red line a PCB board where electronic components are mounted. A Scheimpflug Telecentric Lens is used to image the sample from a 45° viewing angle and to perform 3D reconstruction based on triangulation techniques. The tilted mount ensures that the focus is maintained througout the whole field depth of inspection.

example

Pin Alignment Control

A Macro lens images the connection pins of an integrated circuit. A Scheimpflug Illuminator projects a striped pattern on the pins through a Telecentric Lens. The lines are kept in focus through the whole component surface by tilting the illuminator pattern. Defective pins are thus detected.