

## 360° VIEW OPTICS

## TCCAGE

The **TCCAGE** is an integrated opto-mechanical system designed to fully inspect and measure parts from their side without any need of rotation. Four orthonormal views of an object are provided by a telecentric lens through an array of mirrors. The optical path is designed so that the displacement angle between the views is exactly 90°; this optical layout ensures complete coverage of the object lateral surface. Furthermore, telecentric imaging makes the system insensitive to part decentering and therefore suitable for measurement applications. The TCCAGE is the perfect solution for inspecting parts whose features would be hidden when looked at from the top and for all those applications where an object must be inspected or measured from different sides. Two different illumination devices are built into the device to provide either backlight or direct part illumination.

# Multiple side imaging and measurement at 90°

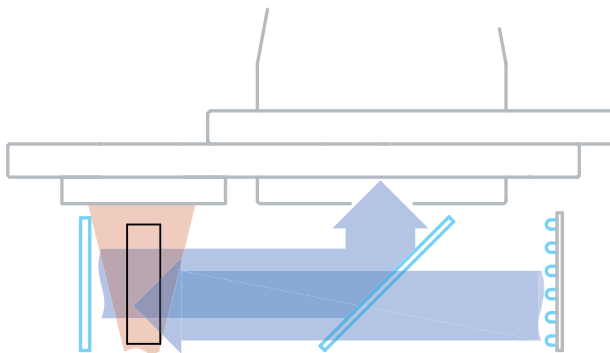
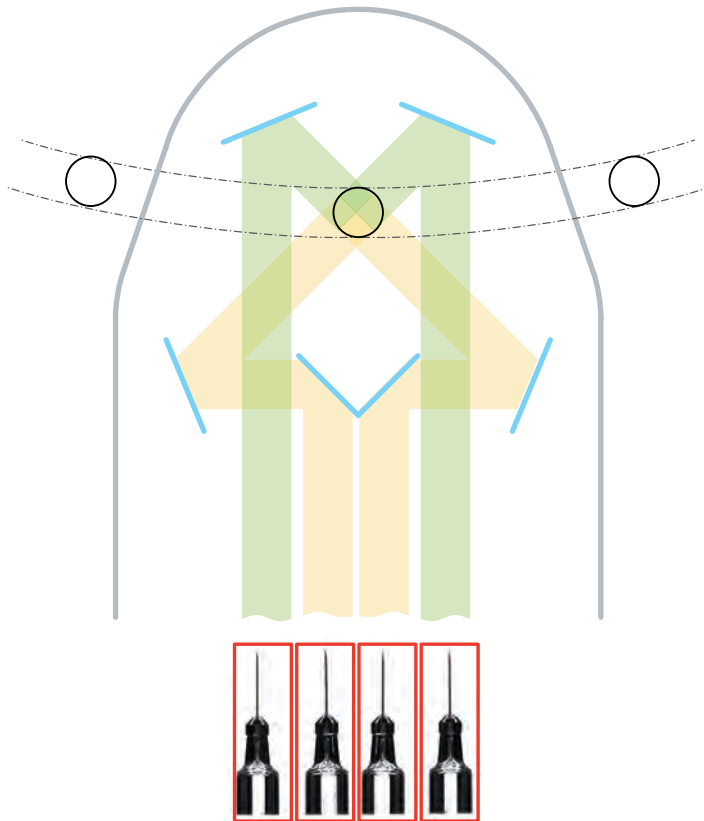


### KEY ADVANTAGES

- 1 **90° lateral imaging:** the 4 orthonormal views allow visualization of object features that are hidden when looked at from the top
- 2 **Long and thin object inspection:** the characteristic aspects ratio of the 4 image segments perfectly fits long and thin objects
- 3 **Built-in illumination:** the device also incorporates two different light sources, for back and direct illumination
- 4 **Suitable for measurement:** the telecentric optics makes this module perfect for any multiple-measurement application.



part number		TCCAGE1248	TCCAGE2348	TCCAGE1296	TCCAGE2396
detector size		1/2"	2/3"	1/2"	2/3"
max. object diameter	(mm)	8	8	16	16
max. object height	(mm)	32	32	68	68
wavelength range	(nm)	450 .. 650	450 .. 650	450 .. 650	450 .. 650
CTF @ 70 lp/mm	(%)	> 40	> 40	> 40	> 40
f-number		8	8	8	8
width	(mm)	111	111	179	179
length	(mm)	192,8	192,8	323	323
height	(mm)	248	248	421	421
weight	(g)	2700	2700	5800	5800
mount		C	C	C	C
Ring Illumination Voltage	(V, DC)	24	24	24	24
Ring Illumination Power	(watt)	3	3	3	3
Coax. Illumination Voltage	(V, DC)	24	24	24	24
Coax. Illumination Power	(watt)	9	9	18	18



**WORKING PRINCIPLE**

A telecentric lens observes the object from 4 different positions through a mirror assembly, ensuring that the optical path is the same for all 4 view points.

The 4 views are equally spaced every 90° and partially overlapped, obtaining complete coverage of the object lateral surfaces. The system can thus tolerate component decentering without any significant decay of the image quality thanks to the telecentric optics, which ensures that magnification is maintained in each image segment.

The system is designed so as to allow components to pass unobstructed through the mirror cage, for in-line applications.

**ILLUMINATION GEOMETRY**

The TCCAGE integrates both direct and backlight illumination devices.

*Direct illumination* (red cone in the drawing) is provided by a ring illuminator placed on the top of the part and can be used to enhance surface defects.

*Back lighting* (indicated by the blue arrows) is obtained by means of a diffusive source which illuminates the object through the mirror system; this type of illumination is suggested for measurement purposes or to inspect transparent objects.

**ADDITIONAL PORT**

The TCCAGE is provided with a 28 mm diameter hole, placed right above the object.

This port can be used to inspect the top of the part by means of an additional lens and camera system (i.e. a *Hole Inspection Lens*, a *Macro* or a *Telecentric lens*).

The aperture can also host other types of illuminators.