OPTICAL RESOLUTION OF LINE SCAN CAMERAS

The native resolution of an optical line scan camera is defined by the number of pixels – the row of photosensitive elements in the sensor line. Line scan cameras are available with more than 8000 pixels.

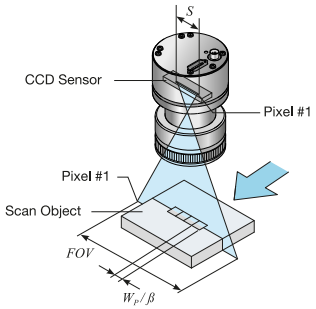


IMAGE SCALE

The resolution of the scanner system is determined by the objective lens chosen and the scale of the image ß', as a function of the ratio of image size (FOV, field of view) to object size S:

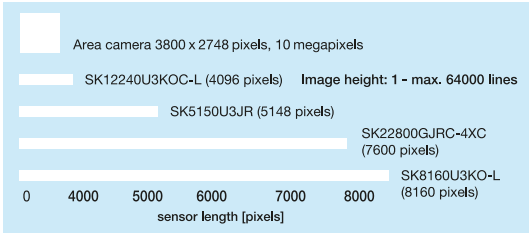
$$\beta' = -\frac{S}{FOV}$$

PIXEL RESOLUTION

The pixel resolution is defined by the pixel width w and the image scale β'

$$p' = \frac{w}{-\beta'}$$

Also, to maintain the correct aspect ratio for an image, the pixel resolution p', in the direction of the sensor X-axis must be identical to that in the direction of the transport Y-axis, perpendicular to the sensor. The resolution in the direction of transport is a function of transport speed and the line frequency of the camera .
An identical resolution in both the X and Y-axis directions is an absolute prerequisite for the accurate geometrical measurement of the surface characteristics of the test object. The optical resolution of the scanner system is often reported in dots per unit length, usually dots per inch or dpi.



COMPARISON: A CONVENTIONAL AREA CAMERA AND VARIOUS LINE SCAN CAMERAS

Here the pixel number and possible resolution of conventional area cameras is compared to various line scan cameras.
The possible resolution of a 10 Megapixel area camera is small compared to that of the line scan camera sensors with large sensor length. Also, the image height is much larger than with an area camera and can be as much as 64000 lines.

This is a printout of the page https://sukhamburg.com/support/technotes/linescancamera/basics/opticalresolution.html from 6/17/2025

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