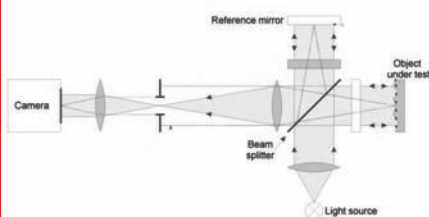




# White-Light Interferometry

# 3D-Shape



Classical interferometry has long been known as a metrological principle. Interferometry has figured chiefly in microscopic applications involving smooth surfaces. With modern methods of signal processing, the interferometer has been developed into a highly precise and extremely fast measuring instrument. High-resolution cameras transmit immense data sets to computer systems, where fast processors can deliver useful results in fractions of a second.

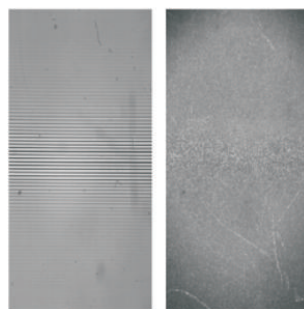
Most white-light interferometers employ the Michelson design. Light from a white source (with a coherence length of typically a few micrometres) is passed through a half-silvered mirror (beam splitter). The two resulting beams illuminate simultaneously the object for measurement and a reference mirror

With its variety of measurement principles, 3 D -Shape GmbH covers a broad spectrum of applications, proving to be an ideal partner for your measurement needs. With the innovative measurement principles of 3D-Shape, three-dimensional images of microscopic to full, meter-sized objects can be generated. Exacting measurement demands are met with the highest precision. The sensors developed by 3 D-Shape are in place worldwide – in the automotive and electronics industries, medical technology, tool making, optical systems and many more. User-friendly analysis software facilitates optimal processing and analysis of three-dimensional data. Customer-specific solutions can be realized upon request. Direct cooperation with end-users enables 3 D-Shape to implement emerging needs into measurement solutions in a timely manner. In cooperation with system integrators, complex systems can also be realized on the production line.

Light waves reflected by the object and the reference mirror pass through the beam splitter again and on a detector (camera chip). If the path length to the object matches the path length to the reference mirror, the instrument produces interference patterns that are sensed by the camera and can be analysed.

Software interprets fluctuations in brightness in order to compute the object distance for each object point. As the object moves along the optical axis, a height map of the object with sub-micrometre precision can be created in this way.

The scanning speed is typically between a few micrometres per second and 100 μm/s, depending on the precision required.



Fluctuations in brightness:

Left: Interference pattern on a smooth surface  
Rechts: so called speckles on a rough surface.

The KORAD<sup>3D</sup> product family made by 3D-Shape GmbH permits measurements both under laboratory conditions and under manufacturing conditions on the factory floor. Precisions are in the range of about 1 μm for rough objects, and cycle times on a scale of seconds can be achieved in 100% inspection right on the conveyor belt.

A series of models with fields ranging from 0.25 x 0.25 mm<sup>2</sup> to 50 x 50 mm<sup>2</sup> cover a wide range of industrial applications. The lateral resolution is typically between 2-30 μm and 8-70 μm. The system places virtually no limitation on the material properties of the object for measurement, provided the object surface reflects enough light. Even with transparent or very dark objects there is commonly enough reflection to support precise, reliable measurements given an optimally constructed system.

