Fraunhofer IPM

F-Scanner 2D

Imaging inspection of cleanliness and coatings

100-percent monitoring in the lab or in the line

Laboratory version of the F-Scanner 2D with sample chamber below the scanning unit. The system is available as stand-alone-device and can also be integrated into production lines.

The laser scanners of the F-Scanner 2D series by Fraunhofer IPM enable complete, spatially resolved inspection of the cleanliness and coating quality of components. The F-Scanner 2D is designed for use in quality assurance laboratories as well as in nearline and inline applications.

High-resolution fluorescence image of the component surface

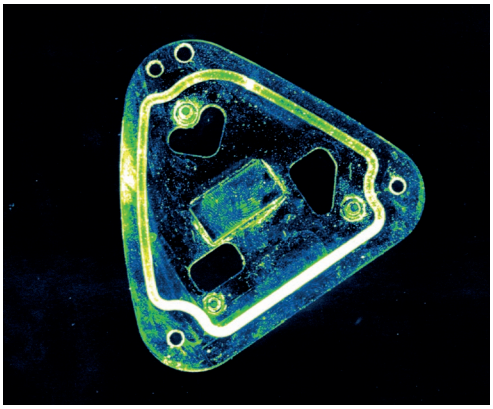
The F-Scanner 2D, like all systems of the F-Scanner family, is based on the technology of fluorescence measurement. The inspection system makes organic layers and even the slightest residues on metal surfaces visible and quantifiable. Unlike the line scanners of the F-Scanner 1D series, the F-Scanner 2D scans the entire surface without moving the component. Full-surface inspection is achieved by a second deflection unit located inside the system. The laser beam traverses the entire scanning area in approximately 5 to 30 seconds, depending on the desired resolution. The measurement data is acquired simultaneously with the scanning motion. Software processes the millions of individual data points to obtain a high-resolution fluorescence image of the part's surface. This image shows where and to which extent organic residues or coatings can be found on the component surface.

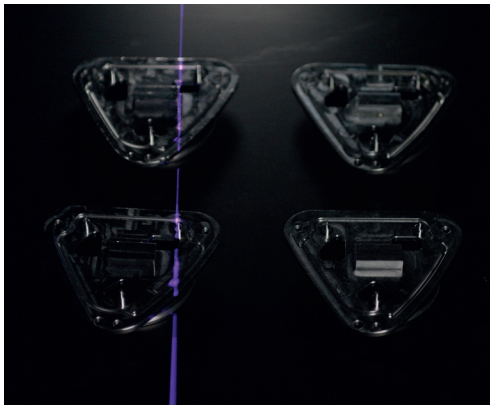
Inspecting cleanliness – optimizing production processes

State-of-the-art joining and coating processes such as adhesive bonding, laser welding, electroplating or plasma coating often put very high demands on the cleanliness of the components to be processed. By combining laser technology with extremely sensitive detectors, Fraunhofer IPM's F-Scanners detect organic contaminations such as lubricants, corrosion protection or release agents down to layer thicknesses of just a few nanometers. Thanks

Advantages at a glance

- Spatially resolved 100-percent surface analysis
- High resolution and field depth
- Eye-safe housing (laboratory version)
- Automated image processing
- All-digital documentation for quality assurance
- Full CE documentation





Left: Fluorescence image of a part in false color representation. Black areas are clean. White areas are strongly contaminated.

Right: Laser beam sweeping across a set of parts inside the sample chamber

to imaging, the systems allow for a specific examination of quality-critical areas and help to identify problematic spots. In addition to determining cleanliness, in many cases conclusions about problems in the manufacturing process can be drawn from the data.

Coating inspection with the F-Scanner is based on the same measuring principle and is suitable for almost any coatings that contain organic substances. Just as with cleanliness inspection, apart from assessing the coating quality possible technical issues in the production process can be identified.

Tailor-made inspection systems for laboratory and inline application

The F-Scanner 2D is equipped with a sample chamber for laboratory or nearline applications. This chamber ensures laser safety (laser class 1 for the overall system). The chamber size defines the maximum field of view of the system and is adapted to different applications, such as the inspection of components of different sizes or entire product carriers. Sample chambers with a height of 40 to 80 cm are offered as standard, with fields of view ranging from 30 × 30 cm² to 60 × 60 cm². For the inspection of even larger objects, robot-assisted inspection using the F-Scanner 1D$_{mini}$ is an alternative option.

The F-Scanner 2D can be used as a stand-alone device and can also be integrated into production lines for the inspection of series components. For this purpose, the interfaces are designed according to customer specifications (see also data sheet F-Scanner 1D /1D$_{mini}$).

Typical specifications

Fluorescence excitation	Typ. 405 nm
Laser safety	Laser class 1 (overall system)
Aperture	40°
Working distance	Typ. 40 to 80 cm
Field of view	Typ. 30 × 30 cm² to 60 × 60 cm²
Speed	50 to 100 lines per sec
Resolution	Typ. 200 µm
Dimensions (L × H × W)	70 × 60 × 55 cm³
Detection limit	Typ. < 0.01 g / m²
Detectable substances	Processing agents, e.g. oils, fats, cleaning agents, organic coatings

Contact

Dr. Alexander Blättermann
Group Manager Optical Surface Analytics
Phone +49 761 8857-249
alexander.blaettermann@ipm.fraunhofer.de

Fraunhofer Institute for Physical Measurement Techniques IPM
Georges-Köhler-Allee 301
79110 Freiburg, Germany
www.ipm.fraunhofer.de/en