Fraunhofer IPM

F-Scanner 1D

Inspecting cleanliness and coatings in motion

Inline or robot-assisted 100-percent monitoring

F-Scanner 1D with laser protection shield for oil film measurement in the production line of a stamping plant. Both units capture sheet metal blanks of up to four meters in width.

From the inspection of blank lubrication in press shops to the detection of even slightest contaminations on large and complex parts: The laser scanners of the Fraunhofer IPM F-Scanner 1D series are ideal tools for inspecting parts in motion. Depending on the application, either the component or the scanner itself moves.

Fluorescence reveals even minor contaminations or thin coatings

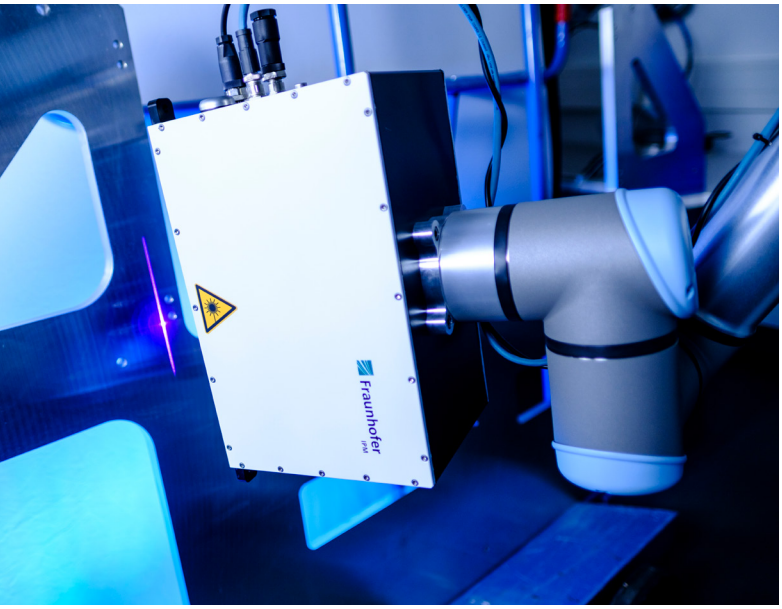
The line scanners F-Scanner 1D and 1D$_{mini}$, like all systems of the F-Scanner family, are based on the technology of fluorescence measurement. Fluorescence makes organic layers and even the slightest residues on metal surfaces visible and quantifiable. While the devices of the F-Scanner 2D series inspect surfaces two-dimensionally, the F-Scanner 1D systems project a single line with up to 2.1 meters width onto the part's surface. The laser line comprises 500 to 1 000 individual measuring points. The full-surface information is acquired by moving the component under or above the scanner – as on a conveyor belt, for example.

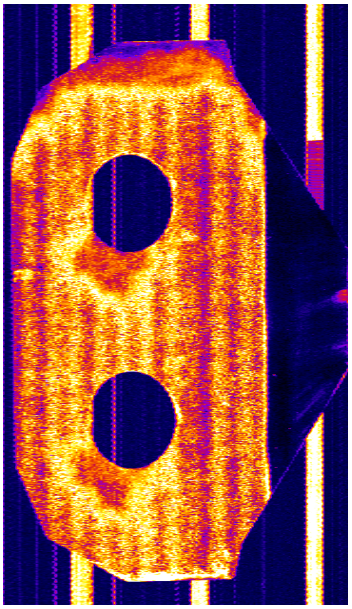
Resolution in the millimeter range

As an alternative, the scanner itself can be moved across large areas with the aid of a robot or a gantry. The high scanning speed of typically 200 to 800 projected lines per second is a decisive factor for such a setup. It enables resolutions in the millimeter range, even at high velocities. Based on the course of motion, the lines are combined to form a high-resolution overall measurement reflecting the “coating or contamination landscape” on the component surface, providing the basis for process optimization and quality control.

Advantages at a glance

- Spatially resolved 100-percent surface analysis
- Suited for rapidly moving large or complex components
- Flexible integration into production lines
- Suitable for application in harsh environments
- Various interfaces available (TCP/IP, MQTT, Profinet …)
- Automated image processing
- All-digital documentation for quality assurance
- Full CE documentation





Right: Example image of a spray-oiled sheet metal part with degreased area.

Left: F-Scanner 1D$_{mini}$ mounted on a robot

Ready to be deployed in the production line

The F-Scanner 1D is designed for use in harsh industrial environments. The scanner is equipped with a water- and oil-tight housing (corresponding to IP65), shock absorbers, heat sinks (water-chilled or thermoelectric) and a replacable exit window. Laser safety of the entire system is achieved with minimum additional effort by means of an external interlock input, warning lights and key-actuated controls. An industrial PC with the F-Scanner software is provided for controlling the devices and for processing the measurement data. Communication between the sensor and line automation or the customer's data processing system can be realized via various interfaces such as TCP/IP or MQTT and data formats. Safety-relevant functions are controlled directly on the device via the interlock logic of the line. All interfaces (mechanical, electrical, software) can be adapted according to customer requirements.

Designed for use on lightweight industrial robots

While the F-Scanner 1D is designed for speed and maximum field of view, the F-Scanner 1D$_{mini}$ features a particularly compact design. Due to its low weight it can be operated with lightweight industrial robots and cobots. In contrast to the stationary F-Scanner 1D, the measurement device itself moves rather than the part. This allows complex geometries, such as structural elements or lightweight constructions, to be completely captured. The combination of line scanner and robot is also advantageous when dealing with large components, where the stationary F-Scanner 2D might be constrained by the limited field of view.

Typical specifications

Fluorescence excitation	Typ. 405 nm
Aperture	40 to 80°
Working distance	30 to 150 cm
Field of view	30 to 210 cm
Speed	200 to 800 lines per sec
Resolution	Typ. 1 000 points / line
Dimensions (L×H×W)	F-Scanner 1D: 27 × 95 × 35 cm³, 60 kg F-Scanner 1D$_{mini}$: 20 × 30 × 25 cm³, 8 kg
Detection limit	Typ. < 0.01 g / m²
Detectable substances	Processing agents, e.g. oils, fats, cleaning agents, organic coatings

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