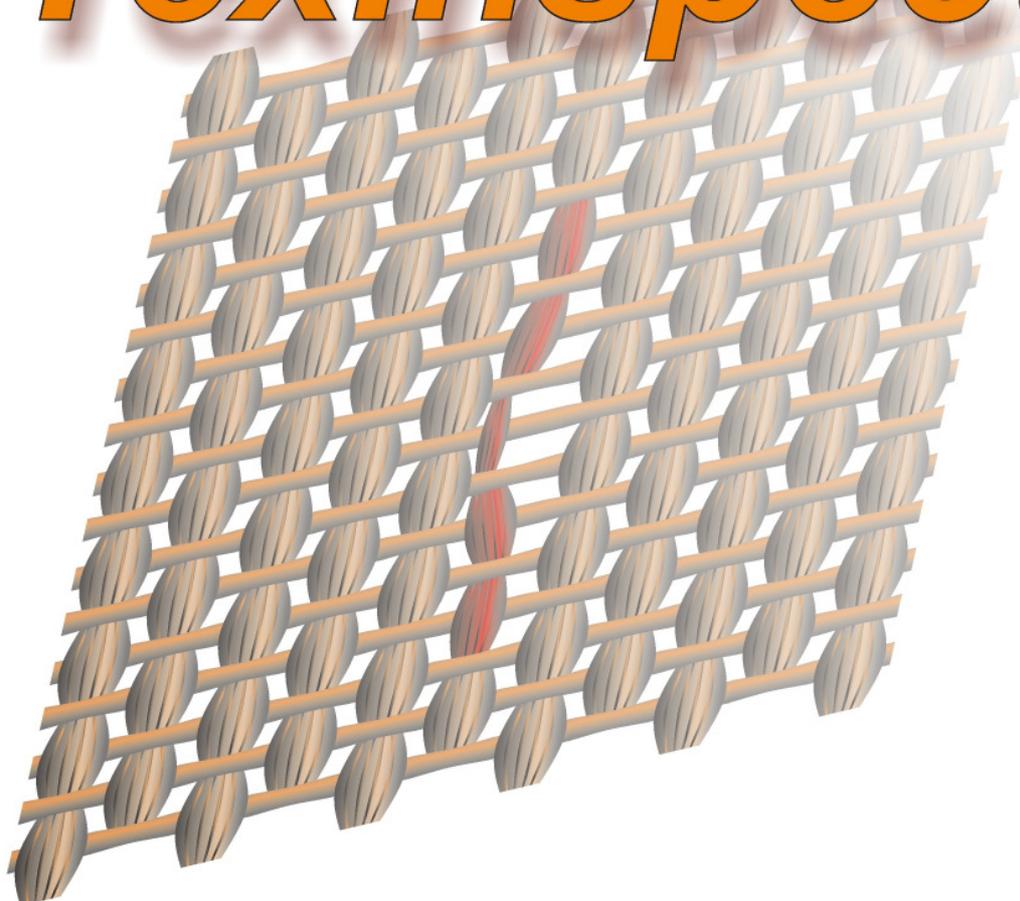

*Optical Inline Inspection System for
Evenly Textured Endless Materials*

TexInspector



OSIF 
GmbH

Optical Sensor Technologies
for Inspection and Form Recognition

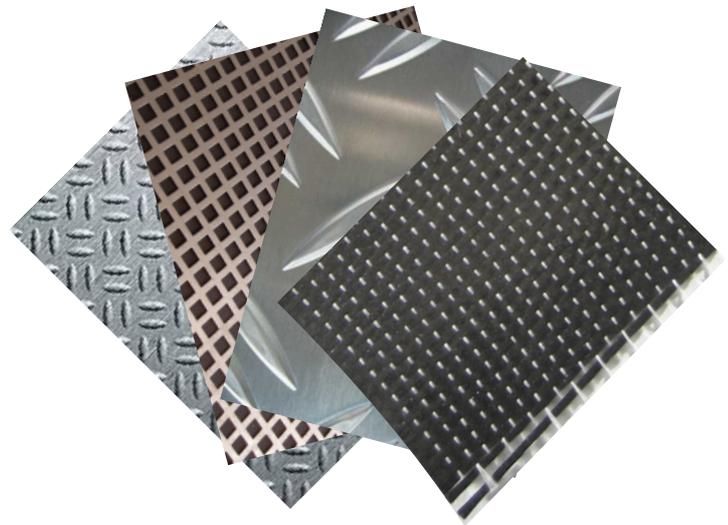
TexInspector- Application Areas and Key Advantages

The **TexInspector** is an optical, contact-free inspection system for the inline quality control of evenly structured endless materials such as woven carbon or glass fibre matting, industrial textiles, periodically structured plastics, embossed metal sheets or woven material, e.g. for screen printing. The system automatically detects defects in the textured surface such as holes, dents or distortions of the texture, etc. It recognizes any deviation from the periodically textured or embossed surface - even if the defects are of low contrast.

Since the system uses a very effective detection algorithm, the setup time for new materials is very easy and does not need extensive and time-consuming defect teaching.

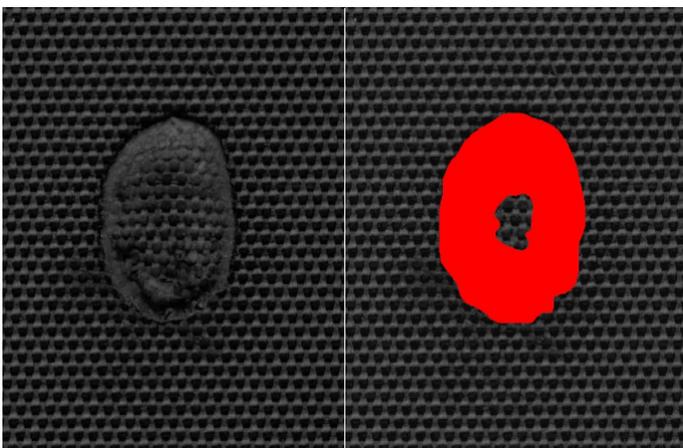
Due to the small space requirements and the robust and simple construction, the **TexInspector** can easily be added to an existing production line.

The **TexInspector** is suitable for quality control in the production line or for finished products and also for incoming material checks prior to manufacture.



The **TexInspector's** key advantages:

- Continuous, complete and objective inspection of the produced material
- Automatic detection of deviations from the periodic texture of the material
- Easy setup without extensive teaching of defects
- High inspection speed, non-destructive and contact-free inspection
- Automatic mapping of defects in a global defects map as well as documentation in a comprehensive, customer specific log
- Quality verification for the end customer
- Changes in the production process can be immediately qualified
- Simple integration into the production process due to small space requirements
- Adaptable to the material width and material speed
- Reduction of the very tiring manual inspection
- Minimum time effort and low expenses for maintenance
- Optional: Defect marking on the material, e.g. using an inkjet printer
- Optional: Software module for comprehensive analysis and statistics

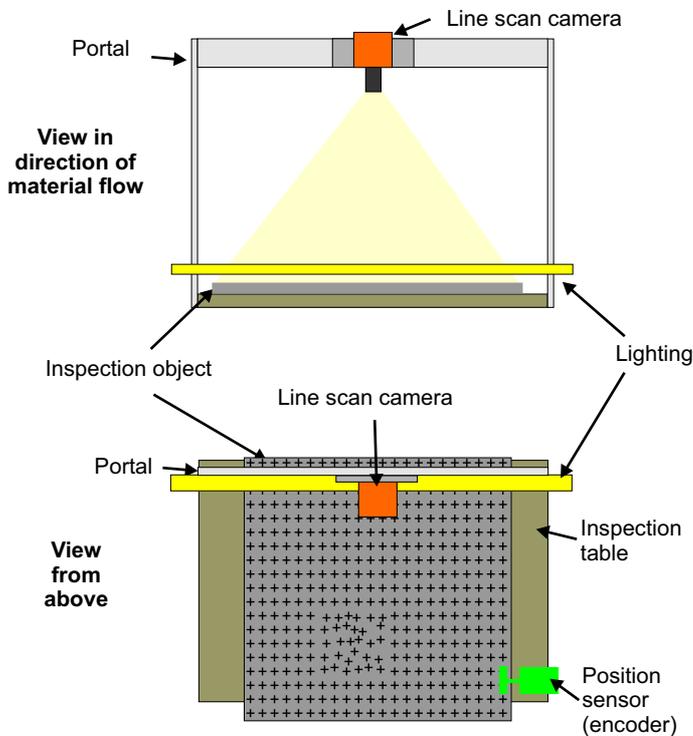


Laminated bubble in a textured synthetic roof sealing sheeting. Left picture: original camera image. Right picture: detected and marked defect

TexInspector- System Setup and Functionality

The main components of the systems are the analysis software, the high resolution camera(s), the lighting system, the encoder for synchronising the **TexInspector** with the production line speed and a high-performance industrial PC.

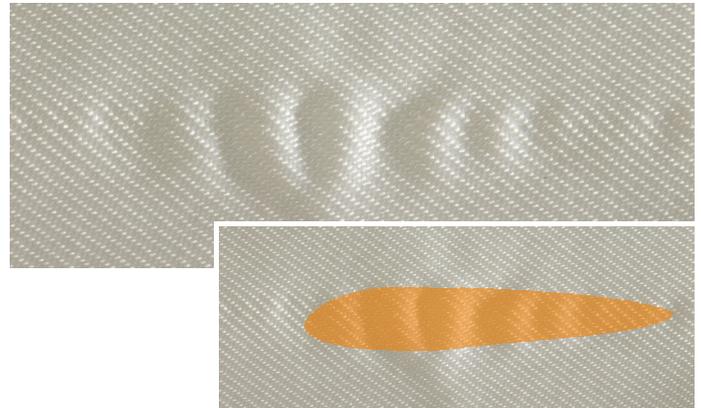
The material moves beneath a line scan camera (e.g. over an inspection table). The camera captures the images of the material using reflected lighting. The image capture is triggered by the encoder, which makes the system independent of the material speed on the production line.



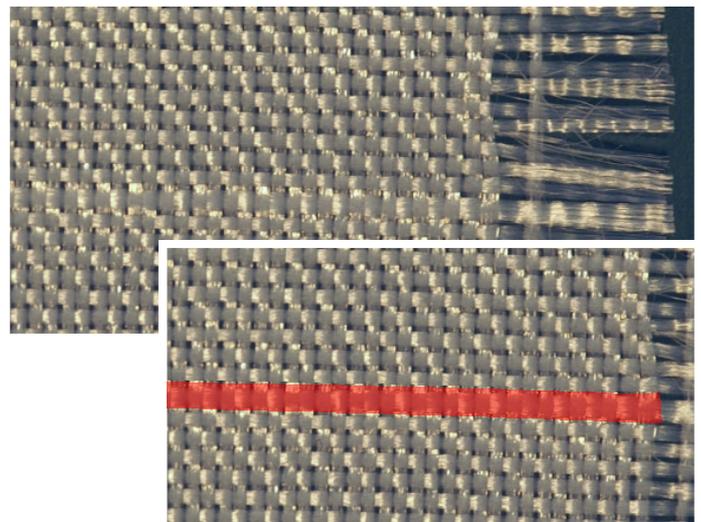
Groups of captured scan lines are joined together to form complete pictures of the inspected material. The pictures are then analysed for material defects using several different detection algorithms. Detected defects and measured values are displayed on the PC monitor and are written to an inspection log. A picture of each defect can be saved on disk for later assessment and the defect can be optionally marked directly on to the material. Defects can also trigger a signal to alert the operator or for machine-to-machine communication.

At the end of each inspection, the defects log and a global defects map can be printed out so

that employees and customers can assess the quality of the material at a glance.



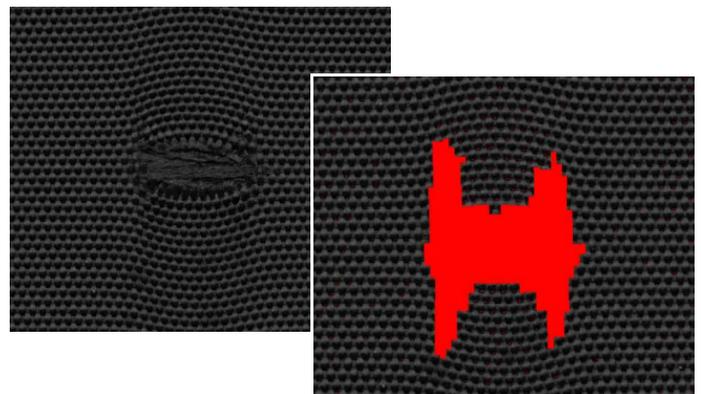
Detected waviness in a woven textile



Inspection of industrial textiles; here glass fibre fabrics

Top: Original picture.

Bottom: Recognised and marked defect

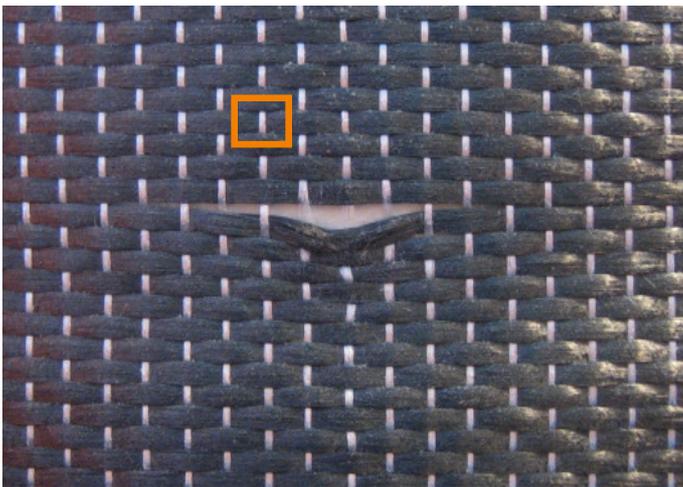


Large-area surface disturbance detected during continuous quality control.

TexInspector- Performance Features and Defect Spectrum

The standard system is equipped with a line scan camera with 8192 pixels. The maximum inspection width which can be inspected with one camera depends on the smallest structure which needs to be detected (see left picture). If for example the smallest texture element has a size of 2 x 2 mm with a pixel size of 10 x 10, then the maximum width that can be inspected with one camera is 1640 mm.

The maximum inspection speed also depends on the size of the smallest structure element. At the maximum acquisition and analysis frequency of 3 kHz combined with the above structure size, an inspection speed of 36 m/min can be achieved.



Carbon fibre fabric; the red square shows the size of the smallest detectable structure element in the above example. Detectable defect: Hole with torn warp thread.

An encoder is used to measure the position of the fabric. This makes the system independent of the material speed on the production line. In addition, it allows the correct physical position to be determined for each defect.

As an option, the defective areas can be automatically marked on the material using for example a label printer or inkjet printer.

All systems are equipped with a remote support software interface. On request, the engineers from OSIF can help the customer to adjust and diagnose the system without needing an expensive and time consuming

visit.

The **TexInspector** analyses the periodic surface texture and registers every deviation from the normal texture. If the area of a detected deviation exceeds a certain size, it will be treated as a defect. The minimum defect size can be adjusted when you start each inspection.

The material width is also measured during the inspection. Variations from the specified target width can also be handled as a defect.

All detected defects are displayed on the PC monitor and are included in a defects log. The main screen of the software is divided into panels (see picture on next side). One panel shows the entire width of the material width with the defects marked in colour. Another panel shows a detailed view of the latest found defect.

The steps to take after finding a defect can be specified by the customer. For instance a detailed picture of the defect can be stored on disk for later quality assessment, a visual and/or acoustic signal can be output to alert the operator to take certain measures or a marking can be applied directly to the defective area of the material, e.g. using an inkjet printer.

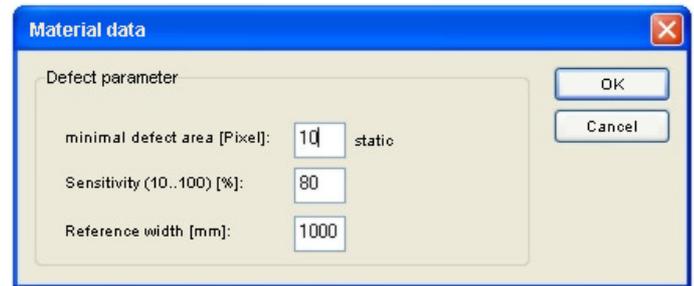


Typical defect which is easily overlooked during manual inspection: Shifted warp thread in a carbon fibre textile.

TexInspector- The User Interface

The control and analysis software is a central component of the **TexInspectors**. It includes several algorithms for defect detection, controls the hardware and provides dialogue boxes for entering the material parameters and defect structure tolerances. It is also responsible for creating and saving log files with the analysis results.

System set up has been kept as simple as possible. Very few inspection parameters have to be configured and this only when you change the material (see picture on the right). You only need to configure the minimum defect area to be detected, the sensitivity of the detection and the reference width of the material.



You only need to enter three parameters prior to an inspection.

Another possibility for production quality control are individual statistical analyses using the MS Excel® export function, which saves the measured values in an MS Excel® readable form. This allows each user to generate his or her own analyses, such as time series, material series or trend analysis.



The main screen is divided into five areas as follows (see picture above):

- A** System messages.
- B** Log of the detected defects with position and size.
- C** Detailed view of the last detected defect. The defect picture can be stored on disk.
- D** Info area showing the material speed, current position and the number of detected defects.
- E** View of the entire width of the material. Detected defects are marked in colour. Faultless material is displayed in green.

Add-ons and Enhancements

Please get in contact with our engineers if you would like us to adapt our system to meet your production needs. The following software modules are available as options:

- Statistical analysis tools:
 - Distribution of the defects over the material width (configurable number of lanes); distribution of the defects per defect size, etc.
- Recognition of periodical defects.
- Display of a defects map.
- Integration of special communication interfaces, eg. to production machines.

Each customer has his own range of products and often unique manufacturing processes. Thus we often get asked for customer-specific changes. OSIF is happy to cooperate with the customer until the requirements are met.

OSIF GmbH – Location



Train

From main train station by metro or by foot (3 min. walk, following the “Bahnhofstrasse” direction city centre) to “Kröpcke”. Then take line 4 direction “Garbsen” to station “Marienwerder/ Wissenschaftspark”. For about 500 m walk on the “Hollerithallee”.

Car

Exit the A2 at “Hannover-Herrenhausen”. Drive on the B6 towards “Hannover”. After crossing the „Mittellandkanal“, leave B6, turning left at the following traffic light.

Hanover Airport

We will pick you up from the airport (approx. 20 min).

We are looking forward to your visit!