



Optical Measuring Systems

X-3DVISION TUBE SURFACE INSPECTION of Tubes

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STEP OUT WITH US INTO THE NEXT DIMENSION!

Imagine you could see virtual images of the billets, blooms or tubes right after they leave the furnace, continuous caster, or the rolling mill. Every infringement of a limit value would be shown. You would know immediately where a tool is damaged or worn.

In tube production, surface defects are often perpetuated through the complete process chain. Non-stop surface inspection from billet to finished tube is therefore critical for the quality of the final product.

You Know These Difficulties?

- ✘ **A 100% manual inspection of hot tubes or billets is not possible**
- ✘ **Defects in the billet can cause defects in the blooms and later in the tubes**
- ✘ **Feedback from the cold inspection of the tube comes days too late**
- ✘ **Feedback from later processing steps is delayed even longer**



surcon

100% powered by IMS



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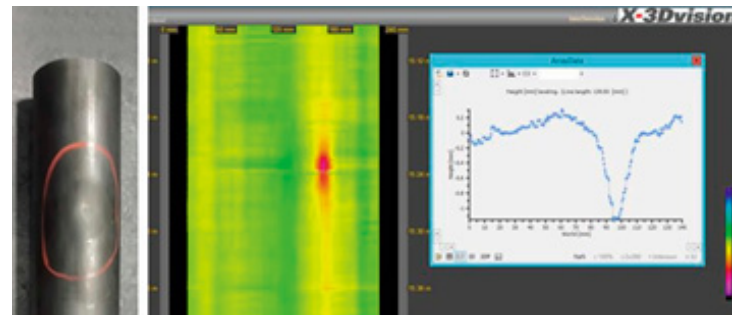
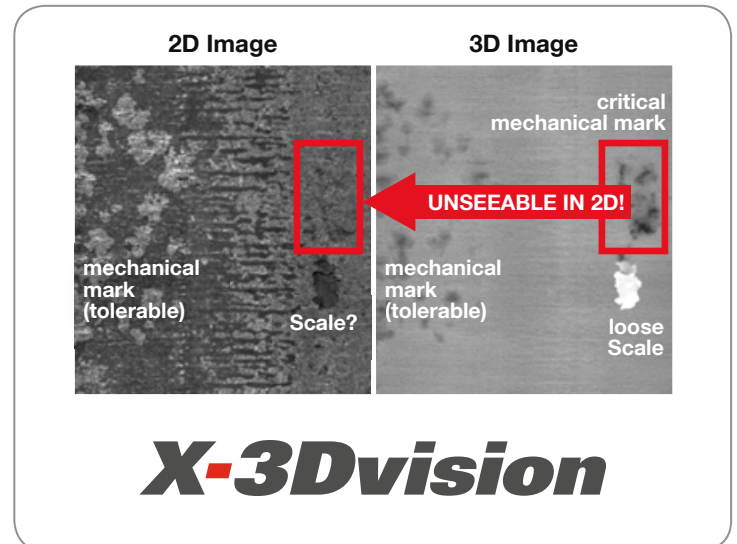
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X-3Dvision Tube – The Superior Solution from IMS

In addition to a grey value diagram, we also provide you with the 3D topography of the surface.

3D Inspection is Vital!

A 3D inspection is necessary because the information from a 2D image does not suffice to evaluate the defects as textures and scale offer a multitude of misleading image information.





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These Benefits Will Take You Forward!

- ✓ Automatic detection and classification of relevant defects (including position) and geometric data (including the depth)
- ✓ Estimation of the significance of the defects
- ✓ Correlation of billet to bloom to tube
- ✓ Documentation of the billets, blooms and tubes
- ✓ Archiving of the data for process optimisation
- ✓ Correlation with production parameters
- ✓ Substitution of manual inspection
- ✓ Detection of defects before further processing in the production cycle, warning (live) in the case of serious defects
- ✓ Increase in production output by early detection of rejects



Our Core Competency for 15 Years

We have more than 36 years of experience in the design and production of measuring systems for the metal industry. Continuous, non-contact measurement of hot material has been one of the core competencies of IMS for decades. More than 15 years ago, IMS was the first manufacturer of laser contour measuring gauges for hot rolling mills (flat products).

Stable constructions, a suitable choice of materials, passive heat protection measures, active water and air cooling systems and optimally designed purge air technology for reliable protection of sensitive components are features our customers have always placed their trust in.



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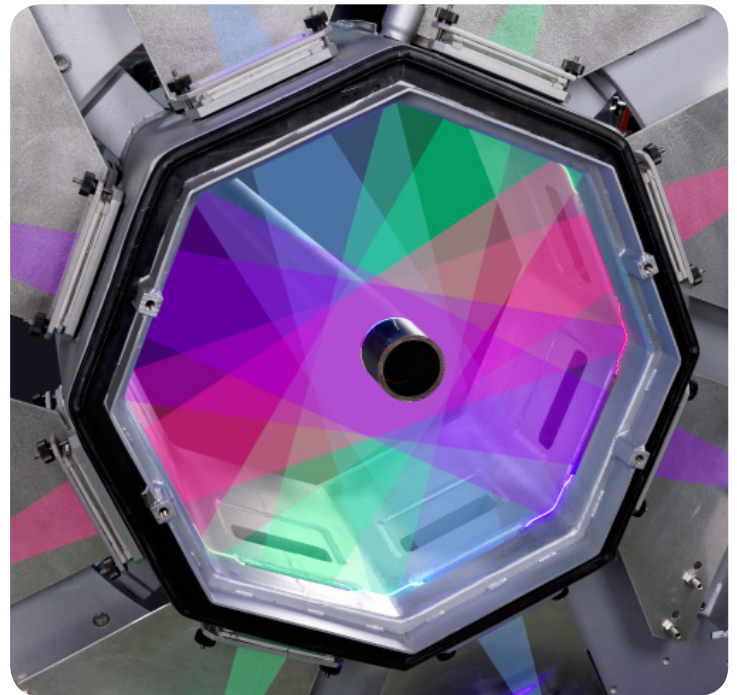
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Newest Laser Light Section Technology

The surface inspection system works by the principle of laser light section technology

A laser beam is spread optically on a line that is projected perpendicularly to the surface of the material. A high-speed 3D camera (matrix) films the image from the progression of the laser line, undertakes the complex pre-processing of the data and then sends them to the central station. There the high-performance computers process the data and place them in the data storage system.

The key to very high measurement precision is the geometric stability of all components concerned. Every effort was made while designing this system to ensure that every laser camera system individually and all systems together remain in constant alignment to each other within tight tolerances.



The suitable number of laser camera systems needed for complete and simultaneous measurement of the product is arranged around the periphery. Four to eight sets are typically used, depending on the complexity of the product and the necessary performance. The minimum and maximum product dimensions are also taken into consideration.

In order to achieve the best-possible measurement results, lasers in different colours with corresponding filters for the cameras are used so that overlapping laser lines can be detected without interference.



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MODERN HARD AND SOFTWARE FOR DATA PROCESSING

Excellent measurement performance can only be achieved if the newest optical devices and latest components for network and data processing interact perfectly with each other.

IMS uses ultra-modern lasers specially adapted to the measurement task in question with extremely stable intensity, pointing stability and straightness. The matrix cameras used work with on-board data pre-processing so that huge volumes of data do not need to be sent to the computers in the central station (on-board intelligence). All the optical components are exclusively of the highest quality and were selected on the basis of their suitability for industrial environments, best-possible optical properties and low distortion.

The pre-processed data are sent to the process computer in the central station via light wave. Highly-specialised algorithms and powerful hardware are used to process the raw data in the necessary format.

The data of all cameras installed are then processed and the resultant product contour image shown on the user screen together with reference data. It is saved in the MEVInet-Q quality management system, where the user can evaluate the quality of the product and process.

Draw up Your Own Catalogue of Defects!

The software of all inspection systems offers a maximum in ease of use and intuitive intelligibility thanks to graphic user interfaces and simplest program navigation. This leads to faster start-up and enables long-term maintainability of the systems.

Classification by X-Vision Software

The key technology of every single surface inspection system is the fully automatic detection and classification of defects. To enable optimal use of this technology, we offer:

- **easy-to-use tools to adapt detection and classification (software module "The Inspector")**
- **easy configuration and quick training of the classifier (software module "Trainer")**
- **rules editors for the creation of optional rules for classification, and additional test classifier**
- **an offline simulation system that enables comprehensive testing of new classifiers with existing data before release for use in production.**

FULL RECORDS OF 60,000 TUBES OR EVEN MORE!



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Your Challenges:

- A 100% manual inspection of hot tubes is not possible
- Defects in the billet can cause defects in the blooms and later in the tubes
- Feedback from later processing steps can be delayed by days

Our Solution for You:

- Automatic detection and classification of defects including their position and geometric data including the depth
- Continuous logging of all measuring data, product parameters and system events
- Detection of defects directly during the process

Performance Data of a Tube Inspection System (Example)

Configuration per side	8 high-speed cameras and lasers (various wavelength)
Typical resolution	200 μm in transverse and thickness direction, longitudinal direction is dependent on the speed
Memory management	About 200 MB of image data per tube, with a database size of 12 TB, about 60,000 tubes can be recorded completely, significantly higher storage time if only defect images are saved. Automatic compression available.