OPTICAL MEASURING SYSTEMS

SURCON 3D
SURFACE INSPECTION

OF TUBES

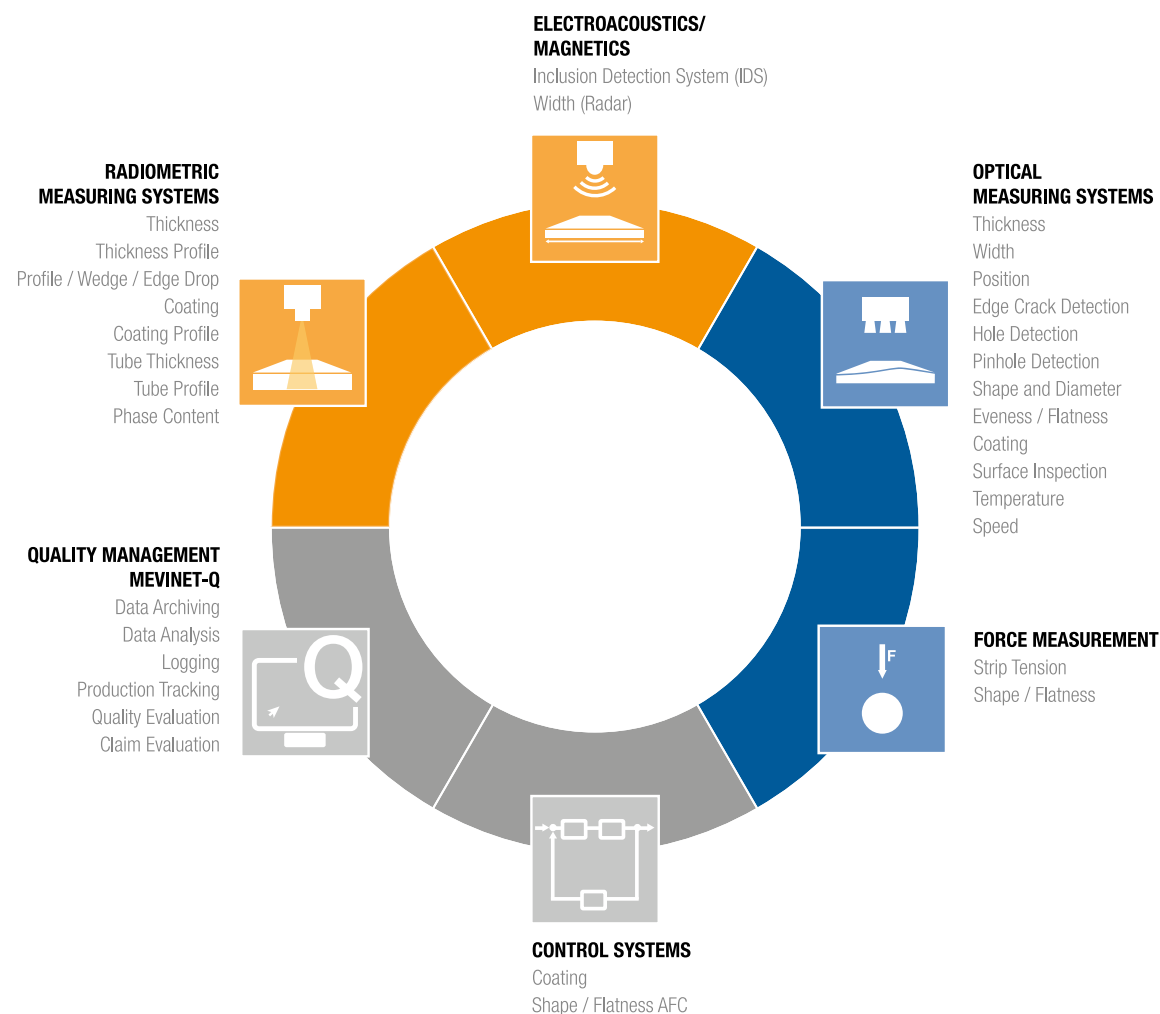# Precision out of Passion, Quality out of Conviction

X-ray measuring systems, isotope measuring systems and optical measuring systems from the world's leading manufacturer IMS have been a guarantee for highest product quality in the production and processing of steel, aluminium and non-ferrous metals since 1980.

Our non-contact detection systems are used in the steel, metal and aluminium industries wherever meticulous material testing is required to guarantee the highest standards of quality – worldwide under the toughest operating conditions.

Both in hot production, such as continuous casting plants, hot rolling mills and tube mills, where shimmering surfaces, heat, dirt and moisture are common, as well as in cold rolling mills and service centres, measuring systems from IMS measure and detect reliably and with highest precision.

Exactly reproducible measurements and evaluations in real time optimise your production lines and increase product quality while simultaneously reducing production costs and reject rates.

IMS MEASURING SYSTEMS AT A GLANCE

ELECTROACOUSTICS/ MAGNETICS
Inclusion Detection System (IDS)
Width (Radar)

RADIOMETRIC MEASURING SYSTEMS
Thickness
Thickness Profile
Profile / Wedge / Edge Drop
Coating
Coating Profile
Tube Thickness
Tube Profile
Phase Content

OPTICAL MEASURING SYSTEMS
Thickness
Width
Position
Edge Crack Detection
Hole Detection
Pinhole Detection
Shape and Diameter
Eveness / Flatness
Coating
Surface Inspection
Temperature
Speed

QUALITY MANAGEMENT MEVINET-Q
Data Archiving
Data Analysis
Logging
Production Tracking
Quality Evaluation
Claim Evaluation

FORCE MEASUREMENT
Strip Tension
Shape / Flatness

CONTROL SYSTEMS
Coating
Shape / Flatness AFC

Step out with us into the next Dimension!

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.

Our "surcon 3D Tube" surface inspection system allows to detect surface defects at a much earlier stage in the rolling process than before, and to counteract them early and effectively by means of concrete corrective measures.

In addition, 100 % surface inspection ensures that immediate knowledge is available as to whether a detected defect occurs once, repeatedly on a tube or at the same length position from tube to tube – information that can be reliably determined is almost impossible by manual inspection.

Exactly reproducible measurements and evaluations in real time optimise your production lines and increase product quality while simultaneously reducing production costs and reject rates.

Climate Neutral Company:
Our CO_2 footprint is balanced!

Precisely determined and documented measurement data make it possible to detect material defects, surface unevenness, tolerance as well as dimensional deviations and many other factors that can lead to later material scrap already during the manufacturing process.

Use the data obtained by our systems to conserve resources effectively! We also take responsibility for our environment. An independent body has confirmed that IMS Messsysteme GmbH is a climate neutral company!

Find out more at: **www.imsocial.info**

Optical Measuring Systems | **surcon 3D Surface Inspection of Tubes**

Optical Measuring Systems | **surcon 3D Surface Inspection of Tubes**

# IMS Technology enables 3D Inspection

EXAMPLES OF DEFECT TYPE DETECTION USING SURCON 3D TUBE SURFACE INSPECTION

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.

Depending on the defect type, the cause of the defect can be determined as quickly as possible and a corresponding countermeasure can be taken, e.g. a change of roll stands if all the following tubes were rolled out with the same significant defects in case of a roll breakage or bearing damage.
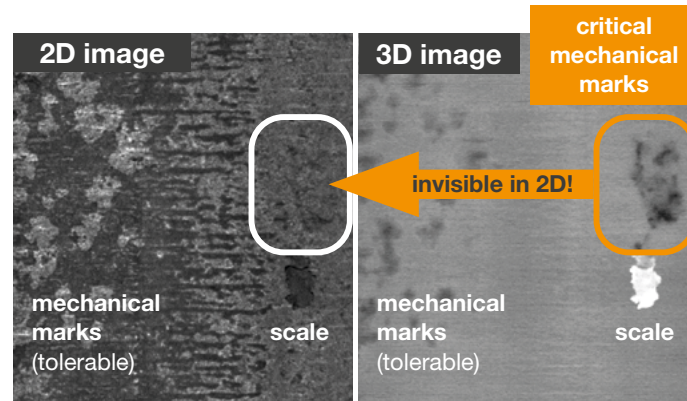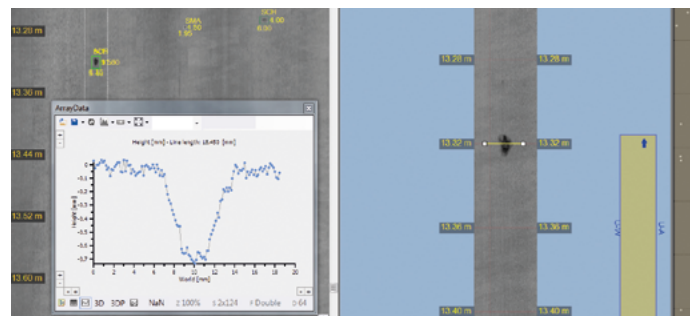

While invisible in the 2D image, the critical surface defect can be clearly distinguished in the 3D image
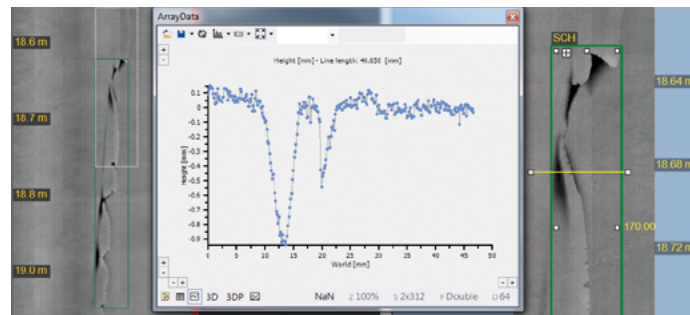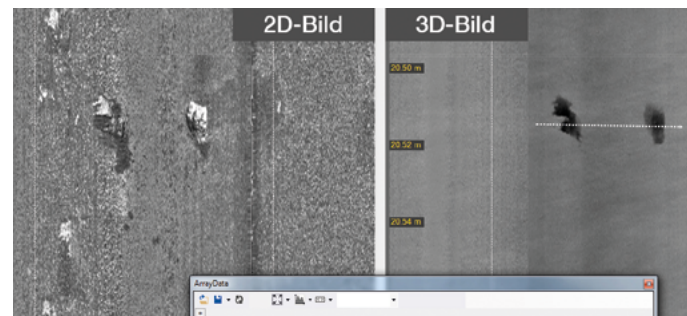

Defect: Height profile type „shell"
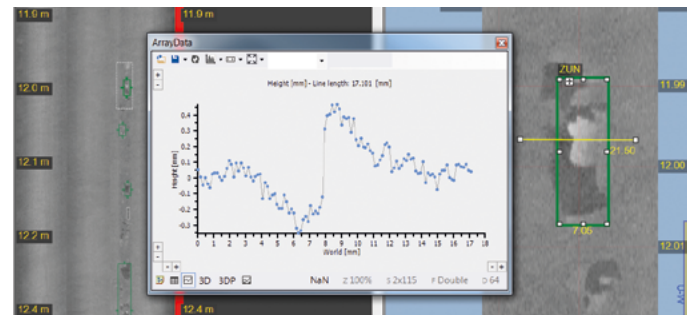
Defect: Height profile type „scale"

Defect: Height profile type „impression"

Defect: Height profile type „washout"

100% Automated Surface Inspection

- ☑ Automatic detection and classification of relevant defects and geometric data (including depth and position)
- ☑ Estimation of defect significance
- ☑ Correlation of billet to shell to tube
- ☑ Documentation of billets, shell and tubes
- ☑ Archiving of 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 case of serious defects
- ☑ Increase in production output by early detection of rejects

OUR CORE COMPETENCY FOR 15 YEARS

We have more than 40 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.
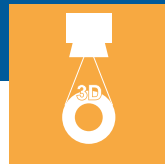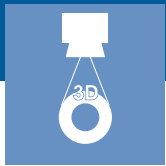
Newest Laser Light Section Technology

THE SURFACE INSPECTION SYSTEM WORKS BY THE PRINCIPLE OF LASER LIGHT SECTION TECHNOLOGY

A laser beam is spread optically to a line that is projected perpendicularly to the surface of the material. A high-speed 3D camera (matrix) captures the images 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 into 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 units 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.
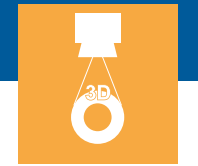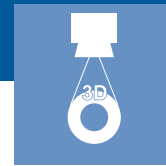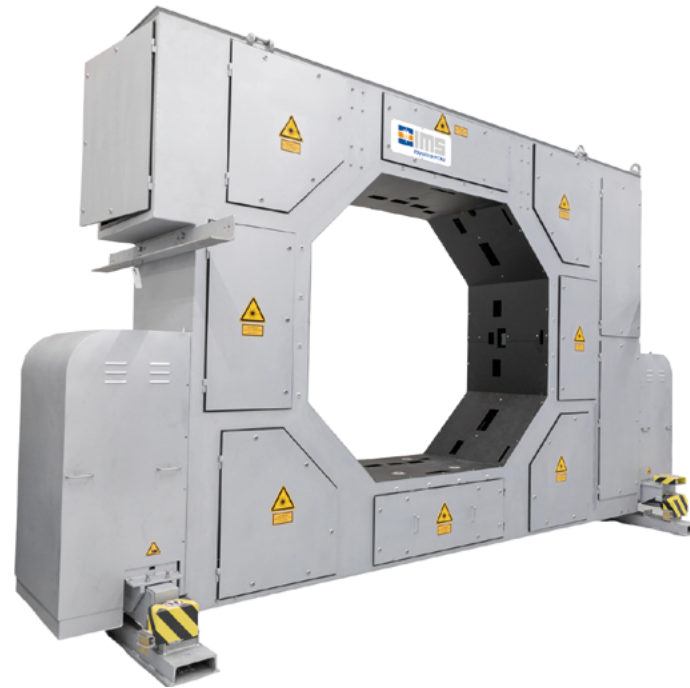
Retrofit existing measuring system with surcon 3D SIS

SIGNIFICANT ADVANTAGES DUE TO SUBSEQUENT INTEGRATION INTO EXISTING IMS MEASURING SYSTEM

The earliest possible detection of defects will be an indispensable "must have" in seamless tube production in the future. Even today, it is no longer possible to operate without high-precision measurement technology without compromising on top product quality.

The integration of an IMS 3D Tube Surface Inspection System into an existing IMS Tube Wall Thickness Measuring System offers several advantages compared to an additional, stand-alone gauge:

- All measurement data such as wall thickness, diameter and profile, temperature and surface defects are determined simultaneously at the same measuring point and have the same tube length reference.
- The existing IMS gauge can continue to be used as before.
- There is no need to create additional installation space for another gauge.
- Only minor modifications to the roller table elements and their surroundings are necessary.

Placed behind the last of the three forming stages, the surface inspection of hot-rolled finished tubes in this way moves directly to the manufacturing process in the hot section of the seamless tube rolling mill.

In future, possible surface defects will be detected immediately after the finish-rolling and corrective measures in direction of the process and tools can be initiated accordingly in a fast and targeted manner.

surcon))

surcon))
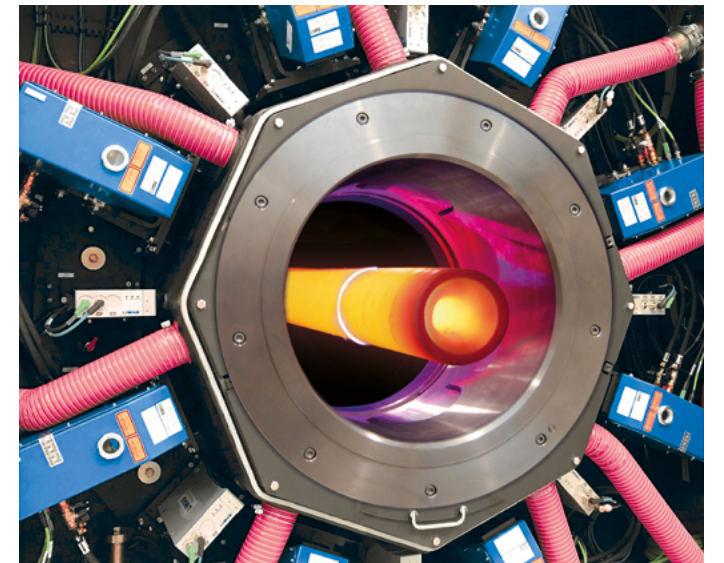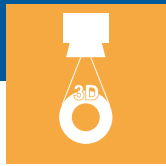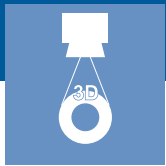
Challenge meets Solution

Complete functionality without compromises

- Automated detection of surface defects
- Classification of detected surface defects
- Detection of periodical surface defects
- Integrated quality evaluation of inspection results
- Visualization of inspection results
- Reporting inspection results via data interface
- Archiving results for later review

Customized solutions

- Adaptation to local conditions
- Integration into existing process technology
- Process optimization with the help of surface data
- Correlation with quality data of subsequent process steps
- Using surface inspection results to control surface treatments

Performance Data of a Tube Inspection System (Example)	
Configuration per side	8 high-speed cameras and lasers (various wavelengths)
Typical resolution	100 µm in transverse and thickness direction, longitudinal direction is dependent on 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
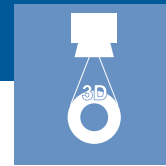
Modern Hard- and Software for Data Processing

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 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 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 is sent to the process computer in the central station via optical fiber link. Highly-specialised algorithms and powerful hardware are used to process the raw data in the necessary format.

The data of all cameras installed is 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 DEFECT CATALOGUE!

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 SURCON 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
- easy configuration and quick training of the classifier
- rule editors for the creation of optional rules for classification and additional test classifier
- offline simulation system, that enables comprehensive testing of new classifiers with existing data before release to be used in production

COMPLETE RECORDING OF YOUR PIPES OVER THE LAST 2 YEARS!*

*longer period by scaling

Mobile Inspector App (MIA)
for Surface Inspection Systems

## ALL SURFACE INSPECTION RESULTS ON HAND AT ALL TIMES!

With the help of the IMS Mobile Inspector App (MIA) for surcon 2D and 3D surface inspection systems (available for iOS and Android), inspection results can be viewed while on the move.

Regardless of your whereabouts – whether in a conference room or in the plant – all data is always just a finger swipe away.

The surface map, which can be controlled via gestures, enables fast, intuitive navigation through the inspection results of all surcon 2D and 3D surface inspection systems.

In this way, the detected surface defects can be compared directly with the actual surface of the material. You can of course add your own images quickly and easily to complete the inspection report.

The IMS MIA Inspector App supports all surcon 2D and 3D surface inspection systems. Even simultaneous access to several systems is possible, thereby bundling all inspection results in your hands.
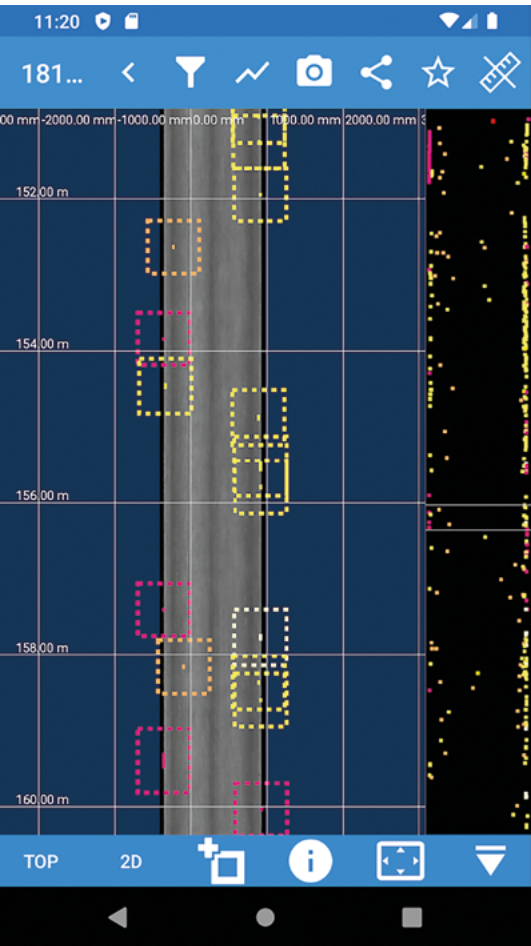
Special Features

- Touch screen optimised operation – available for iOS and Android
- Easy access to all inspection results wherever they are needed
- W-LAN connection to local inspection server
- No cloud
- Easy addition of defect images
- Freely scalable defect map

GET IT ON
Google Play

Download on the
App Store

POWERED BY PEOPLE