



## Surface Inspection



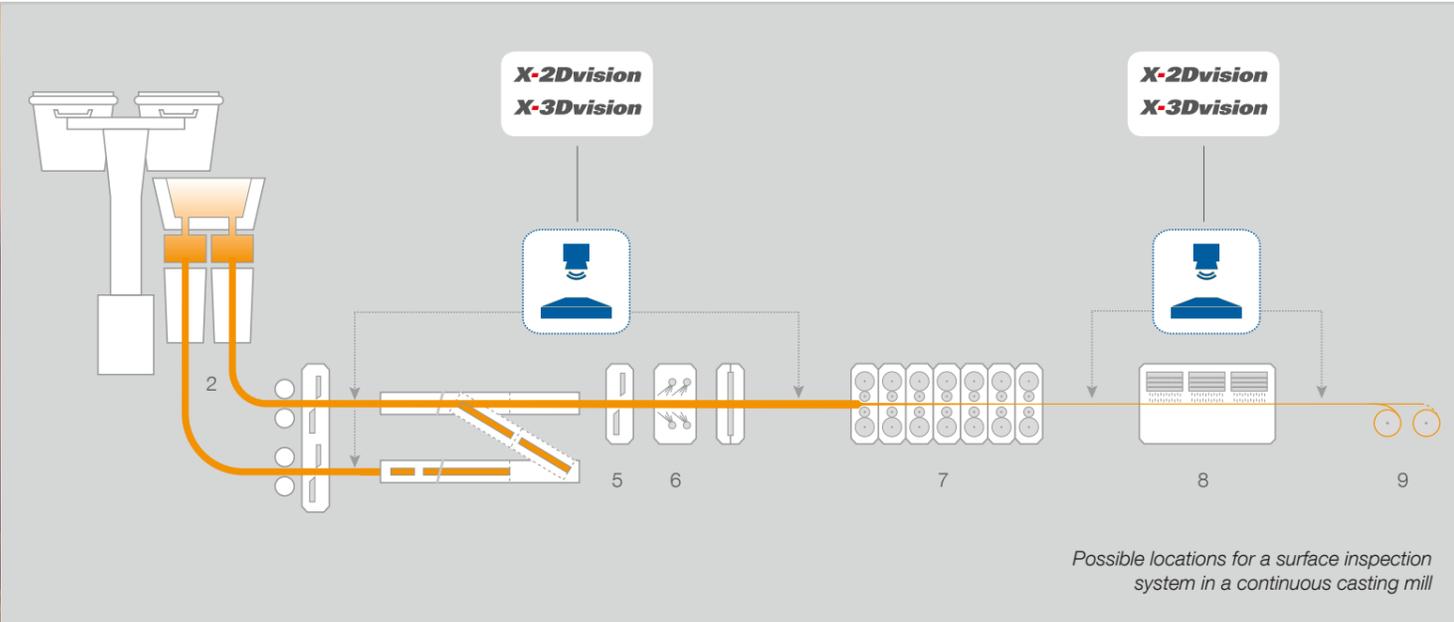
100% powered by IMS

# Contents

You can also find brochures on other products in the download section of our internet site at [www.ims-gmbh.de](http://www.ims-gmbh.de).

4	3D Inspection of Slabs and Heavy Plate
6	X-3Dvision – 3D Topography for Safe Classification
7	X-2Dvision – Use in Hot and Cold Rolling Mills
8	Software – Technology for Simplest Usability
9	MEVInet-Q and MEVInet-QDS – Total Quality Management
10	Service and Training
11	Technology Summary

# IMS Closes the Gap 3D Inspection of Slabs and Heavy Plate



Surface information from the complete process ✓

Overall plant quality management ✓

Surface defects arising during continuous casting are often perpetuated through the complete process chain for the production of strip and heavy plate. Non-stop surface inspection from continuous casting to finished coil or heavy plate is therefore critical for the quality of the final product.

As a manufacturer of surface inspection systems, *IMS* supplies both 3D systems for high-resolution capture of topographical data for slab inspection as well as 2D systems for hot and cold rolling applications.

With its combined 3D and 2D surface inspection solution for slabs also directly after casting, *IMS* has now closed one of the last gaps in optical surface inspection in the steel industry.

### Benefits of X-3Dvision:

- It detects surface defects and enables direct optimisation of the continuous casting process.
- Combined with our *X-2Dvision* systems for the inspection of hot and cold strip, it is possible to track surface defects along the complete process chain.
- By linking the surface data with other measured data, for example geometry or material data, it is also possible to identify and eliminate sources of error whose causes lie further to the front of the process – an important step in the quality management from continuous casting to finished coil or heavy plate products.

The *X-3Dvision* system detects and classifies surface defects such as cracks, inclusion or impressions. Apart from the extent of the surface defects, it also determines their depth.

The system works in real time and delivers the information on the slab surface immediately. Countermeasures can be taken directly during production, thereby enabling ongoing optimisation of the continuous caster.

The results of the surface inspection can be used, for example, to optimise plant parameters or the adding of casting powder.

The subsequent process steps also benefit: since the severity and position of the surface defects are

known, the surface inspection system minimises the work for grinding and scarfing.

If the surface data are linked to the geometry values of the slabs, the continuous caster delivers perfectly documented products. For instance, the slabs do not need to be weighed and the risk of mix-ups is minimised.

- 1 Rotary ladle furnace
- 2 Casting machine
- 3 Shears
- 4 Continuous furnace with swivel table
- 5 Emergency shears
- 6 Water descaler
- 7 Finishing mill
- 8 Cooling section
- 9 Coiler

Combined 3D and 2D inspection of slabs ✓

Information on the quality of the slab surface in real time ✓

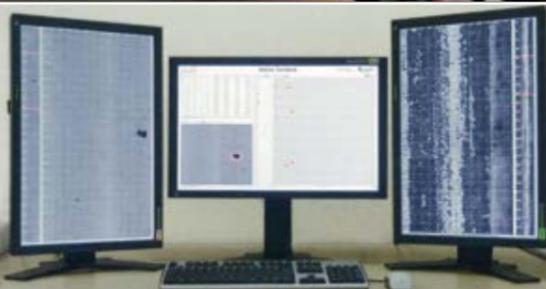
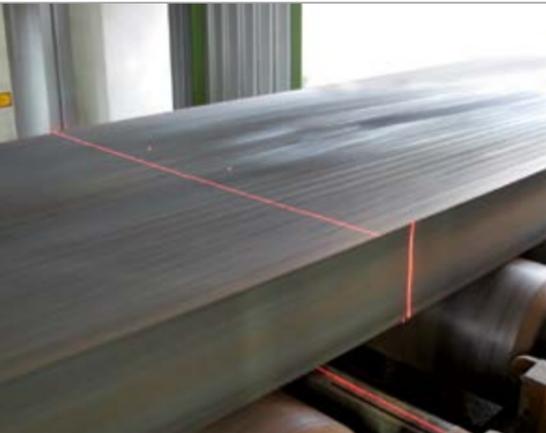
Optimisation of the casting process ✓

Minimisation of grinding and scarfing ✓

“Integrated plant quality management”

# X-3Dvision

## 3D Topography for Safe Classification



From top to bottom:  
Stand-alone slab dimension measurement  
Visualisation station

It has not been possible to date to inspect the surfaces of slabs with conventional systems because it is not possible to distinguish many defects from the irregular textures of the surface safely on the basis of grey value images alone.

Therefore we have developed a technique for surface inspection that delivers not only a grey value diagram, but also a 3D topography of the surface.

X-3Dvision recognises the 3D contour of the surface in high resolution from the shape of lines projected on to the surface of the slabs. In this way the system distinguishes clearly between grey value differences and three-dimensional defects; it reliably

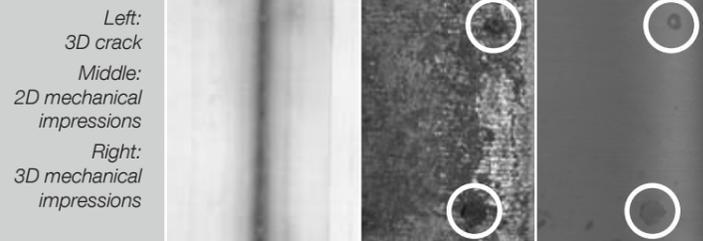
detects, amongst other defects, cracks, inclusions, impressions and oscillation marks and also delivers 3D information – depth and volume – on the defect.

This triangulation method has also proven its worth in similar form in flatness and levelness measurement in many hot strip mills.

If both the top and bottom surface are scanned, this technique can also be used to measure the complete thickness profile of the slabs. Together with detection of the edge contours, which is also integrated in the system, the volume (and therefore also the weight) of the slab can be calculated.

Safe detection and classification thanks to 3D information ✓

“High-resolution 3D contour of the surface”



Left:  
3D crack  
Middle:  
2D mechanical impressions  
Right:  
3D mechanical impressions

# X-2Dvision

## Use in Hot and Cold Rolling Mills



Inspection system for use in hot rolling mills

Hot strip inspection system: fit for harsh conditions ✓



LED illumination for hot strip inspection systems

For inspection of hot and cold strip we offer systems in the X-2Dvision series. These systems come with either line or area scan cameras. Their LED illumination technology ensures low-maintenance operation.

### Robust: hot rolling

The inspection systems behind the finishing line detect defects such as shells, rolled-in scale or cracks and in this way deliver valuable information for optimisation of the hot strip line and for further processing of the strip.

The X-2Dvision systems for hot strip work with a large measuring distance and are adapted to the harsh envi-

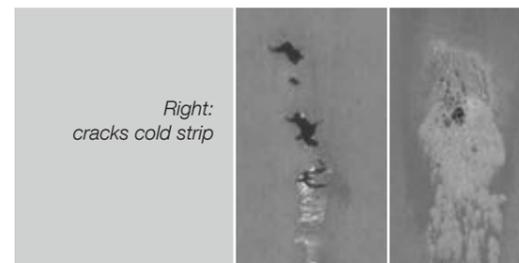
ronmental conditions in which they have to work in hot rolling mills. They are, for example, equipped with blowing equipment, heat protection glass, cooling systems and optical filters.

### Compact: cold rolling and strip treatment

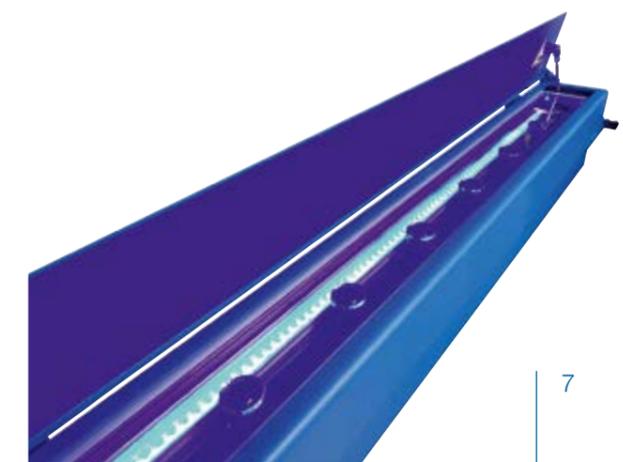
For cold rolling and strip treatment applications, the systems deliver critical information for optimisation of the process and release of the coils for use.

For cold rolling mills with limited installation space, IMS manufactures especially compact sensors that are easy to integrate into existing systems.

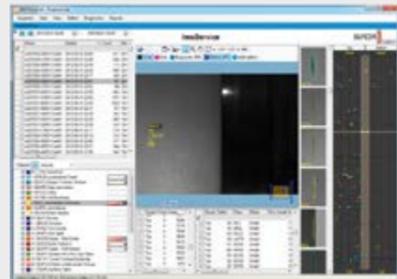
Cold strip inspection system: extraordinarily compact sensors ✓



Right: cracks cold strip



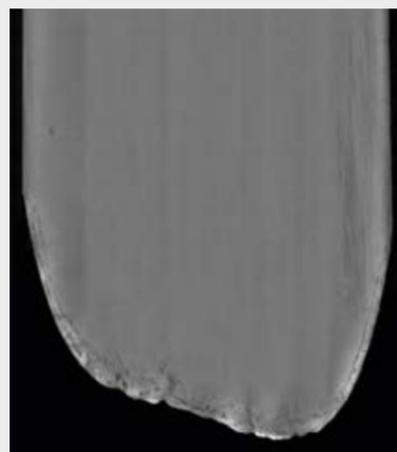
## Software Technology for Simplest Usability



„Inspector“: viewing, searching and evaluation



„Trainer“: creation, management and testing



„OnlineView“: display of manufactured material

The software of all *surcon* inspection systems offers a maximum in user friendly operation due to graphic user interfaces and simplest program navigation. This leads a fast start-up and enables long-term services of the systems.

### Classification

The key technology of 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
- quick configuration and training of the classifier
- rules editors for the creation of optional rules for classification
- an offline simulation system that enables comprehensive testing of new classifiers with existing data before release for use in production

### Database

The classified defect data as output of the inspection are stored in an SQL server. Hard drive arrays with a storage capacity of several terabyte enable traceability of your production for many years.

The database structure is transparent and can be queried externally. It is thus possible, in addition to the existing reports and evaluations, to effect highly individual adaptations and integrations.

### Complete records

Thanks to the availability of large main memories, *surcon* systems can store the complete video material of individual strips or slabs. This enables comprehensive offline diagnosis of the system. These data can also be used for simulation and optimisation of detection and classification. This in turn enables significantly faster start-up and training.

### Tools

A manageable number of tools enables easy use of the system:

- viewing, searching and evaluation of all stored data centrally with the „Inspector“
- creation, management and testing of the classifier with the „Trainer“
- display of the manufactured material at any point with the „OnlineView“ module

Diagnosis of the system is supported fully by graphic user interfaces.

“High user friendly operation and fast start-up”

## MEVInet-Q and MEVInet-QDS Total Quality Management

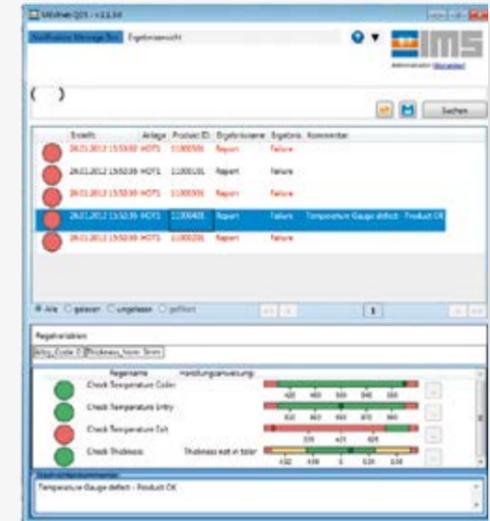
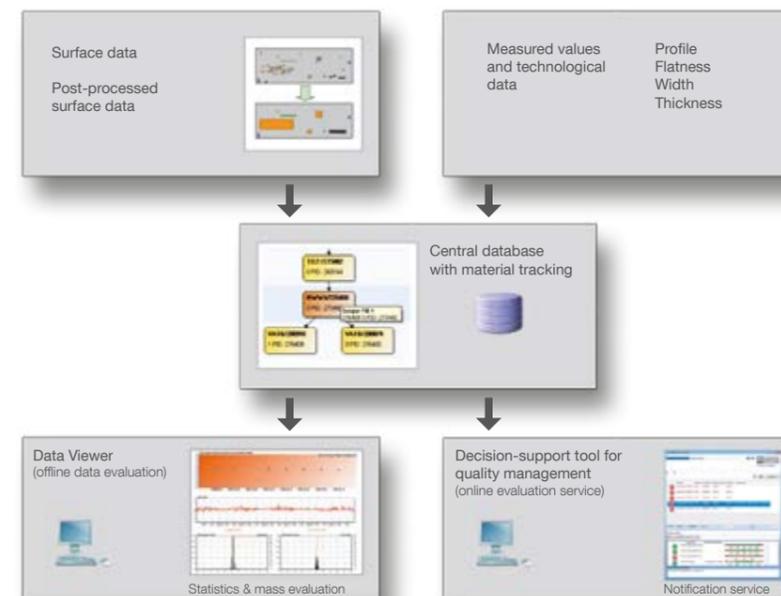
**MEVInet-Q** is a quality management system and seasoned tool for comprehensive analysis of all process-related data. It collects and archives all information arising in the course of the process – surface data as well as other process data stemming from other measuring systems.

If the surface data of slabs and hot and cold strip are correlated with each other, it is possible to identify the causes of defects arising in upstream stages of the process and whose effects only become visible later on in the process. In *MEVInet-Q* we offer an easy-to-use tool for this that enables comprehensive analysis of the complete process.

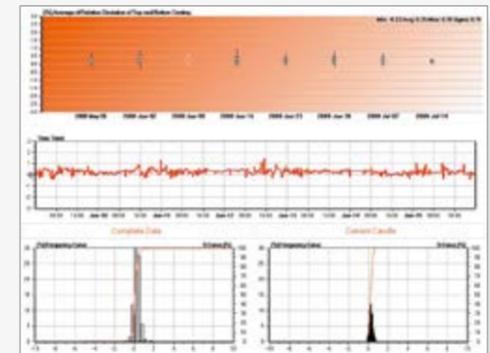
The *DataViewer* – the application for presentation of the data – grants the

production and quality experts access to the archived data at any time. It can present single measured values and data series (length, cross and error profiles) on freely configurable pages that are managed centrally on a server or locally at an operator’s position. All pages can be published when necessary on a company intranet, where they are shown in a web browser.

**MEVInet-QDS** is a rules-based decision-support tool for quality management. *MEVInet-QDS* can be used to define rules that are applied automatically to every product manufactured. These rules can check quality on the basis of all data available. The result of this rules computation process can be used by the operator as a decision-making aid.



MEVInet-QDS



MEVInet-Q evaluation

Conceptual  
outline

## Service and Training Our Services for You



Apart from inspection systems, we also offer a wide range of services. Use our individual service packages for preventative maintenance to secure maximum system availability. Our qualified service team is your first point of contact in a service case. Our service centre is located in Germany and as command centre coordinates our global service network.

### Our Services at a Glance:

#### Service Information

- Worldwide service centre
- Three-level service model:
  - service engineers / system specialists
  - equipment / software know-how
  - development

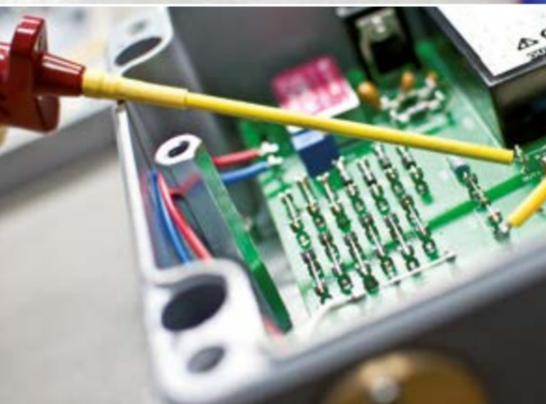
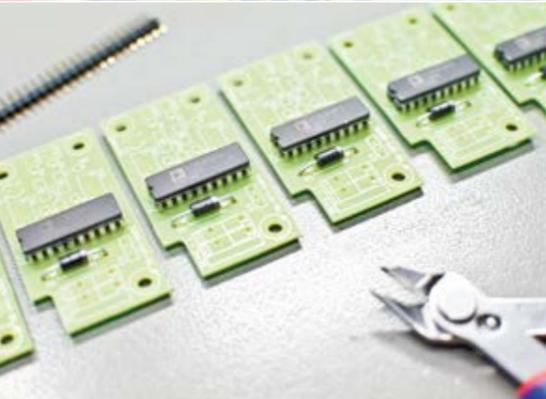
- Competent information from experts in German/English

#### Remote Maintenance

- Quick response by qualified personnel
- Supportive servicing of the system on site
- Maintenance and updating of systems

#### Spare Parts Service / Repair Service

- Stocking of spare parts in Germany, North America, China, India, Korea and Japan
- Repair of all components



#### Lifelong Support

- Regular ongoing communication
- System optimisation through monitoring of processes
- Individual advice on current systems and developments to optimise production lines

#### Service and Maintenance

Regular inspections and maintenance work by qualified personnel secure the long-term availability of your system.

Servicing of your system comprises:

- correction of faults
- calibration
- testing of system performance

#### Training

We offer training courses for your operating and maintenance personnel – at IMS or on your system. Use our offer so that you can use your measuring system optimally and efficiently.

#### System Optimisation

To optimise your system, we offer:

- adaptations of the system to new conditions
- modernisation of hardware and software
- extensions in functionalities
- optimisation of performance

## Technology Summary

Technology at a Glance	Slab X-3Dvision	Heavy Plate X-3Dvision	Hot Strip X-2Dvision	Cold Strip X-2Dvision		
<b>Inspection Results and Measured Results</b>	<b>Inspection Results</b>					
	Defects 2D	✓	✓	✓	✓	
	Defects 3D	✓	✓	–	–	
	<b>Measurement Results</b>					
	Width	✓	✓	✓	✓	
	Length	✓	✓	✓	✓	
	Volume/Weight	✓	✓	–	–	
	Thickness	✓	✓	–	–	
	Thickness profile	✓	✓	–	–	
	Edge profile	✓	✓	–	–	
<b>Hardware</b>	Line scan cameras	–	–	✓	✓	
	Area scan cameras	✓	✓	✓	–	
	LED illumination	–	–	✓	✓	
	Laser illumination	✓	✓	–	–	
<b>Software</b>	OnlineView video streaming	✓	✓	✓	✓	
	MEVInet-Q integration	✓	✓	✓	✓	
	MEVInet-QDS interface	✓	✓	✓	✓	



IMS Messsysteme GmbH

Dieselstraße 55  
42579 Heiligenhaus

Postfach 10 03 52  
42568 Heiligenhaus

Germany

phone: +49 2056 975-0  
fax: +49 2056 975-140  
e-mail: [info@ims-gmbh.de](mailto:info@ims-gmbh.de)  
internet: [www.ims-gmbh.de](http://www.ims-gmbh.de)