

Steel inclusions



The analytical properties of steel materials have increased with the introduction of the standard **DIN EN 10247 (09/ 2017): testing non-metallic inclusions in steels**.

Fully automated analysis system

dhs Solution offers a fully automated analysis system for this, which is used to detect, analyse and classify the **sulfide and oxide inclusions of the cross-sections**. The analysis software determines the geometric parameters, such as size, shape, arrangement and colour.



Our example-system consists of

- a motorised microscope
- adapted Märzhäuser components (enables the high-precision actuation of the table (X/Y) as well as autofocus (Z))
- dhs-MicroCam (for image transfer)
- dhs analysis software

We would be pleased to check the possibility of upgrading or retrofitting existing systems!

All images and data are archived in the dhs Image Data Base and are ready for communication or reporting.

Other standards such as **DIN EN 50602 (AS-MET Interpretation)**, **ISO 4967**, **ASTM-45**, **JIS G0555**, **NF A 04-106**, **SEP 1571 (09/ 2017, Inclusive Extreme Value Analysis)** are supported and the results are presented to comply with the desired standard.

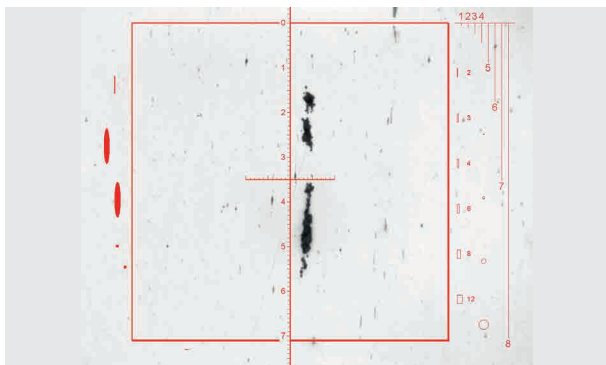
Information in the overview

- Intuitive software that can perform analyses without supervision
- High processing speed
- Supports all common national and international standards, simultaneous measurements in line with DIN EN 10247, DIN 50602, ISO 4967, ASTM-45, JIS G0555, NF A 04-106 and SEP 1571 (09/2017)
- Determination of geometric parameters
- Automatic scanning of large sample areas, and even very large inclusions are detected in their entirety
- Saving of system and measurement parameters to ensure analysis results are reproducible and permit simple documentation
- Connection of all types of microscope
- Also suitable for manual analyses
- Can be supplied as part of semi-automated solutions or complete fully-automated systems
- Existing systems can be upgraded

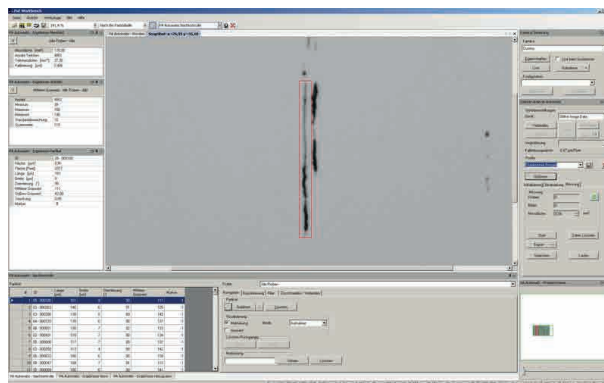
Our Software supports the following **analysis methods**:

Manual testing

The cross-sections are visually examined with the aid of a microscope and a microscope camera to **determine the largest inclusion or the worst measurement field**. Images are captured and then **passed on for software analysis** (normally fewer than 20 images). The **analysis and evaluation (according to various standards)** can then be triggered using a single command. A **virtual eyepiece insert** is used as a visual measuring aid.



Manual analysis is particularly suitable for **tests based on the mean value (such as the DIN 50602 K methods)**. Depending on the type of steel, only a low number of inclusions are analysed as part of methods such as K3 and K4.



Automatic testing

Using this method, a **complete cross-section with all its inclusions can be detected, analysed and classified fully automatically**. The only limitation on the number of samples and the size of the measurement areas is the power of the hardware being used. Unlike purely manual evaluations and visual comparisons, automatic image analysis is **fast, reproducible, objective and extremely efficient**. Logically structured as well as simple and intuitive to use, the software requires little time for familiarisation.

Our software module can be connected up to all standard microscopes and to existing equipment.

Semi-automatic testing

Semi-automated solutions (**with separate image capture and analysis**) are realisable.

We would be delighted to provide you with any advice you require.

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