

AUTOMATIC CHARACTER RECOGNITION "OCR"



READING STATIONS FOR THE AUTOMATIC READING OF CHARACTERS AND CODES (BARCODE, DATA MATRIX CODE) IN STEEL, ROLLING AND TUBE MILLS.

Until a few years ago, the automatic reading of embossed or stamped characters was often an almost insoluble challenge in steel mills, but today this technology is already being used successfully by many leading steel companies. Through marking and automatic character recognition, seamless, database-driven traceability and documentation can be established from the glowing primary material such as slabs, billets and beam blanks to the end product. Even in a harsh environment, innovative processes such as pattern recognition, image processing and database-based plausibility checks can achieve a recognition reliability of almost 100%.

MACHINE INTELLIGENCE

By using different methods of "machine intelligence" in character recognition, markings can be made in motion, vibration, contamination and glowing material. In addition to the classic embossing by stamping machines, other markings can also be reliably read out with our reading stations:

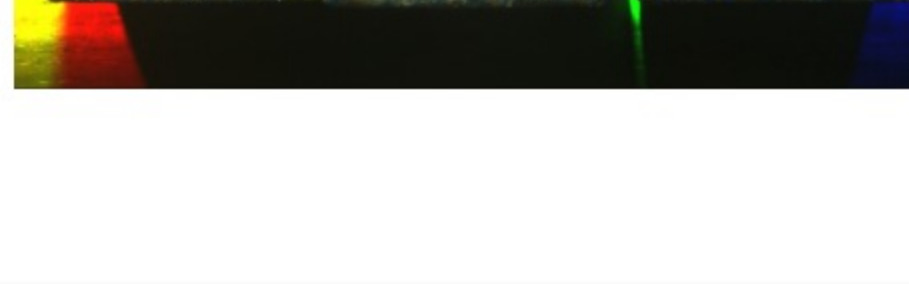
- Embossed characters and data matrix code
- Labels
- Ink and colour signatures
- Handwriting
- Cast characters

This means that not only material grade (alloy) and batch can be recorded automatically, but also critical process parameters (measurement data for continuous casting) can be assigned to the respective starting material. If these parameters are evaluated logically, a foresighted quality and cutting planning can be carried out and the subsequent processes can be optimized.

Another important aspect for investment in automatic character recognition is material flow tracking. Continuous material flow tracking between the continuous casting plant and the rolling mill helps to prevent material mix-ups. This usually requires at least two reading stations. One reading station directly after the marking system and one in front of the furnace for reheating the starting material. In some cases it makes sense to install an additional reading station after the furnace, e.g. if forging blanks with different residence times are used (rotary hearth furnace) or if other processes can lead to material mix-ups.

APPLICATION EXAMPLES

BILLET SLAB DETECTION "STEEL INDUSTRY"



EMBOSSING CATALYST (AUTOMOTIVE INDUSTRY) - DOCUMENTATION OF THE VARIOUS TEST STEPS DURING FINAL INSPECTION

The tubes with a specially coated surface show irregular reflective zones, but are still machine-readable under appropriate lighting.



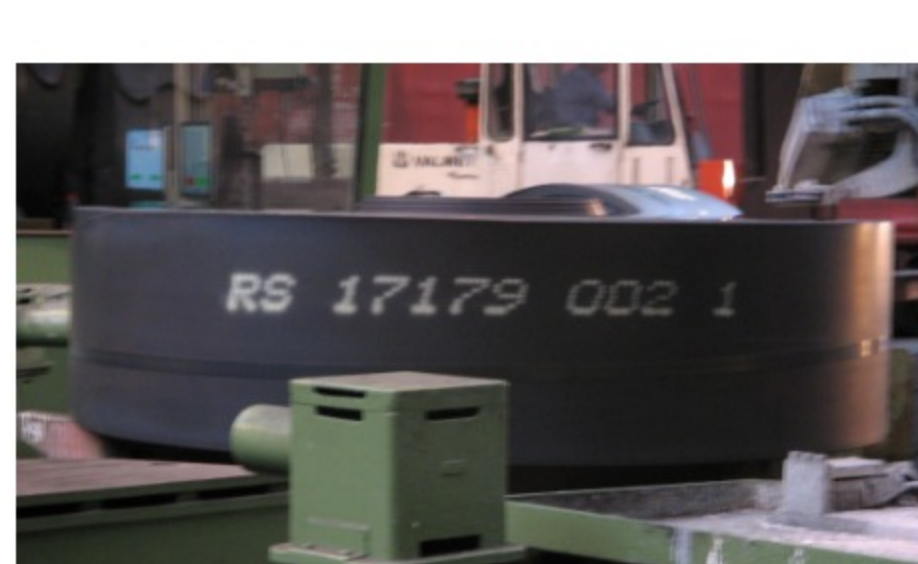
EMBOSSING ON RAILWAY TRACKS (ROLLING MILL)

The specified target data during operation, installation location and time, train frequency and speed are stored for this material and batch identification. The readout takes place at a very high speed and at a temperature of approx. 900°C. The data are stored in a memory.



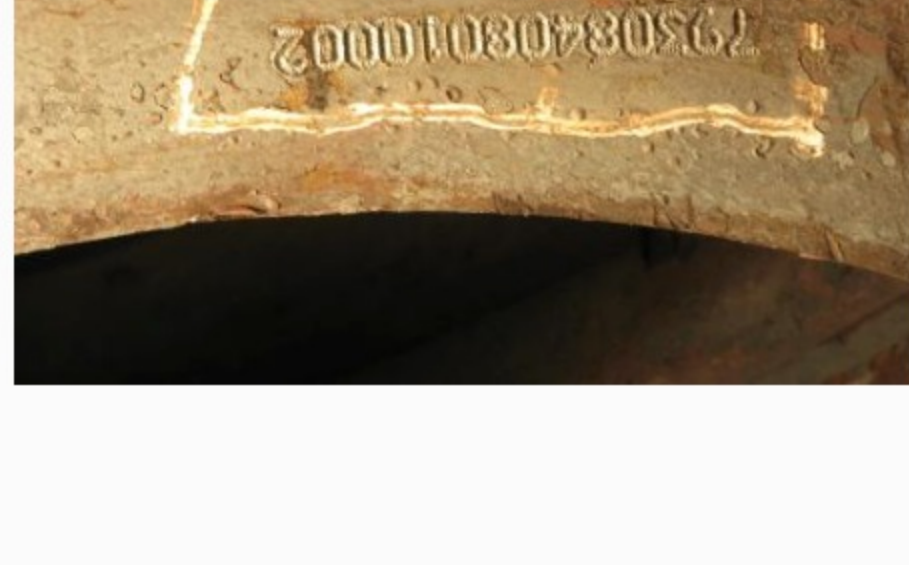
COLOUR MARKING OF COILS AT 400°C SURFACE TEMPERATURE

The not always cleanly sprayed braille is controlled by a camera. Due to the length of the text and the curved surface, the typeface is distorted.



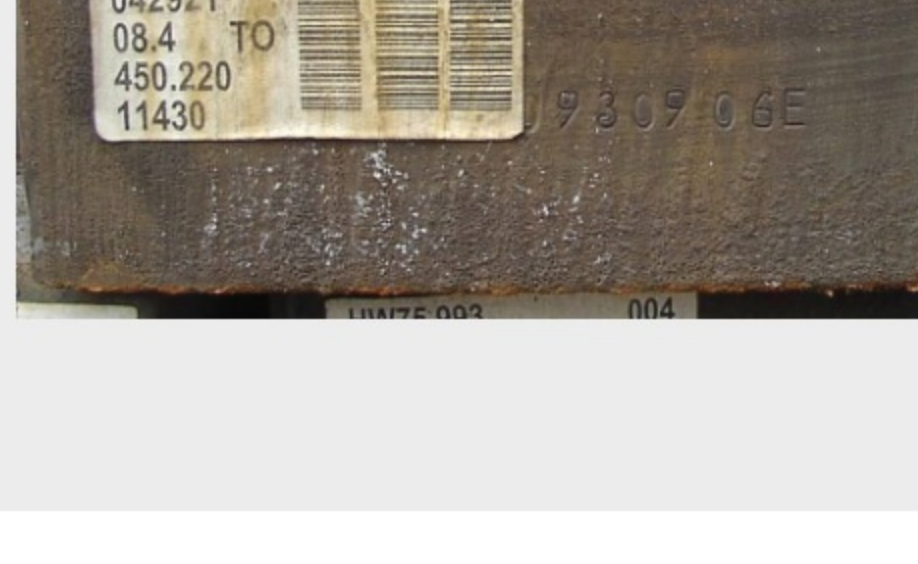
NEEDLE / DOT MARKING - SEAMLESS ROLLED RING (RING ROLLING MILL)

The marking takes place directly after rolling at a temperature of approx. 900°C. Seamless rolled rings are often safety components such as wheel tyres for rail traffic. After quenching and tempering of the ring, the marking is used for automatic identification during measurement, hardness testing and mechanical processing. These test values are transferred to the test certificate/tool certificate.



LABELS - SLAB (STEEL MILL)

The harsh environmental conditions and the transport of slabs lead to damage and weathering of the labels. This can considerably limit the reading security of simple barcode readers. In addition, labels must be removed before further processing, as rolling in the ceramic-coated labels can lead to errors.



HANDWRITING RECOGNITION

Manual markings, such as color markings with a brush, can also be read.

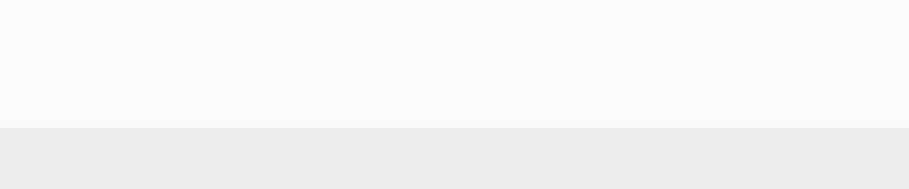


NEEDLE / DOT PIN EMBOSSING

On a rotor blade of a helicopter turbine, depending on the state of processing of the material, the structure of the surface is

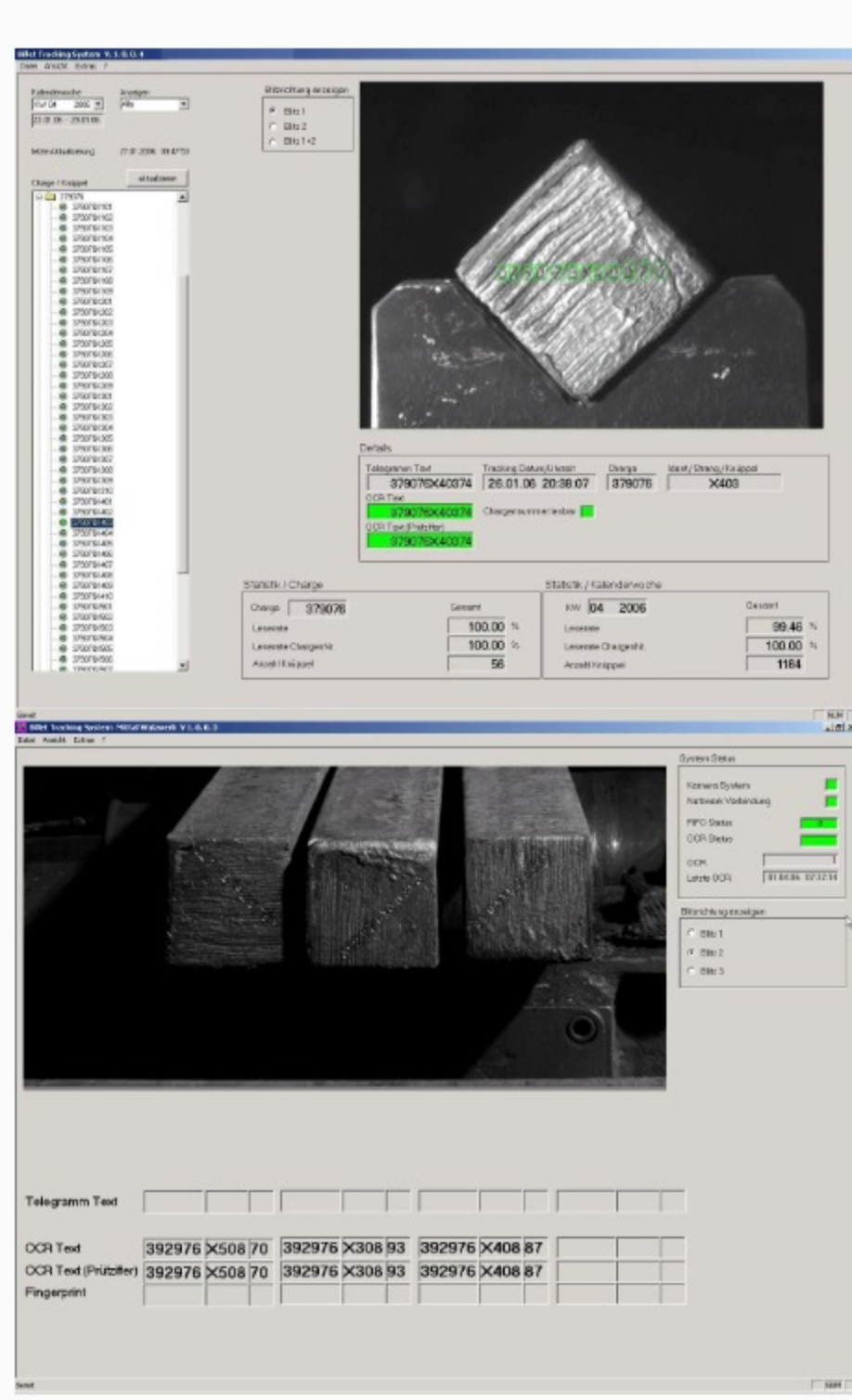
INK STAMPS

With uneven ink application



SOFTWARE FEATURES AND VISUALIZATION

The intuitive software OCRExplorer-IV offers different modules and takes care of visualization, archiving and statistical evaluation of the reading results.



The visualization software enables an on-line display of the current reading processes from any authorized PC workstation in the company. In addition, the software is used for research purposes and for individual item tracking. Based on the data, information and images can be made available for the creation of test and quality certificates, and through a connection to a warehouse management / material flow tracking system, information about the storage location and the planned further processing/delivery can be controlled and planned. Additional modules such as the fingerprint procedure or check and checksum routines can be used to further optimize the reading probability.

INSTALLATIONS IN THE STEEL INDUSTRY

The OCR systems are flexible and can be easily integrated into existing industrial plants. A camera image is only taken under special lighting (LED or Xenon flash). This also ensures reliable detection:

- Workpieces in motion
- Several objects in the picture
- Hot steel parts (up to 1200°C)
- Large required viewing distance
- Incidence of ambient light (except direct sunlight)

The pictures show some installations in the rough environment of the steel industry.



CHECK DIGIT / CHECKSUM METHOD

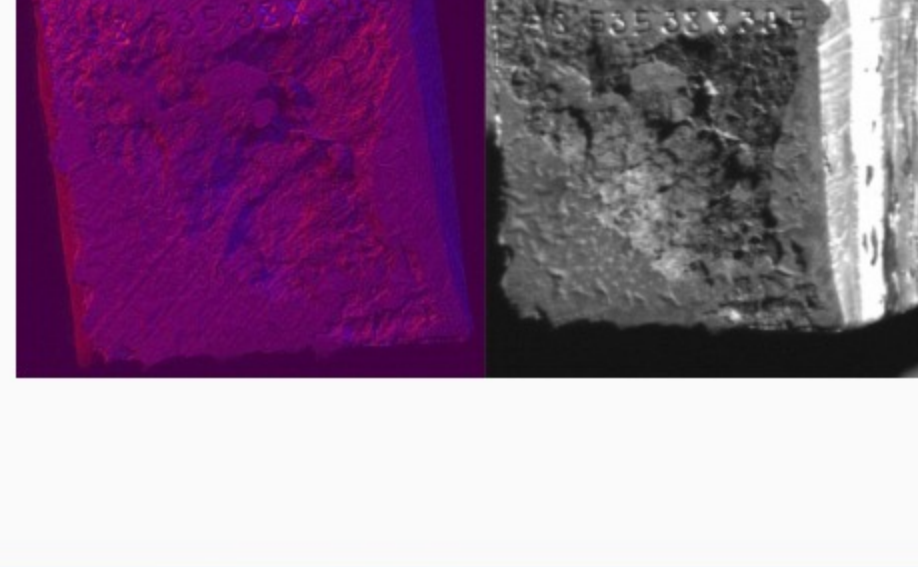
- Additional check digits increase reading reliability / check of correctness
- Reconstruction of illegible or missing digits
- Correction of misreadings



Possible reduction of the error rate:

- with 1-digit check digit: to 40 – 50 %
- with 2-digit check digit: 20 – 30 %

FINGERPRINT PROCESS



The cause of poor readability is usually related to craters and grooves on the surface. The fingerprint method uses such characteristics to recognize billets at later reading stations using the reference image from the steel mill. The rougher the surface, the better it works and is therefore the ideal complement to stamped reading.

INTEGRATION INTO SYSTEMS AND IT STRUCTURES >

<p>Material identification</p> <p>PDF DOWNLOAD ↓</p>	<p>Product identification</p> <p>PDF DOWNLOAD ↓</p>	<p>Article steel iron</p> <p>PDF DOWNLOAD ↓</p>	<p>Article MPT International</p> <p>PDF DOWNLOAD ↓</p>
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