QualiMaster VC1

VC1 is a system for continuous, automatic monitoring of granulate properties.
It is used on conveyors, with the system being installed above the conveyor. VC1 determines the granulate properties from images taken of the bulk particles on the conveyor.

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The Pioneer in Material Processing®

Image analysis based on artificial intelligence and deep learning

VC1 – a System for assessing quality

The new QualiMaster VC1
Our new, intelligent system monitors granulates literally non-stop. A special camera is used to continuously take pictures of the product on the conveyor, which are then processed and analyzed. In the process, the system identifies and calculates numerous parameters and product properties from the images. The assessment of the quality parameters can be performed by the person operating the system, or this can be handled with the aid of artificial intelligence.

VC1 is a system for assessing the quality, parameters, and properties of bulk goods and particles. It is used on conveyors, with the system being installed above the conveyor. VC1 determines the properties of bulk goods with the aid of images that are taken with special cameras and then analyzed.

The measurements are performed inline and contactlessly, without diverting part of the product stream. As a result, the system requires no maintenance and only very little cleaning. Comparable devices from other manufacturers usually take samples from the conveyor, which puts moving parts in direct contact with the material being analyzed.

Image analysis is performed on the basis of artificial intelligence and deep learning. (For information about the measurement and analysis principle Information see Page 8).
The system has been designed and developed for use in harsh **industrial environments**. A robust housing protects the sensitive components against dirt and damage. The pressure inside the unit is kept higher than the surroundings to effectively prevent ingress of superfine particles.


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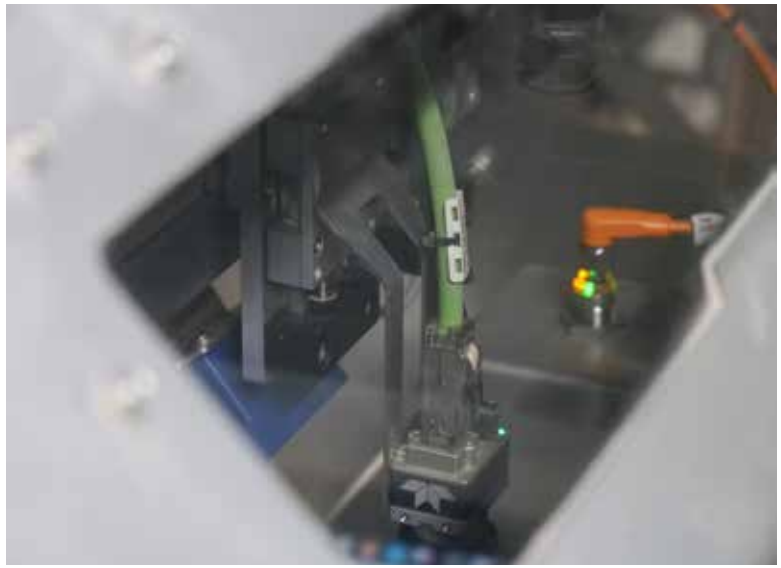
0.9 mm

Product-information

Equipment

- 2 cameras available for detailed imaging of surface quality and particle sizes
- Different lenses available for different
- applications with a single measuring device
- Powerful LED flashlights for fast exposure times
- Horizontal traversing unit for compensation of high conveyor speeds
- Designed and built to be easy to clean and maintain

Eirich VC1
Vision Control



Features

- Effective protection against soiling through enclosed housing
- Automatic height adjustment for adaptation to the product quantity on the conveyor
- Out-of-focus images are detected and automatically discarded
- A traversing unit accelerates the cameras up to the speed of the conveyor; this almost entirely eliminates any motion blur
- Particle detection via a deep learning approach based on artificial intelligence
- User-friendly presentation of measurement data and analysis

Further specifications:

- Typical measurement range 0.5 mm to 15 mm (depending on the lens)
- Adaptation of the analysis to multiple products with different properties and grain sizes
- Analysis frequency typically up to 6 images per minute
- Measurement results are processed and presented as time series and average values; distribution curves; access to historical measurement data
- Current camera images can be displayed on the device or also externally (e.g. at a control station or in a control room), and access is always possible via a web browser
- Option for exporting data

Unique features:

- VC1 inline measurement with information supplied very quickly and in high time-based resolution. Conventional quality assurance methods usually only determine the properties of bulk goods retrospectively or with a time delay.
- Low cleaning requirements, as no part of the product stream is diverted.
- VC1 allows immediate interventions in the event of product changes – so that quality can be improved and rejected product can be avoided.
- VC1 significantly shortens feedback time and feedback loops with the production process

Strategic considerations:

- Embedded in the Eirich Digital Strategy. Data from VC1 can be integrated in comprehensive process data visualization systems.
- This means that VC1 delivers valuable data for process optimization, troubleshooting, and quality assurance in process engineering.
- VC1 is the starting point for the process control of tomorrow on the basis of artificial intelligence. Short feedback loops enable direct coupling to the line, particularly to Eirich mixers.

Eirich ProView

+ Enables immediate interventions in the event of process changes

The analysis process consists of several individual steps

Image acquisition
VC1 uses two cameras, which can be equipped with different lenses, to take the images. As a result, it is possible to take images of both larger numbers of bulk particles and close-ups/macro images of individual particles.
For the analysis, it is possible to select which of the cameras to use for which parameters. Example: Determination of particle size from the images taken of the bulk produce; determination of structure properties or surface characteristics from macro images.

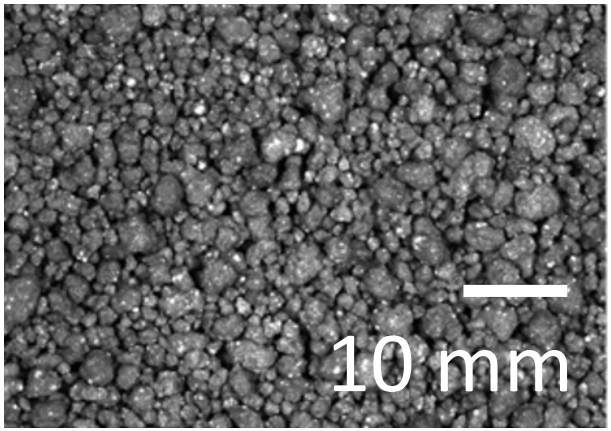


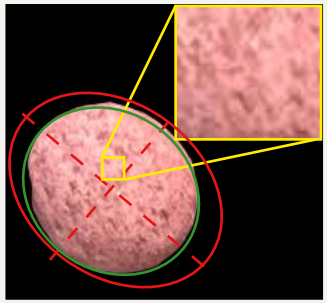
Image showing bulk produce and a macro image, taken at a conveyor speed of 0.25 m/s

Particle detection
The particles can be detected using various algorithms. Detection of individual particles from the images is performed via a deep learning approach on the basis of artificial intelligence. VC1 has several pre-learned models that are suitable for a wide range of bulk goods. In addition, it is also possible to teach the system customer-specific models (for special bulk goods), which can be done on the basis of test images.

Bundling and visualization
The results can be displayed as a time series of the individual values (accurate to single data points or as floating average values).
As well as distribution curves it is also possible to display diagrams showing the proportion of particles with certain properties (e.g. with a certain diameter) across the measuring range.

1 Images of bulk particles

2 Identification of individual particles

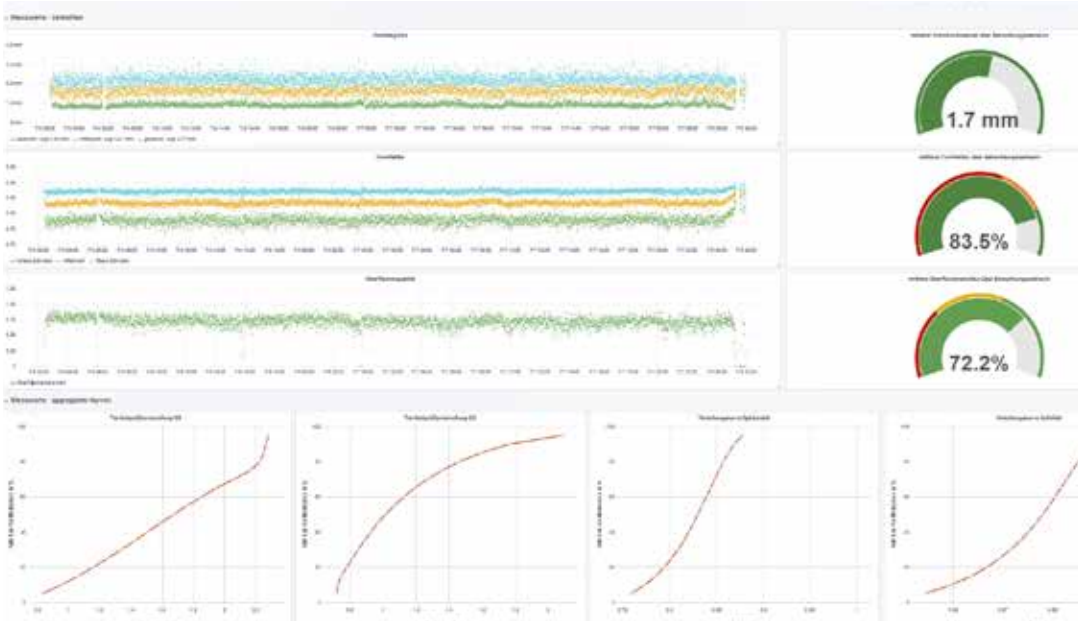


3 Determination of characteristic properties

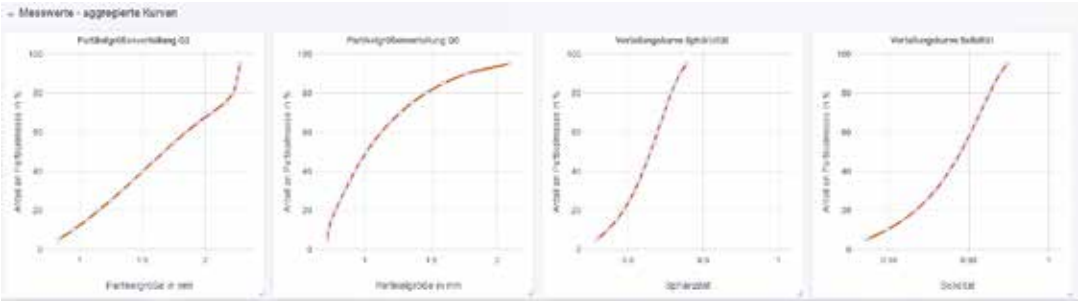
4 Bundling, visualization, analysis

Screenshots of the graphical user interface

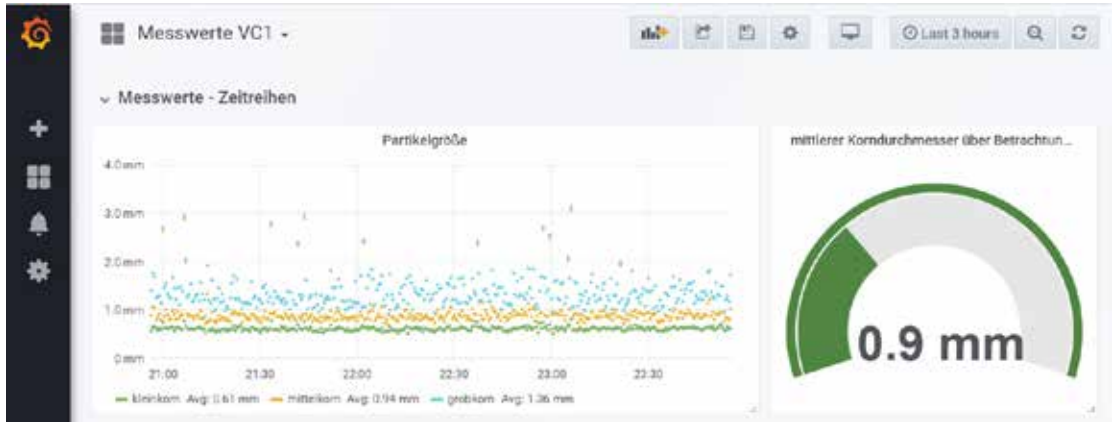
All the functions of the VC1 image analysis, including access to time series, current images, and the image archive, can be accessed via a web browser. This means that the system can be used both directly at the control cabinet, but also remotely through online access – for example in control rooms or offices. All screens are optimized for display via a web browser and will automatically adjust to the screen size. As a result, it is also possible to view the results on e.g. a cellphone or tablet. Configuration of the analysis settings is generally also possible via the graphical user interface, although this is password-protected.



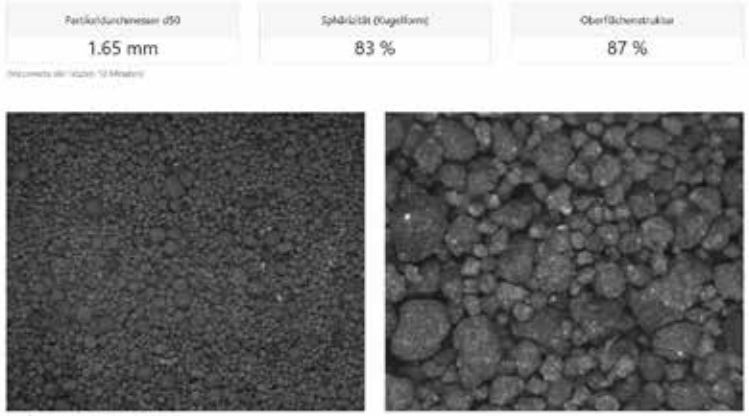
Presentation of measured values as a time series



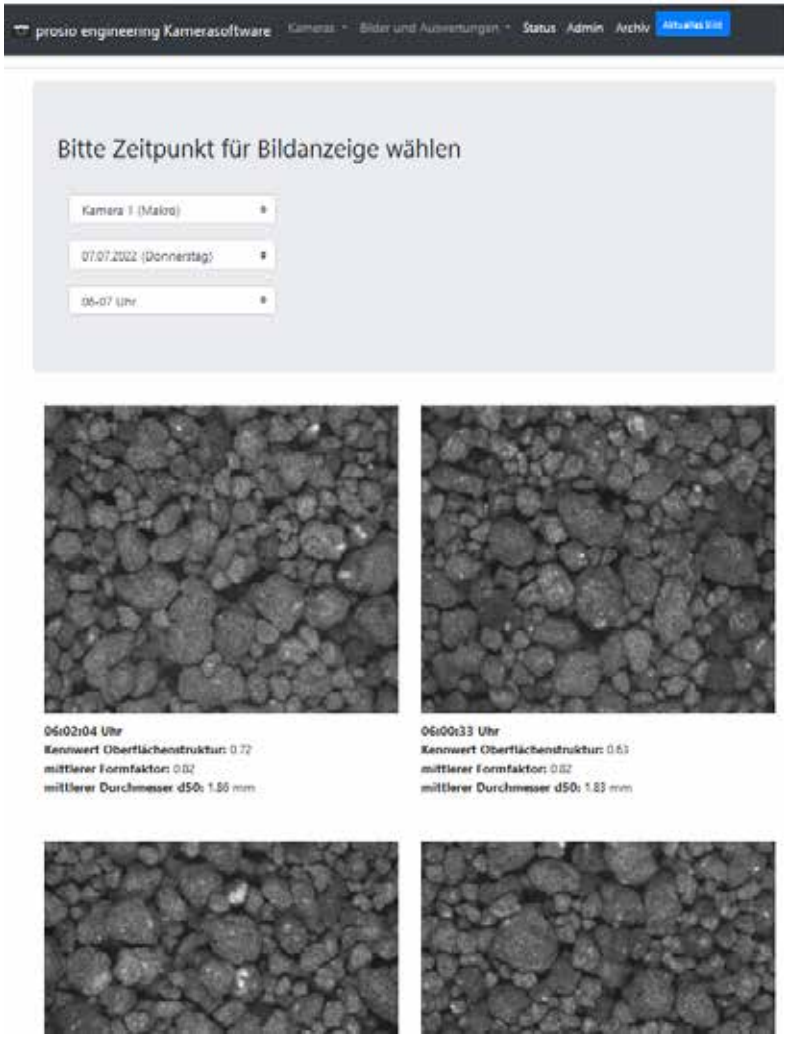
Detailed views of distribution curves from VC1



Detail view of particle size



Browser screen showing current images and measured values



Screen showing a selection of historical photos

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The Eirich Group, with Maschinenfabrik Gustav Eirich as its strategic center in Hardheim, is a supplier of machinery, systems, and services for industrial mixing, granulating/pelletizing, drying, and fine grinding. Our core expertise is in the field of processes and techniques used for the preparation of pourable materials, slurry, and sludges. We are a family-run company that operates 16 sites around the world.

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