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UNOFFICIAL ENGLISH TRANSLATION

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Perfect biscuits

Historical technical claims and contact information are translated as published. Unrelated neighbouring articles remain in their original language. Original publisher artwork, logos and advertisements are retained in their original language.



Figure 1 | During production, 4,200 biscuits per minute must be inspected precisely for over 20 features and sorted into pass/fail categories. Many results are used directly as a data stream, feeding back into ongoing production.

Perfect biscuits

Large-area lighting for biscuit inspection

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Wide conveyors in the confectionery and baking industry often require large inspection fields with specialised lighting. Hygienic design adds further demands. The solution combines powerful LED lighting systems with intelligent, versatile light control.

For extensive inspection fields, Cretec offers a broad portfolio of large-area, modular LED lighting systems with intelligent control. As in professional photography, the company based in Hesse uses

luminance as the basis for illumination. Luminance describes the brightness of light from emitting surfaces. This approach precisely characterises homogeneous light emission across the entire illuminated area. It matters for difficult objects when shape and reflective properties, such as applied glazes, impose high requirements. One example is light-intensive inspection of fast-moving objects whose centres must not be overexposed.

Lighting in hygienic design

Basic LED modules can be assembled in any geometric format. Available illuminated areas range from 50 mm × 50 mm to 6,000 mm × 6,000 mm. All lighting colours are available as basic modules for continuous or strobed operation. The in-house LED boards carry white, red, green,

blue, IR, UV, RGB or RGBW LEDs. In backlighting modules, the spacing of the dimmable LEDs relative to each other and to a special diffuser is chosen to create an optimised, borderless and homogeneous field. Openings for optics can be incorporated into large-area lighting modules as required. The LED lights are calibrated at the factory and require no manual recalibration when replaced in an application. Protection is at least IP65, optionally up to IP67. Application-specific hygienic designs are also possible.

Intelligent light control

External control of the LED modules permits individual adjustments. For example, separating grayscale brightness values can produce higher-contrast images of multicoloured objects. Intelligent control of coloured LED light (RGB/RGBW) and image processing with tone

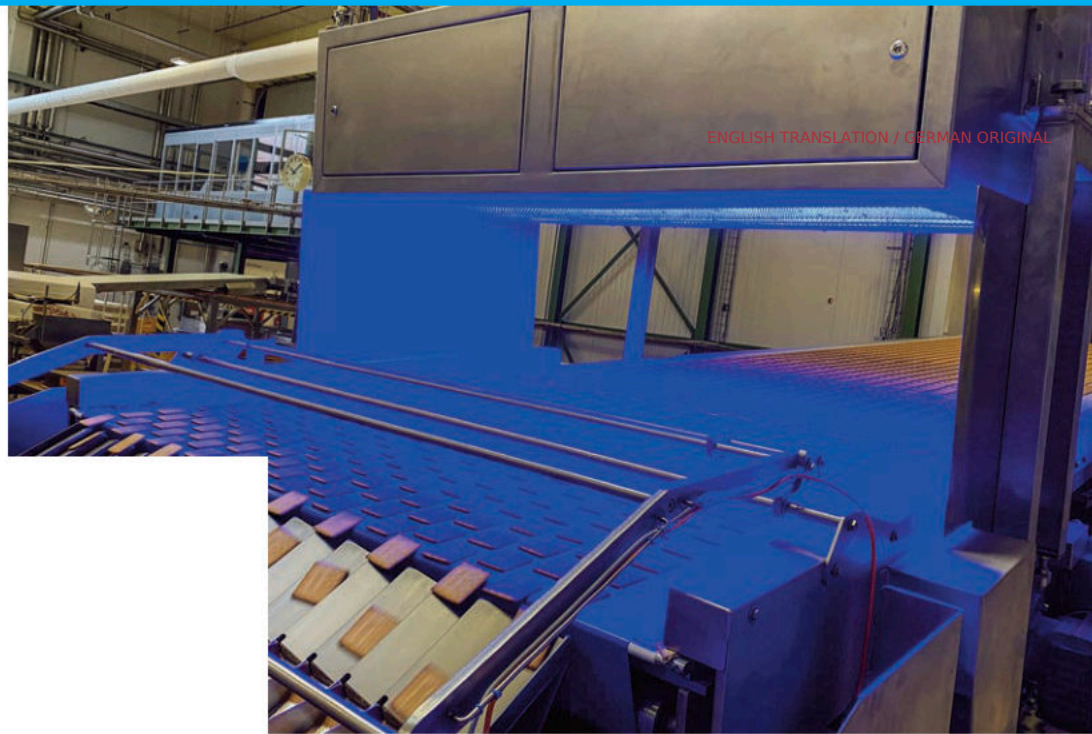


Figure 2 | The encapsulated lighting module in a stainless-steel housing provides homogeneous light across the full conveyor width.

mapping can substantially improve reliable structure recognition. Four-colour LEDs allow several different colour exposures of a product in rapid succession, precisely detecting complex features with just one camera. All lighting parameters for product variants are stored as complete recipes in the vision software. White light with adjustable colour temperature opens up further applications. Very short flashes readily allow operation at a nominal current 300% higher, increasing available illuminance.

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Enjoyment in flawless quality

In biscuit quality control, perfect lighting enables machine vision to detect very subtle differences in browning among many other properties. Further defect features of individual biscuits are inspected at very high detail resolution. Criteria include correct area and height, surface embossing, corner shape, absence of spots, colour gradients in the centre, material inclusions, damage, foreign bodies, contamination and many others. At 4,200 biscuits per minute on a wide conveyor, everything must run with absolute precision for the subsequent production stages. AI algorithms are used for selected features to improve detection continuously and automatically through self-learning. This is a decisive step towards continuously increasing inspection performance. The vision system, including eight cameras, lighting, a 3D system and other components, has an application-specific hygienic design. Ongoing production is continuously inspected and documented for over 20 features, and the biscuits are sorted into pass/fail categories. Many results are used directly as a data stream, feeding back into the production process.

LINE SCAN CAMERAS SYSTEMS

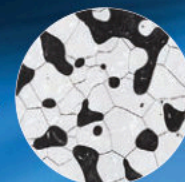


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