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Best inspection and sorting solutions for IBC, PERC, Bifacial and Glass-Glass modules

New inspection solutions for the latest cell & module designs cover the entire value chain of solar manufacturing

The latest designs in solar cell and module production can now be individually inspected according to the highest quality standards. Inspection solutions covering the entire value chain in solar manufacturing are available from one provider: Even the latest cell and module technologies such as IBC, all PERx designs (PERC, PERT and others), black silicon cells, bifacial cells and glass-glass modules can easily be inspected. Solar cell and module manufacturers receive an easy to operate and highly cost-effective way to push the efficiency of their production, and a reliable partner for increased quality.

The solar industry is setting new standards for the efficiency of future energy generation: IBC and PERC cells and modules have already been successfully developed to gain energy in a most effective way. Recently these technologies have been complemented by other similar designs, including PERT, PERC and PERL, forming the PERx family. The success story of diamond wire cutting has fueled new texturing processes, e.g. formation of black silicon by MCCE (metal-catalysed chemical etching) to increase the effectiveness of cells through better light trapping thanks to more structured cell surfaces. Finally, bifacial technology introduced in PERx and IBC designs allows gathering of reflected light from underneath the cells to increase overall energy harvesting. These new cell concepts can become quite challenging for common inspection solutions as they all differ from the standardized designs. Simultaneously, they all are likely to

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become very important in the future of solar production due to their potential to further reduce the cost of solar electricity by offering lower costs per kilowatt hour. This holds true in the same way for trends in module manufacturing following the new cell designs, while leading to new interconnection approaches for IBC and multi-wire cell designs. Glass-glass modules, constructed by a rear glass instead of back sheet, compliment the bifacial technology of solar cells to empower higher energy harvests, while also reducing mechanical stress on the embedded cells, enabling longer lifetimes at lower failure rates. All of these new designs and technologies are becoming the focus of the entire industry with a similar result - perfect quality control will be a challenging task.

High contrast imaging for versatile cell inspection

A complete product family of inspection solutions is now ready for the latest cell and module technologies, offering reliable inspection throughout the entire production chain. The innovative product line detects all types of defects and ensures the highest cell and module quality. The inspection systems use different technologies like the reworked Light Dome for cell inspection, which makes use of multiple illuminations with different wavelengths and arrangement. By combining the resulting information from different illumination scenarios, the multi-image technology computes the most informative picture achievable with sharply defined contours of a contact or defect. Typically new defects evolving from the texturing of diamond wire cut multi-crystalline silicon, new production equipment introduced by new players in the market as well as all new print patterns and new inspection requirements evolving from IBC solar cells can be readily carried out with the current CHROME+ inspection software and hardware.

In addition, the inspection solutions are supported by a flexible CAD-style editor, defining any arbitrary contact shapes for metallization of

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rear side in PERx as well as in IBC, which is similar to the print pattern editor for the front side. This allows for individualized inspection and the fastest implementation on site. Standardized calibration procedures and centralized recipe management allow all inspection systems in each factory at each production site to use the same "global quality standard" to ensure consistent worldwide quality classification.

High speed inspection, 100% traceability and centralized recipe management for modules

Joined by advanced module inspection, either using electroluminescence or optical inspection with high resolution camera components, the combination of cell and module inspection forms a highly reliable portfolio covering the entire production chain. Features like high speed inspection with module cycle times below 20 seconds and automated detection of defects and classification of the module quality. The data obtained from the automatic inspection is more detailed and more reliable than any manual inspection can deliver, and allows documenting all inspected quality, tracing back root causes of defects. As an additional feature, centralized recipe management can be made available for modules, even sharing part of the cell inspection recipes for module inspection. By placing a recipe describing the targeted module – or cell – quality on a server, every networked system is able to use those parameters for inspection. The highly developed systems are even able to neutralize their own individual deviations from the norm with a standardized calibration procedure, so the desired quality can be achieved and defined on an absolute level, for worldwide use.

The systems enable all manufacturers of solar cells and modules to conduct efficient quality surveillance in production steps and end control to maximize cost efficiency and yield. Thanks to the easy-to-use software and the fast start-up time, the systems ensure high availability and easy maintenance for high productivity and short ROI.

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Cell and module manufacturers, using many identical systems in multiple production lines, can centrally manage inspection and classification criteria. With the Automated Optical Inspection (AOI) they are able to detect the correct defect classification and to define a global quality standard so the same quality can be secured at any time in any place. Enriched with these features, the comprehensive product family offers highly reliable and cost-effective inspection solutions and is best prepared for the latest cell & module designs and technologies.

Images



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New solutions such as ISRA's CHROME CELL-Q ensure the inspection of the latest cell technologies.

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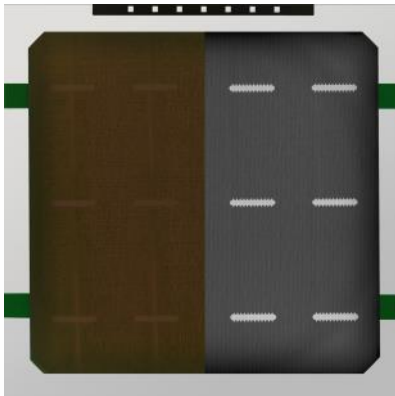
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Even the latest cell designs like integrated back contact solar cells (IBC) can be inspected high precisely



664_3.jpg

Multi-channel lighting delivers a clean grayscale image for cell designs like passivated emitter and rear contact solar cells (PERC): left with standard single LED lighting, right the multi-view results.

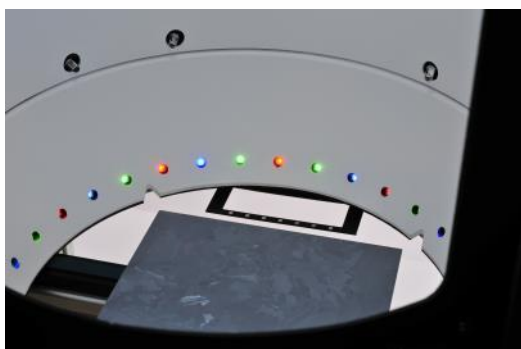
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Illumination at different wavelengths in ISRA's Light Dome allows for high contrasting images.

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