

■ ■ ■ ANTARES: Wafer and Cell μ Crack Inspection Reliable Detection of Microcracks and Inclusions

Area of application

Reliable crack detection

Early and reliable microcrack detection is important in solar wafer, cell and module production to reduce downtime and loss of parts due to breakage.

The μ crack detection system **ANTARES** is equipped with a new imaging setup which allows to inspect wafers and even finished cells reliably. The inspection is neither disturbed by back field metallization nor by the natural grain structure in multi-crystalline wafers or cells. Therefore, microcracks cannot be mixed up with grain boundaries.

New setup improves reliability

ANTARES has the following advantages:

- **Contact-free**, ensuring a careful handling
- Works for **wafers and even for cells**
- **Easy to integrate** into existing conveyor belt lines

Different system concepts available

We offer different **ANTARES** system concepts:

- **Inline** system
- Inline system including **conveyor belt module**
- **Stand-alone** system (5 s/part)
- Stand-alone system **high throughput** (1.5 s/wafer)

The system recognizes microcracks, stores the inspection results and transfers them to the MES in the production line. Results are presented on an operator monitor, where the user can change recipes, system parameters, supervise inspection results, and handle external signals. The results are communicated to line automation via Profibus interfaces to allow direct sorting of defective parts.

Fields of application

The **ANTARES** μ crack detection system is quite helpful in the following fields of application:

Wafer manufacturer:

- Wafer outgoing inspection

Cell manufacturer:

- Wafer incoming inspection
- Immediate crack detection prior and after printing
- Cell outgoing inspection

Module manufacturer:

- Cell incoming inspection
- Cell inspection of tabbed and stringed cells

Technical data

Components of the inspection system

All **ANTARES** inspection systems consist of maintenance free illuminations, cameras, sensors as well as a PC with monitor and RAID storage system. The offline version consists additionally of all automation parts for the handling and sorting.

Performance data

ANTARES inline (single wafers or cells)

Cycle time	1 s (wafers) or 1.5 s (cells)
Part size	156 × 156 mm ²
Part thickness	120 μ m up to 300 μ m
Max. bow	4 mm
Max. height tolerance (z-position) of conveyor belt	± 0.1 mm
Camera resolution	150 μ m

Differing data for ANTARES stand-alone (5 s/part)

Max. number of parts in a stack	200
Cycle time	5 s

Differing data for ANTARES stand-alone (1.5 s/wafer)

Max. number of parts in a stack	150
Cycle time	1.5 s

Customer's benefits

Silicon Wafer Production:

- Higher quality of sold goods (lower microcrack rate in outgoing wafers)
- Reduced loss of good wafers (lower false positive rate in bad wafers)

Solar Cell Production:

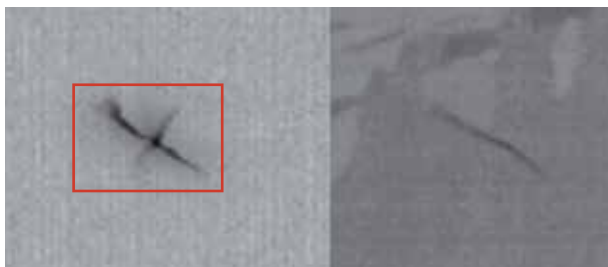
- Don't pay for cracked incoming wafers and reduce breakage rate of cell line
- Avoid cracked parts entering the printer
- Quickly detect repeated defects after the printer or IV-tester

Solar Cell Production:

- Don't pay for cracked incoming cells
- Detect cracked cells in strings prior to layout

Payback time just a few months!

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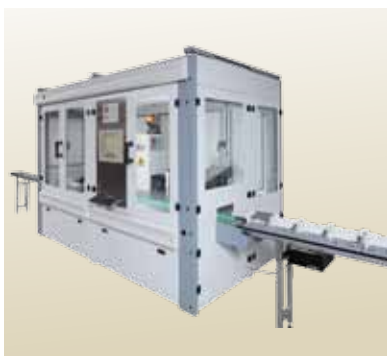
Left: ANTARES image of a microcrack in a wafer. The crack is clearly seen and can be detected automatically.

Right: »Conventional« microcrack image of the same crack. The crack is seen but hard for automatic detection (because of the natural grain structure).



Left: ANTARES image of a microcrack in a finished cell. The crack is clearly seen and can be detected automatically.

Right: EL image of the same crack. The crack is seen but hard for automatic detection (because of the additional structures seen in EL).



ANTARES stand-alone system with high throughput. Cycle time is 1.5 s per wafer.

Faster cycle time, additional sorting bins and inspection tasks on request.



ANTARES stand-alone system. Cycle time is 5 s per wafer or cell.

Ideal for lab use or as random sample incoming control.



ANTARES inline system for integration to production lines.



ANTARES in conveyor belt module.

For direct inline integration, e.g. between an existing tester and sorter.

Contact

Intego GmbH

Henri-Dunant-Straße 8
D-91058 Erlangen, Germany

Fon +49 9131 61082-0

Fax +49 9131 61082-999

Email info@intego.de

Web www.intego.de