

Inspection **Fuel cells**



**Automated
error detection
for maximum
process reliability**



High-resolution visual inspection detects the smallest defects in fuel cell components – efficient, quick to integrate, and cost-effective.

Optical inspection of bipolar plate

The modusAOI MCS42 camera system is virtually maintenance-free. Originally developed specifically for the production line, it is also available now as an offline version. Existing production lines can easily be retrofitted with this system.

The system consists of four 42 megapixel cameras, a high performance control unit, LED lighting, and LED light controller.

The entire field of view is orthogonally calibrated, avoiding image distortions and allowing exact measurements.

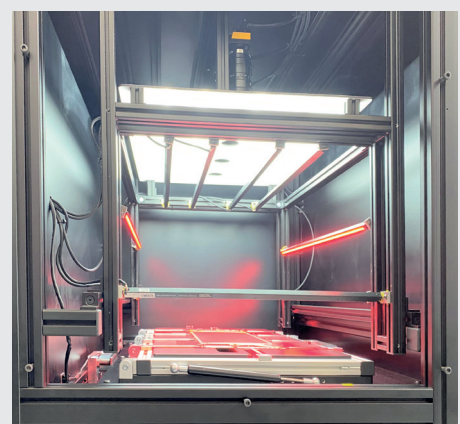
High-resolution image inspection is carried out using the tried and tested modusAOI software. Our production process is certified under **ISO 9001** and also includes a CE Declaration of Conformity.

The system has been adapted to the high requirements of the inspection of bipolar plates. With a total test time of approx. 3,5 seconds at an impressive resolution of 24 μm , it defines the standard in its class.

modus has over 39 years of experience in the field of customer-specific test systems.

Advantages

- Easily integrated
- Cost-effective
- Easy to use
- Minimal training required
- No escapes, few pseudo-errors
- Calibratable system
- Stable test precision





The benefits **For you and your customers**



Cost-effective solution

Small investment. Robust solution for production. 100% quality control.



Utility model protection

Registered design no.:
202 010 004 039.6



Time-saving

Identify production issues early.
Optimize each production step.



User-friendly

Customers are convinced by the ease
of use and robust inspection results.



Improved quality

Compliance with IPC standard,
ensuring stable, reliable production.



AOI expertise for over 39 years

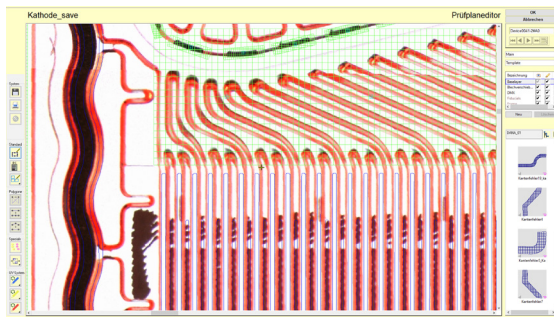
Continuous adaptation to customer
requirements has perfected the
system over the years.

Your production under control – your customers delighted

Our systems help you avoid errors,
speed up processes, and deliver consistent quality.
This allows you to reduce costs, gain trust, and achieve results
that will impress your customers in the long term.

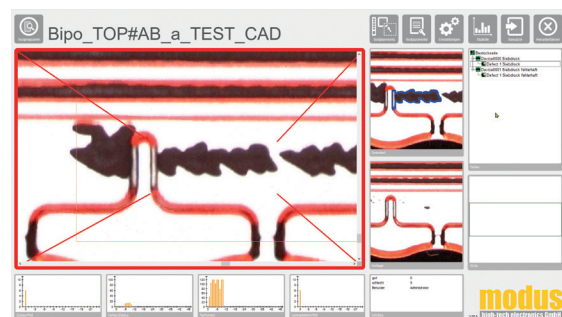


Test plan creation



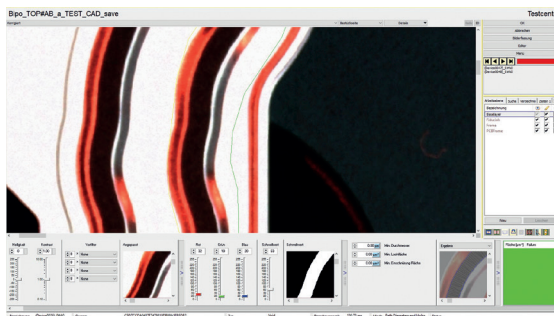
1| User-friendly Test Plan Editor

The graphical editor and preset library allows a quick and easy definition of the test areas.



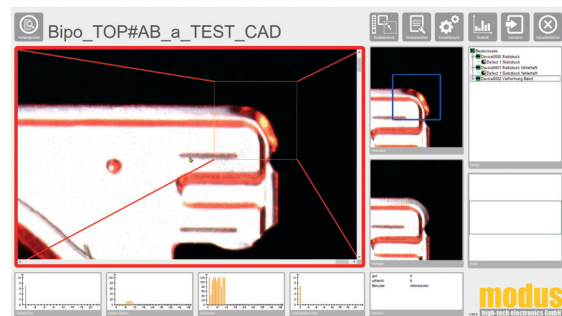
4| Product error detection

The system shows the position of the error, compares it with a template, and displays the part number, name, and error description.



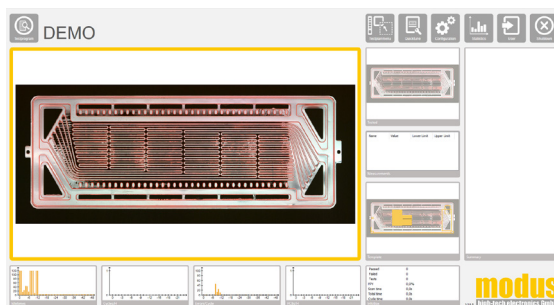
2| Optimisation in Testcenter

Test parameters can be directly adjusted in the Testcenter. Pre-filters and measurement limits are set out clearly and easy to understand.



5| Production statistics

The main panel displays real-time statistics on factors including errors, cycle-time, and scrap rate, allowing full transparency in the production process.



3| Main panel inspection

Main panel inspection allows for a fast and reliable bipolar-plate inspection.

Camera inspection with modusAOI

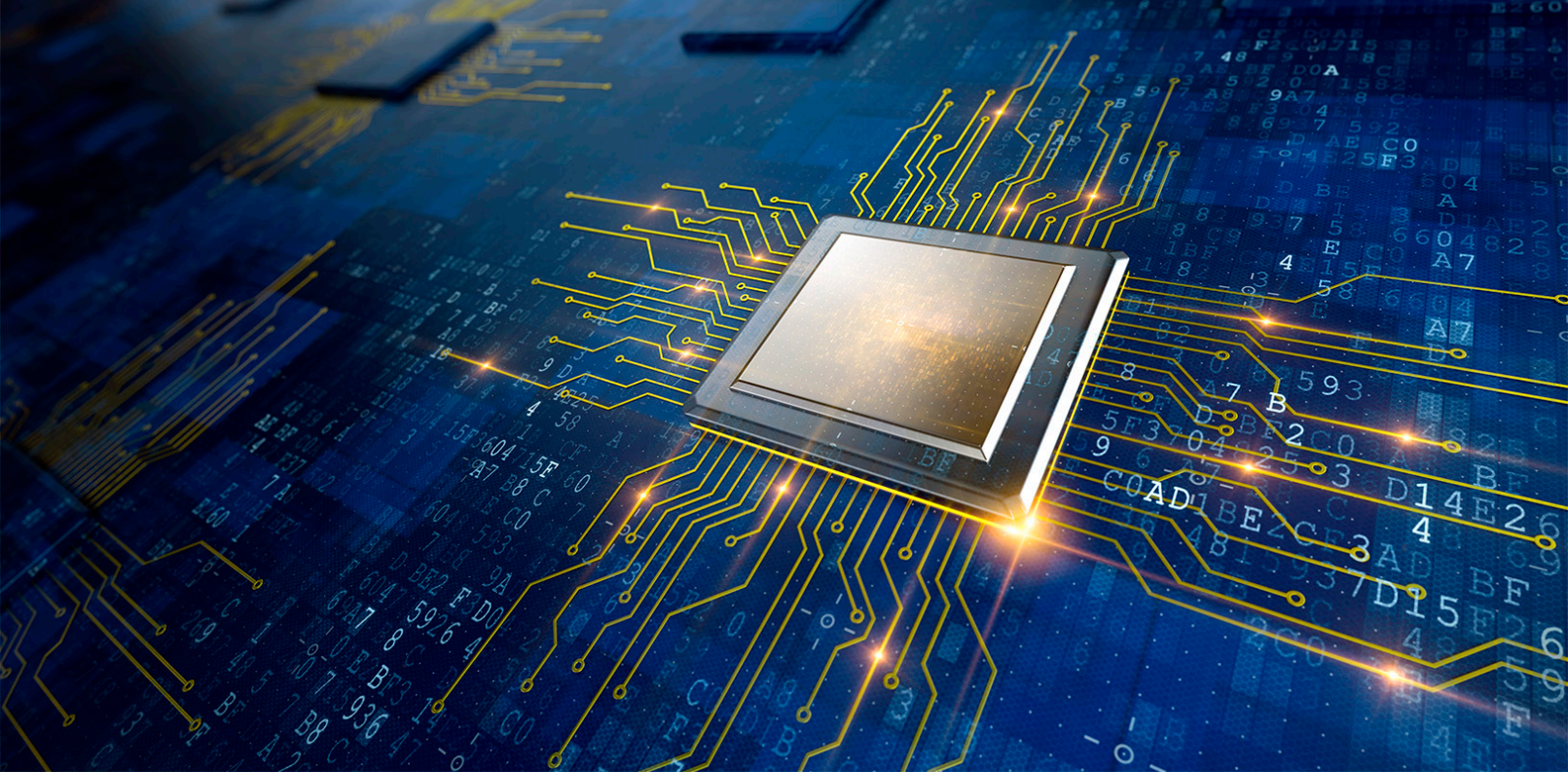
Test requirements

Fuel cells demand the highest quality – especially when it comes to bipolar plates. This requires precise control of the coating, contour, position, and material condition. The inspection system from modus high-tech meets these requirements in an automated, reliable, and inline-capable manner.

Test capabilities

- Position and minimum thickness of the graphite coating in the central area
- Position and minimum thickness of the screen print at the edge of the workpiece
- Checking the surface that should not be coated
- Coating contamination (graphite/screen print)
- Coating mass may only be on the beading tops
- Testing of a defined target shape in screen print
- Constrictions in coating path
- Small blisters in coating path
- Damage to the metal at the edge (balcony) of the workpiece
- Position of the anode-cathode connection (offset)
- General damage such as deformation and scratches





Technical information at a glance

Technical information	
Camera unit C42	Resolution 4x 42 megapixels = 168 megapixels (21440 x 7716 pixels) aspect ratio 2:3 per camera RGB colour filter from CMOS sensor, colour intensity 24 bit
Light source	LED cluster white and red
Lens	1:1.4 – 16 mm, lens (C-mount)
Field of view	480 mm x 200 mm (customisable)
Test speed	Image analysis including error calculation: 3,5 seconds typical
System PC	modusAOI, powerful control unit, keyboard, mouse, operator, 24" Full HD IPS 16:9 monitor
Dimensions	Camera unit (L*W*H): 39 x 39 x 40 mm AOI box (L*W*H): 829 x 788 x 1011 mm
Connected values	230 V / 50 Hz P1 or 110 V / 60 Hz consumption: 300 W
Options	Seamless stitching of 4 camera images (combined for one test plan), automatic start by closing the drawer, DMC Code automatically detected, customer-specific software development

Quality made visible

Quick testing, accurate results

The system meets the high requirements of bipolar plate inspection in the various production stages such as washing, welding, graphite coating, and screen printing.

Stable test accuracy is guaranteed at all times – with minimal pseudo error rates and zero escapes. This does not only increase process reliability, but also reduces waste significantly.

The inline control of the entire test sequence can be implemented either via a Simatic S7 interface or via I/O connections. This allows the system to be flexibly integrated into existing production environments.

Thanks to precise system calibration, mechanical parameters such as screen printing positioning can be imported without any problems.

In this way, the captured image data is synchronised with the existing production

data, enabling a particularly accurate overall assessment.

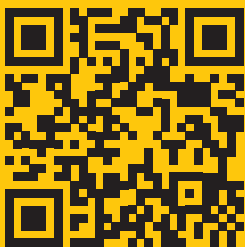
The possible cycle time, including handling, is only about 7 seconds – based on a generous scanning area of 480x200 mm. This allows for fast yet thorough inspection, even at high throughput rates.

System settings can be conveniently configured via an intuitive configuration menu within the AOI software. Creating test plans is also quick and easy thanks to a graphical user interface that has been specifically optimized for industrial use.

**Fast.
Secure.
Scalable.**



Bringing tomorrow's electronics to life.



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