



Applications and Use Cases

of SENIS Magnetic Field Mappers & Magnetic Field Camera

SEE THE INVISIBLE. ASSURE THE QUALITY. POWER THE FUTURE.

Precision. Performance. Innovation.

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SENIS MAGNETIC FIELD CAMERA – QUALITY ASSURANCE IN PRODUCTION

Real-time visualization of current flow – Detect bad or insufficient solder and welds while powered

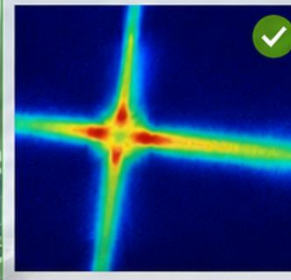
SOLDER QUALITY MONITORING IN SOLAR PANEL PRODUCTION

SENIS magnetic field camera visualizes the magnetic field generated by current flow in soldered connections between solar cells and bus ribbons.



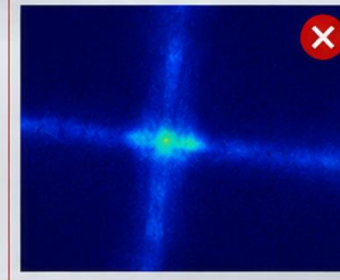
GOOD SOLDER JOINT

Strong magnetic field –
Good current flow



BAD / INSUFFICIENT SOLDER JOINT

Weak or disturbed magnetic field –
Poor current flow



Low magnetic field  High magnetic field

ADVANTAGES

-  100% inline inspection
-  Detects hidden defects
-  Works while powered
-  Improves yield and long-term reliability

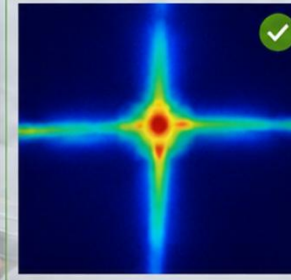
WELDING PROCESS MONITORING FOR EV BUS BAR CONNECTIONS

SENIS magnetic field camera detects weld defects such as lack of fusion, porosity or insufficient contact in real time – while current is flowing.



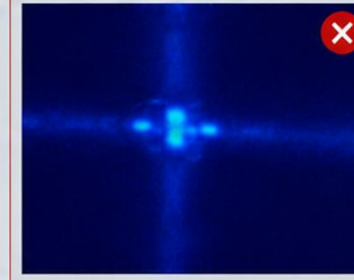
GOOD WELD

Strong magnetic field –
Low resistance connection



BAD / INSUFFICIENT WELD

Weak or uneven magnetic field –
High resistance risk



APPLICATION BENEFITS

-  Ensures electrical safety
-  Prevents field failures
-  Supports process optimization
-  Enables zero-defect manufacturing

HOW IT WORKS

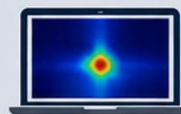
Current flowing through connections generates magnetic fields.



CURRENT FLOW
Through connection



SENIS CAMERA
Captures magnetic field



REAL-TIME VISUALIZATION
And analysis



PASS / FAIL DECISION
Inline quality assurance

SENIS
magnetic & current measurement

See the invisible.
Assure the quality.
Power the future.

SENIS MAGNETOMETERS & FIELD MAPPERS – PRECISION MAGNETIC MEASUREMENT

ENABLING QUALITY, PERFORMANCE & INNOVATION IN SEMICONDUCTOR MANUFACTURING

Testing, calibrating and characterizing magnetic sensors, systems and processes across the semiconductor value chain.

WAFER-LEVEL MAGNETIC SENSOR TESTING & CALIBRATION



Measure, test and calibrate magnetic sensors and ICs on wafer for offset, sensitivity, linearity, noise and cross-axis behavior.

- Hall, AMR, GMR, TMR, CMOS magnetic sensors
- Wafer-level parametric test & calibration
- High accuracy, high throughput solutions

MAGNETIC SYSTEMS FOR SEMICONDUCTOR EQUIPMENT



Characterize and verify magnetic systems used in sputtering, deposition, ion implantation, etching and inspection equipment.

- Magnet field mapping & uniformity
- Magnet design validation
- Process optimization & troubleshooting

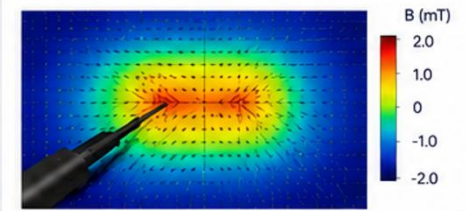
INTEGRATION IN SEMICONDUCTOR TEST EQUIPMENT



Seamless integration of SENIS magnetometers and transducers into ATE and process control systems for in-line measurement.

- Compact, robust & system-ready
- Fast data acquisition & real-time output
- Supports automation & high-volume test

R&D, FAILURE ANALYSIS & PROCESS DEVELOPMENT



Advanced magnetic field mapping and analysis for R&D, failure analysis and next-generation device development.

- 2D/3D magnetic field mapping
- Root cause analysis of magnetic anomalies
- Support for new materials & device innovation

SENIS INSTRUMENTS FOR SEMICONDUCTOR APPLICATIONS



F3B Field Transducer

Ultra-high bandwidth for dynamic & pulsed field measurements (up to MHz range)



I3D Isotropic 3-Axis Transducer

True 3D magnetic field measurement for complex field analysis & mapping



3M4 Teslometer

Versatile 3-axis teslometer for R&D, production & quality control



3M1-E Teslometer

Compact 3-axis teslometer for small magnets & magnetic components

MAGNETIC FIELD MAPPERS



3D Automated Field Mapper

High-resolution 3D mapping of magnetic fields for systems, tools & components

KEY BENEFITS

- ✓ High accuracy & traceability
- ⌚ Fast & reliable measurements
- ⊙ Compact & easy integration
- 📈 Support for R&D to production
- ✓ Improved yield & process control

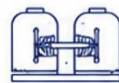
TYPICAL SEMICONDUCTOR APPLICATIONS



Wafer-level sensor testing & calibration



Sputtering & thin film equipment validation



Ion implantation system verification



Etch & deposition process control



ATE integration & in-line testing



Failure analysis & R&D characterization

TRUSTED BY SEMICONDUCTOR LEADERS

SENIS magnetometers and field mappers are used worldwide by semiconductor manufacturers, equipment suppliers, OSATs and R&D labs to ensure performance, reliability and innovation.



SENIS
magnetic & current measurement

www.senis.swiss

Precision. Performance. Innovation.

PRECISION MAGNETIC MAPPING FOR **AUTOMOTIVE** EXCELLENCE



SENIS Mappers deliver unmatched accuracy for testing, measuring and characterizing rotors, motors and sensor magnets – powering the next generation of vehicles.

- ✓ Sub-mT resolution
- ✓ Wide dynamic range
- ✓ Full 3D field measurement
- ✓ Fast, automated scanning
- ✓ Easy integration in R&D and production

- COMPLETE MAGNETIC FIELD MAPPING**
3D vector field (Bx, By, Bz) measurement
- HIGH ACCURACY**
Detect subtle variations and ensure top performance
- QUALITY ASSURANCE**
Identify defects early and ensure consistent production
- R&D & OPTIMIZATION**
Validate designs, improve efficiency and reduce time-to-market
- TRACEABILITY & RELIABILITY**
Repeatable results for full traceability and compliance



SENIS MAPPER SOLUTIONS – ACCURATE. RELIABLE. AUTOMATED.

- Detect asymmetries and magnet defects
- Verify magnetization quality and direction
- Measure PCB magnets and sensor assemblies
- Optimize motor performance
- Ensure functional safety and reliability
- Support innovation in e-mobility

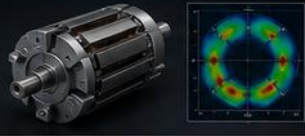
SENIS MAGNETIC MAPPERS – BUILT FOR PRECISION



PERFECT FOR:

- OEMs & Tier 1 Suppliers
- E-Mobility Innovators
- Motor & Sensor Manufacturers
- Research & Development Teams
- Quality & Test Engineers

APPLICATIONS IN AUTOMOTIVE

 <p>TRACTION MOTORS Measure and optimize permanent magnet rotors for maximum efficiency and power density.</p>	 <p>SENSOR MAGNETS Characterize magnets used in position, speed and angle sensors for reliable and precise detection.</p>
 <p>STARTER GENERATORS Ensure high performance and durability of rotors in start-stop and mild hybrid systems.</p>	 <p>E-MOBILITY COMPONENTS Validate magnets and motors for EVs, including inverters, pumps and actuators.</p>
 <p>QUALITY CONTROL IN PRODUCTION 100% inspection capability for consistent quality and reduced scrap.</p>	 <p>DESIGN & SIMULATION VALIDATION Accurate measurement data for validating simulations and improving electromagnetic design.</p>

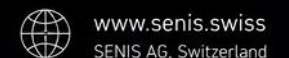
KEY BENEFITS

- | | | | | |
|--|---|---|---|---|
| <p>IMPROVE EFFICIENCY
Optimize motor and magnet performance</p> | <p>REDUCE COSTS
Lower scrap rate and warranty claims</p> | <p>SPEED UP DEVELOPMENT
Faster validation and shorter time-to-market</p> | <p>ENSURE SAFETY
Meet functional safety and industry standards</p> | <p>DRIVE INNOVATION
Enable next-gen mobility solutions</p> |
|--|---|---|---|---|

"PRECISE MAGNETIC DATA FOR BETTER MOTORS, RELIABLE SENSORS AND SMARTER VEHICLES."



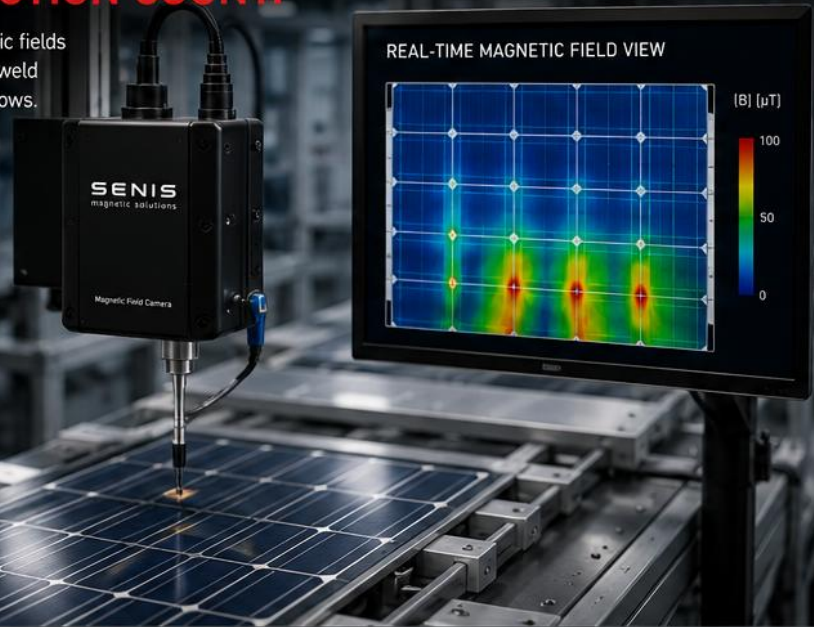
SWISS ENGINEERING. GLOBAL IMPACT.
Empowering the automotive industry with precision magnetic measurement.



SEE WHAT MATTERS. MAKE EVERY CONNECTION COUNT.

SENIS Magnetic Field Camera visualizes magnetic fields in real-time to detect weak or faulty solder and weld connections during production - while current flows.

-  **REAL-TIME VISUALIZATION**
See magnetic fields generated by current flow instantly.
-  **DETECT DEFECTS EARLY**
Identify weak, cold or missing solder and welds immediately.
-  **ENSURE QUALITY & RELIABILITY**
Guarantee strong connections for long-term performance and safety.
-  **INCREASE YIELD & REDUCE COSTS**
Minimize rework, scrap and warranty claims.

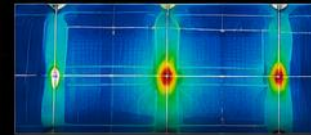


SOLDER QUALITY MONITORING – SOLAR PANEL PRODUCTION

Inspect soldered connections between solar cells and bus ribbons.

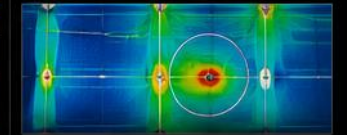


GOOD SOLDER CONNECTION



Strong and uniform magnetic field indicates a good electrical connection.

BAD / INSUFFICIENT SOLDER



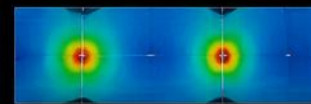
Weak or missing magnetic field reveals poor or insufficient solder.

WELDING PROCESS MONITORING – EV BUS BAR CONNECTIONS

Monitor resistance welds on bus bars, tabs and connectors in EV batteries.

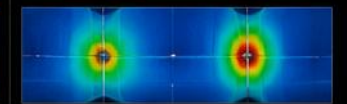


GOOD WELD CONNECTION



Strong magnetic field confirms a solid, low-resistance weld.

BAD / INSUFFICIENT WELD



Weak or irregular magnetic field indicates poor or inconsistent weld.

SENIS MAGNETIC FIELD CAMERA – FOR IN-LINE PRODUCTION MONITORING






-  **HIGH SPATIAL RESOLUTION**
See even the smallest defects clearly.
-  **REAL-TIME FEEDBACK**
Instant results for immediate process adjustment.
-  **EASY INTEGRATION**
Compact, robust and easy to integrate in production lines.
-  **OPERATES WHILE POWERED**
No need to stop the line. Works with live current.



HOW IT WORKS IN PRODUCTION



KEY BENEFITS

-  **IMPROVE PRODUCT QUALITY**
-  **REDUCE RETURN & WARRANTY COSTS**
-  **INCREASE PRODUCTION YIELD**
-  **ENSURE SAFETY & RELIABILITY**
-  **SUPPORT INDUSTRY 4.0 & TRACEABILITY**



SEE THE MAGNETIC DIFFERENCE.
Ensure perfect connections. Every time. In real-time.

 **DESIGNED & MADE IN SWITZERLAND**

 **TRUSTED BY LEADING MANUFACTURERS**

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SENIS AG, Switzerland