



Inspection System

SONOAIR®

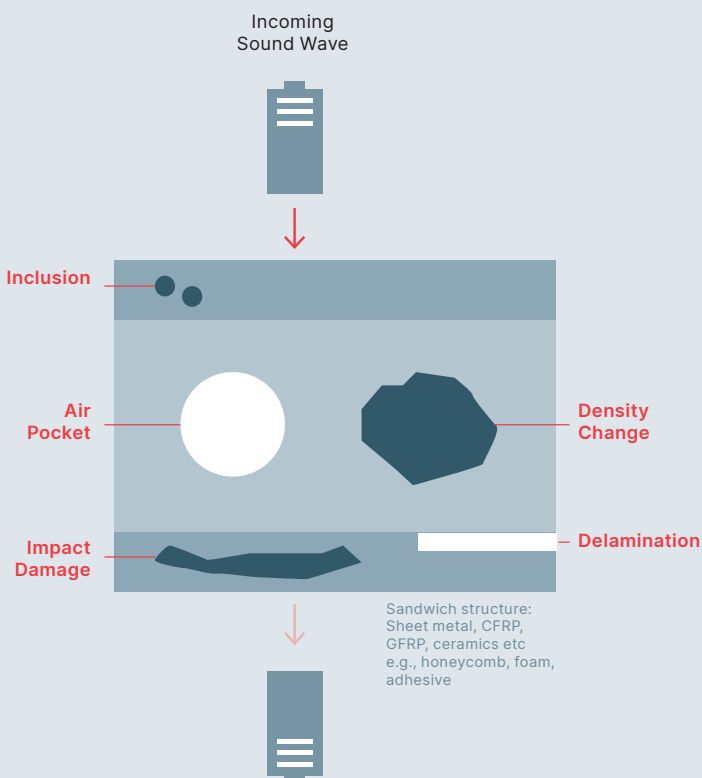
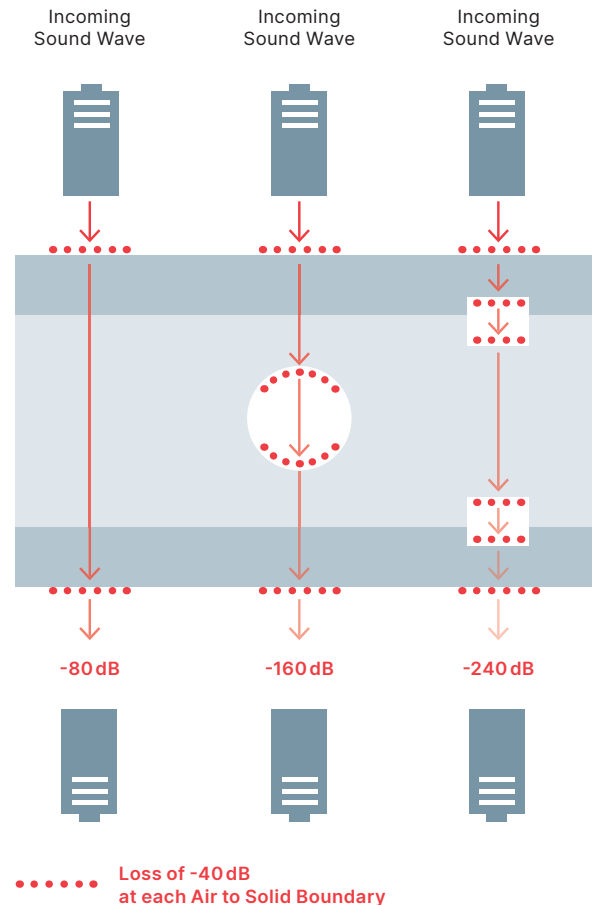
For Non-Contact
Ultrasonic Testing

MADE IN GERMANY

Nondestructive Testing

The Principle of Air-Coupled Ultrasonic Testing

- New challenges for testing lightweight components where conventional methods cannot be used and contamination with couplant is not desirable
- Air-Coupled Ultrasound Testing (ACUT) allows contact-free testing without the use of additional coupling fluids
- Send-receive configuration with the test item in between 2 transducers placed opposite to each other
- The sound attenuation between sender and receiver is evaluated at a specific point (point measurement)
- By taking multiple measurements and moving the transducers it is possible to scan a larger area

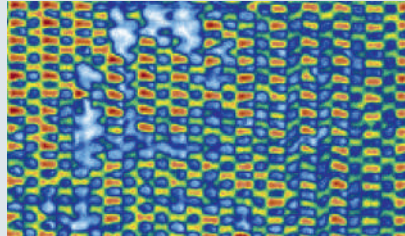
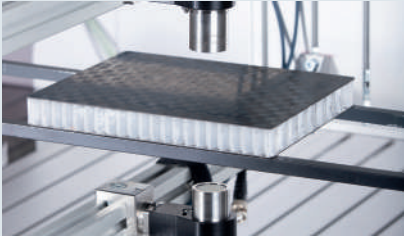


Possible Defects

- Ideal measurement method to detect common defects in modern multilayer composite structures (delaminations, air inclusions, kissing bonds, impact damages)
- Even very small defects can be located: with a wavelength in air of only 0.85 mm discontinuities from approximately 1 mm size can be detected
- Inspect highly attenuating materials which are impossible or difficult to test with liquid coupled ultrasonic inspection systems
- Particularly used for foams, multi-layer honeycombs, plastics, ceramics, wood, and concrete inspection
- Modern fibre-composite structures such as CFRP or GFRP can be inspected without any compromises

C-Scans with Transmission Test Method

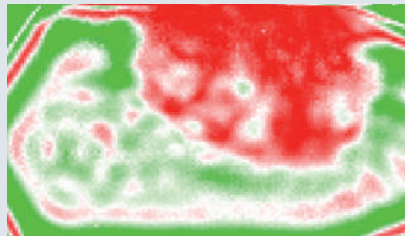
Honeycomb Composite with CFRP Layers



Types of defects: impact damage and delaminated top layer

Probe: CFC230_D25_P65

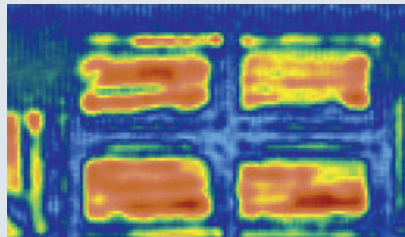
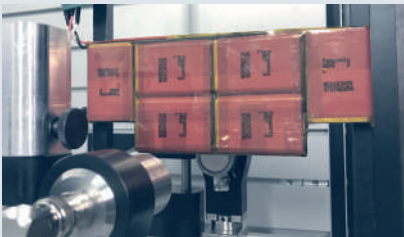
Ceramics



Types of defects: delamination and density fluctuations before and after the sintering process

Probes: CF075 and CF1255

Battery



Types of defects: air pockets and electrolyte distribution

Probes: CF400

Piezo-Ceramic Probes

CF Series

Robust and Wear-Free

Narrowband

Very high sensitivity

Size of the transducer and therefore also the acoustic field geometry is dependent on the nominal frequency



CFC Series

Latest piezocomposite technology

Broadband

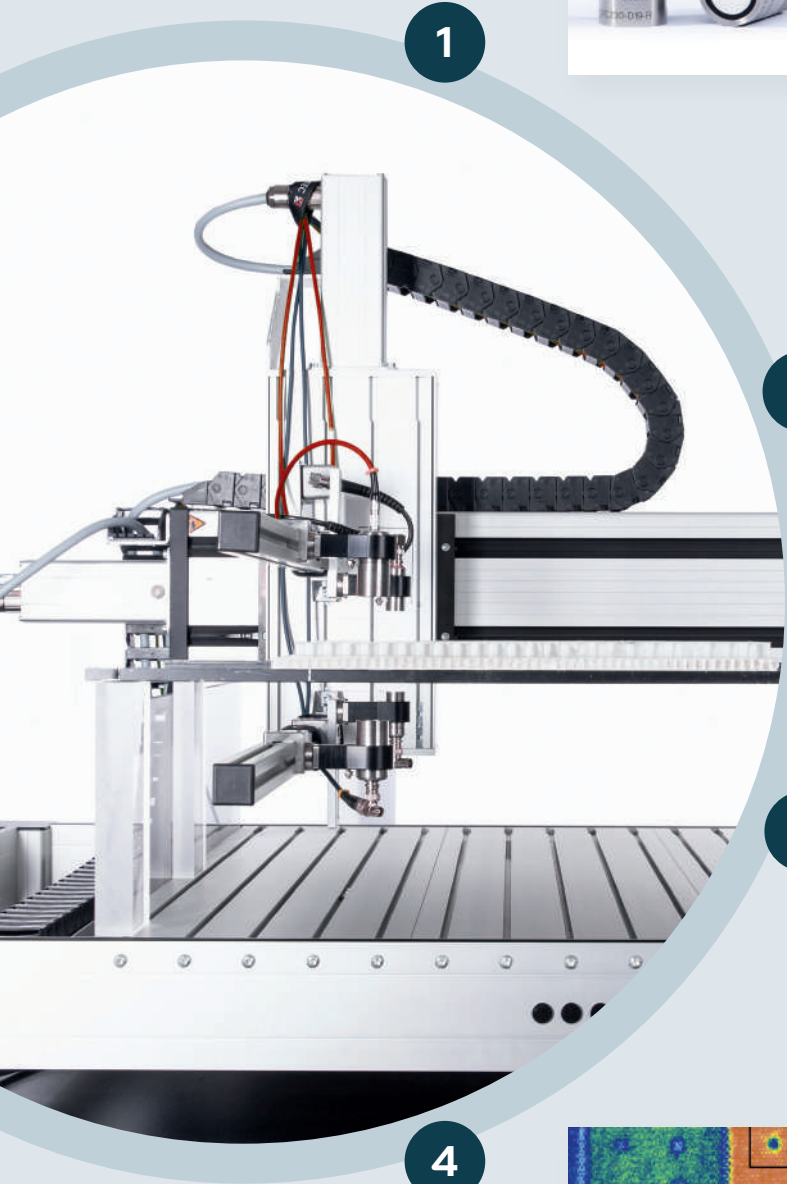
High sensitivity

Transducer geometry independent of frequency, allowing the acoustic field parameters to be individually adapted to the inspection task

Receiving transducers with integrated preamplifier for especially low-noise applications



SONOAIR® Components



1



Air-coupled Probes

Maximum resolution and highest sensitivity due to state-of-the-art SONOTEC piezo-composite technology incl. element focusing

2



Up to 4 Channels

Up to 4 independent transmitter and receiver channels with configurable square-wave burst pulser and low-noise pre-amplifiers

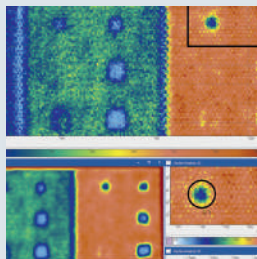
3



High End Laboratory Electronics

High performance pulser-receiver system

4



Software

Laboratory friendly software for basic measurement and advanced analysis capabilities

Technology Leader

Experts throughout the entire measurement chain, including electronics, sensor technology, and composite technology.

Sensor Technology

- Latest composite technology enables high bandwidths at high sensitivities
- Sound field shaping through classical methods, such as shaping of the transducer element or electronic methods by utilizing multi-element technology
- Wide range of air-coupled ultrasonic testing probes

Electronics

- Configurable rectangular transmitter with voltages up to 800V
- Ultra-low noise receiver with a system noise of less than $1\text{nV}/\sqrt{\text{Hz}}$ at a gain of up to 120dB
- Up to 4 independently configurable receiving channels
- Phase-shifted driving of the 4 channels possible



Software

SDK

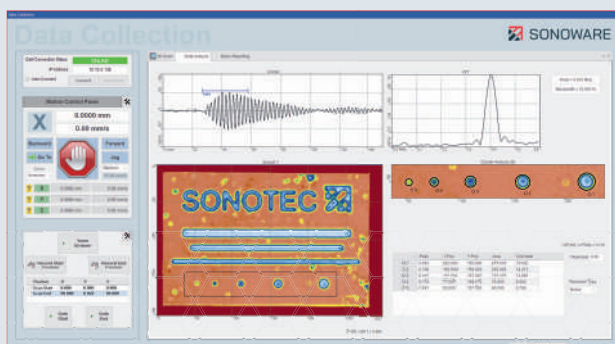
Software Development Kit

We offer you a powerful SDK for integrating your hardware into existing systems or software. Our software development kit also provides access to the Ethernet interface of the SONOIR system.

SONOWARE

Software for Inspection

The SONOWARE inspection software for air-coupled ultrasonic testing is designed for the use in laboratories and offline production environments.



- Control of the transmit/receive electronics as well as a scanning system for air-coupled ultrasonic testing
- Implemented signal analysis functions for processing the RF data both online and in post-processing
- Possibility of data storage of the complete RF data
- Analysis tools for evaluating the measurement results
- Report generation

Technical Data of the Standard Laboratory System

General Data	
19" Unit consisting of	PC with Windows operating system and software; 14-bits digitizer, 100 MB/s; Ultrasonic pulser unit; Ultrasonic receiver unit
Operating Temperature	5 °C to 40 °C
Network Interface	1GB LAN
Protection Class	IP20
Standards	DIN EN 61010, DIN EN 60204

Pulser	
Number of Channels	1 or 4
Pulse Height	Adjustable from 8V to 400V
Frequency Range	35kHz to 3MHz
Maximum Power	2kW (400V), optional 4kW (800V)
Type	Square wave burst (configurable width for each pulse)

Receiver	
Number of Channels	1 or 4
Frequency Range	35kHz to 750kHz
Gain	0dB to 120dB, 0.5dB increment
Noise	1nV/√Hz

Scanner (Standard)	
Scanning Area (X x Y x Z)	500 mm x 500 mm x 160 mm (Other scanners on request)
Positioning Accuracy	20 μm
Scan Increment	0.1 mm

SONOWARE

Intuitive and clear graphical user interface

Separate windows for hardware parametrization (transmitter, receiver, scanner)

Customizable screen layout

Repositioning of the gates after the measurement

Display of the measurement results as C-scan

Storage of complete data sets incl. complete A-scans for each measurement point

Raw data access (e.g., for subsequent export to Matlab, LabVIEW, etc.)

Individual signal processing algorithms, e.g., for filters

Automatic post processing capabilities

Multi-channel measurements

Database support

Applications



Non-contact ultrasonic testing of modern fibre composites such as GFRP and CFRP



No expensive time-consuming water supply, drainage, or drying processes needed



Inspection of highly attenuating materials such as honeycomb structures, ceramics, plastics, wood, concrete, etc.



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