

# Detect through Air !

Air-Coupled Ultrasonic waves Transmitted  
from Air Transducer

# Non-contact !

No Couplant Required

## Inspect Characteristics and Quality of Materials !

Enable Japan Probe to respond to inspections that were never achieved before.

For example : Lithium ion battery, composite material, solar panel,  
wind power generation blades, brake pad, IC chips, films and so on.



NAUT21-M

### *Non-Contact Air*



NAUT21

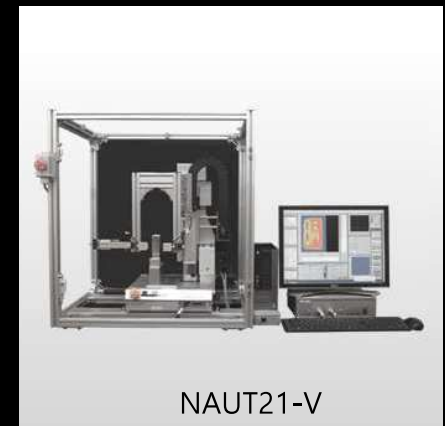


NAUT21-I



NAUT21-R

### *Ultrasonic*



NAUT21-V

# NAUT21

## Non-Contact Air Coupled Ultrasonic Testing system

We are accepting your sample test for  
free charge and renting them !

Search "Japan Probe" on web for details.  
Please see videos about our solutions.

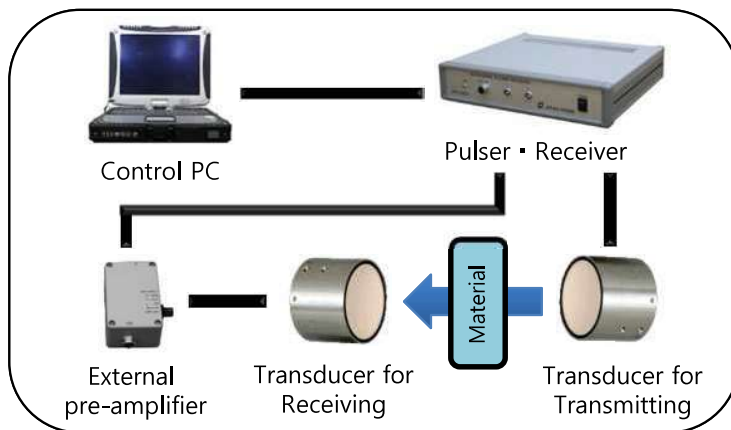


 Ultrasonic Sensor  
**JAPAN PROBE**

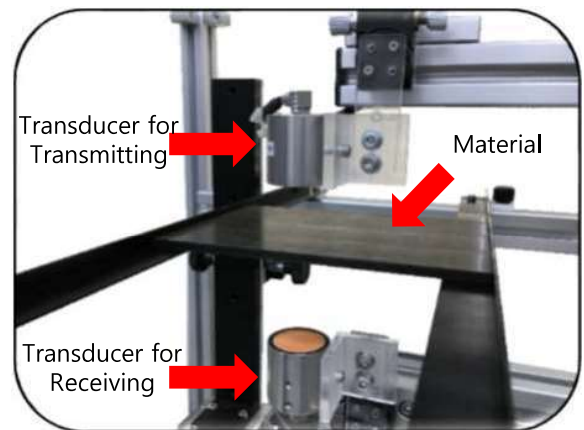
# Non-Contact Air Coupled Ultrasonic Testing NAUT 21

NAUT21 enables you to realize the inspection, measurement, evaluation, and analysis of materials considered impossible until now.

It enables you to detect materials without damaging or wetting them with any couplant. It enables you to detect cracks irrespective of staining or transparency. Also, lighting does not affect performance.



Structure of NAUT



CFRP measurement using NAUT transmission method

## ■ Non-Contact Air Coupled Ultrasonic Testing system "NAUT"

'To develop ultrasonic testing system by contact-free'

Toward this challenge, JAPAN PROBE developed NAUT21 (Non-Contact Air Coupled Ultrasonic Testing system 21) by air-coupled with the help of, the analysis algorithm based on years of extensive experience, technique, inspection data and know-how of the ultrasonic probe.

### 1. Transmission Method :

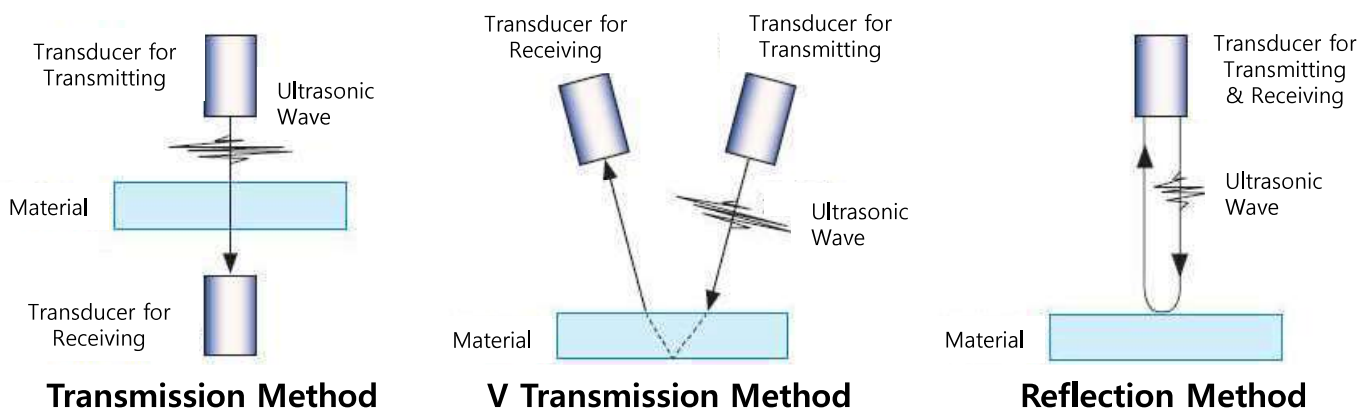
Typical method for detecting the inside of material by air-coupled. Inspecting and measuring the inside of material by setting two air transducers above and below the material.

### 2. V Transmission Method :

Typical method for inspecting and measuring the inside of material or surface condition by setting two transducers at the same side of the material. Used for inspection, measurement, evaluation and analysis of slit flaws, and surface shapes of metal materials and welded parts.

### 3. Reflection Method :

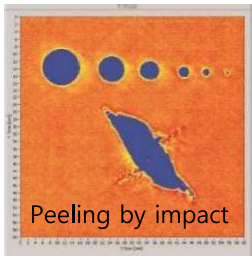
Typical method for inspecting and measuring by using only one air transducer at one side of the material. Used for inspection, measurement, evaluation, analysis, etc. of surface shape and scratches.



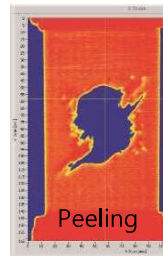
# NAUT21 has been used successfully for the inspection, measurement, evaluation and analysis of materials in many different fields since NAUT21's sale. Here are some of the typical examples.

## ■ Inspection/Measurement/Evaluation/Analysis

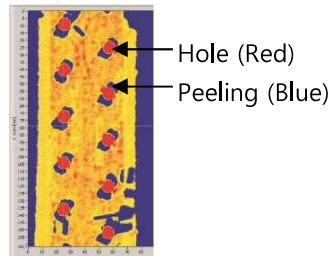
### 1. High-tech Material (CFRP)



a.



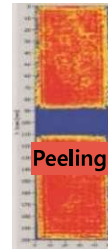
b.



c.

( a. Image after impact test, b. Image after lightning strike test, c. Image after tensile test )

### 2. GFRP (Glass Fiber Reinforced Plastic)



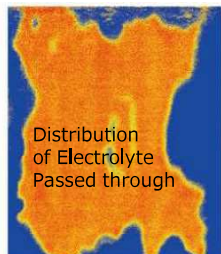
GFRP

### 3. Lithium Ion Battery (LiB)



(Optical image)

a. LiB (Lamination type)

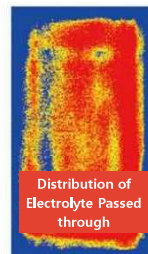


(Image by NAUT21)



(Optical image)

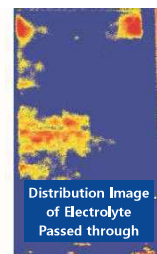
b. LiB (Square type)



(Image by NAUT21)



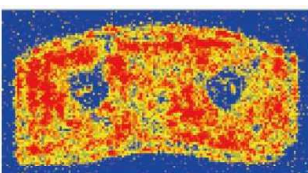
(X-ray image)



(Image by NAUT21)

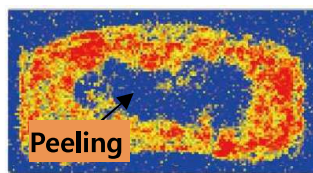
c. LiB (Lamination type)

### 4. Friction Materials (Brake Pad)



(Non-defective)

Brake Pad for Automobile (Image by NAUT21)

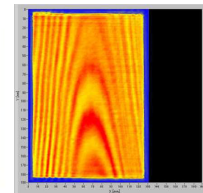


(Defective)

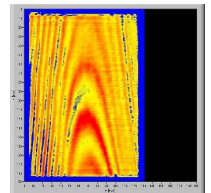
### 5. Woods



(Optical image)



(Image before drying)



(Image after drying)

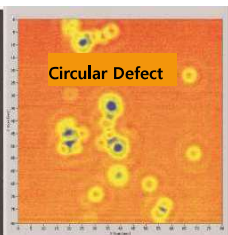
NAUT21 inspection image before and after drying of wood

### 6. Various Materials (Films, Tires, etc.)

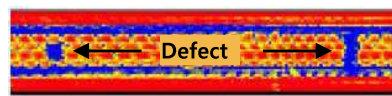


(Optical image)

Contact Surface of Acrylic Resin

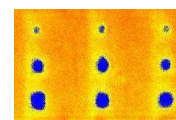


(Image by NAUT21)

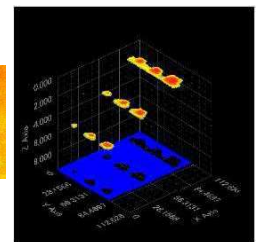


(Upper : Testing scene)  
(Lower : Image by NAUT21 )  
Tire

### 7. 3D Image for LiB Inspection Result



(Left : Planar image by air coupled )  
(Right : 3D image by immersion method)



NAUT21-I Image

## ■ Usage : Material characteristic evaluation, analysis, crack & foreign object detection, etc.

- High-tech material (CFRP, GFRP)
- LiB
- Friction material (Brake pad)
- Solar panel
- Metals (Surface & Internal flaw)
- Ceramics (Green state, etc.)
- Film of paint
- Insulator (Foam, etc.)
- Semi-sintered body
- Pipe (Defect, Length, Thickness)
- Various contact surfaces (Reinforced resin, etc.)
- Measurement of displacement amount and surface, etc.,

# Non-Contact Air Coupled Ultrasonic Testing system

# NAUT21 Series

5 models available for multiple purposes!

NAUT21 will realize the inspection, measurement, and analysis of materials.

## ■ Model Introduction

1. NAUT21 (Standard type) :  
For the inspection, measurement, evaluation & analysis by scanning air transducer horizontally,
2. NAUT21-V (Vertical type) :  
For the inspection, measurement, evaluation & analysis by scanning air transducer vertically.  
(Display upright LiB, bottles and cans by C-scope.)
3. NAUT21-R (Rotating type) :  
For the inspection, measurement, evaluation & analysis by rotating and scanning cylinder type materials such as pipe, tube, etc.  
(We can customize the robotic type of testing system based on the principle of NAUT21-R.)
4. NAUT21-M (High speed type for in-line application) :  
For the inspection, measurement, evaluation & analysis in real time by scanning air transducer at high speed.  
(It is increasingly used in many different fields for inspection of LiB and brake pads.)
5. NAUT21-I (New model coupled with air and immersion testing):  
For the inspection, measurement, evaluation & analysis by both air-coupled and immersion method  
(Visualizing the inside of materials by planar image by air-coupled ultrasonic system, and visualize the depth information in 3D by immersion method in addition to the planar image.)



NAUT21  
(Standard type)

NAUT21-V  
(Vertical type)

NAUT21-R  
(Rotating type)

NAUT21-M  
(High speed type for in-line)

NAUT21-I  
(For both air-coupled & immersion method)

## ■ Air Transducer

Available in 3 types based on usage. It provides high quality & high performance brought by years of research, manufacturing and experience.



Flat Type

Line Focus Type

Point Focus Type

**Ultrasonic Sensor**  
**JAPAN PROBE**

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