2014 A4A NDT forum

San Francisco, September, 2014

A350 XWB NDT In-Service Damage Assessment

Presented by
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NDT Product Leader SEES4

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Agenda

- News A350 ANDT Re-structured procedures
- A350 ANDT New tooling referencing
- A350 ANDT procedures for NDT specialists
- A350 ANDT procedures for Non-NDT specialists
- Conclusion

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ANDT (NTM) Procedures at Entry Into Service

- **General methods** description 51-9X-00
  - **Description of methods for information**
  - **Link to international standards (ASTM International…)**

- **General 51's** procedures 51-9X-(1-9)X
  - **Unscheduled In-service** damage **assessment** & **prior repairs**
  - **Called** up in **RDAS** (Repair Design Approval Sheet)**, ASR** (SRM)**, ISB's**
  - **Customized** & **re-validated** for new materials/designs/programs

- **Specific procedures**
  - **Reference for scheduled maintenance tasks ATA 52 to 57**
  - **Called up in MPD, MP, ISB's**

General procedures & methods ready at Entry Into Service

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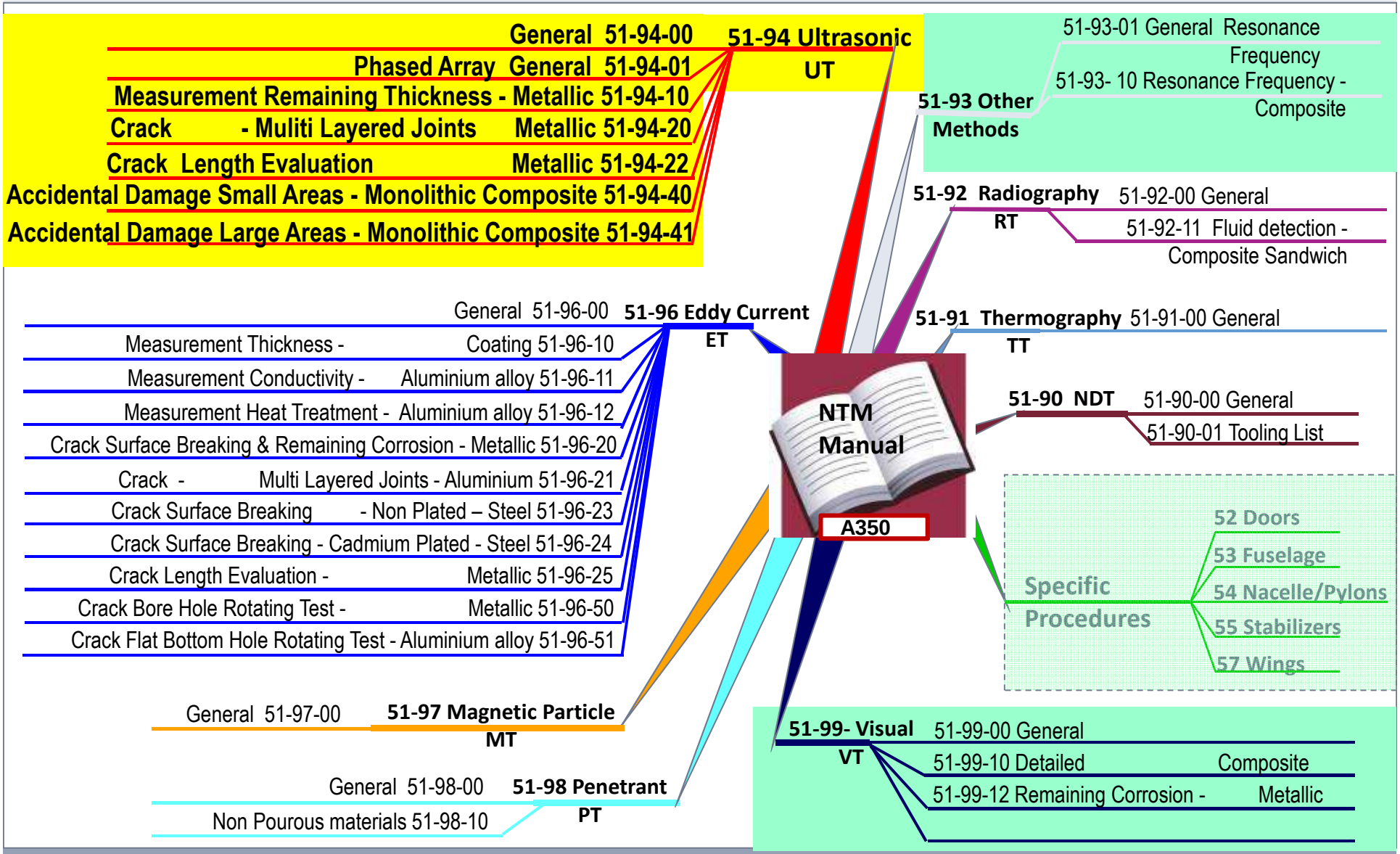
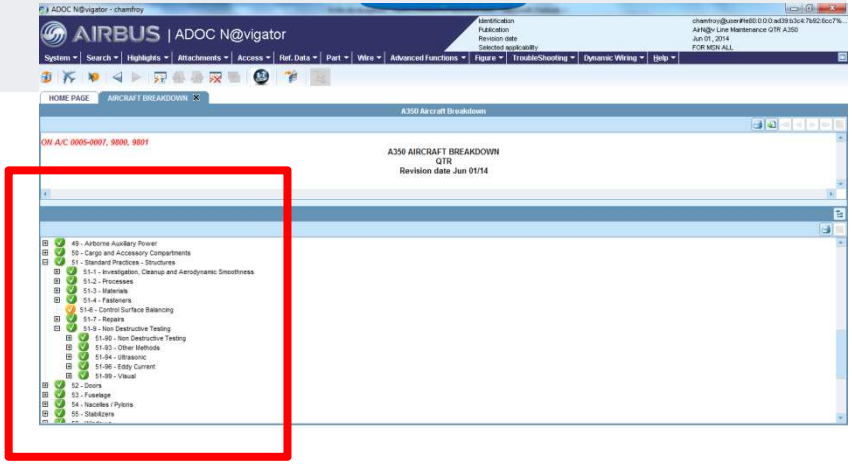
A350 ANDT Re-structured Manual - General Overview



A350 ANDT New breakdown



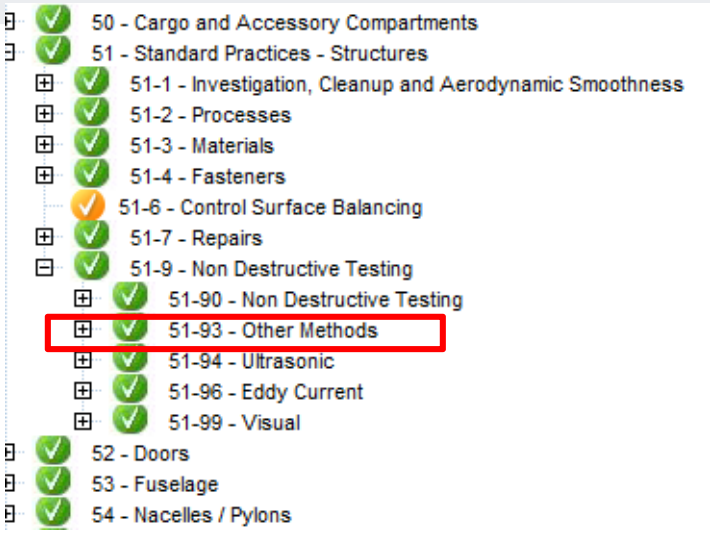
- 50 - Cargo and Accessory Compartments
- 51 - Standard Practices - Structures
  - 51-1 - Investigation, Cleanup and Aerodynamic Smoothness
  - 51-2 - Processes
  - 51-3 - Materials
  - 51-4 - Fasteners
  - 51-6 - Control Surface Balancing
  - 51-7 - Repairs
  - 51-9 - Non Destructive Testing
    - 51-90 - Non Destructive Testing → Introduction & tooling specification
    - 51-93 - Other Methods → Dedicated to Non NDT specialist
    - 51-94 - Ultrasonic
    - 51-96 - Eddy Current → General procedures managed by methods
    - 51-99 - Visual
- 52 - Doors
- 53 - Fuselage → Specific procedures
- 54 - Nacelles / Pylons

New breakdown & Task numbering

News A350 ANDT Re-structured procedures

- **Other method chapter 51-93-00**
  - Can be used by a non-NDT specialist

- **Procedures:**
  - 51-93-20: Line Tool - Fuselage
  - 51-93-30: Scratch depth measurement
  - …

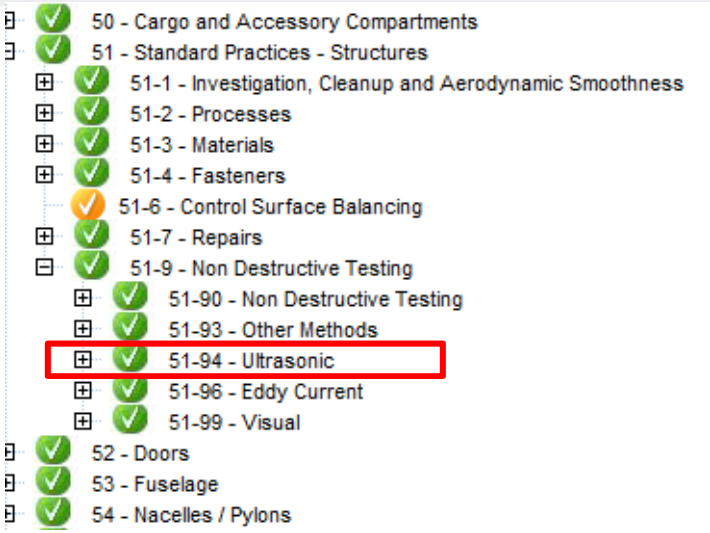


Dedicated chapter for None NDT specialist

News A350 ANDT Re-structured procedures

- **Ultrasonic chapter 51-94-00**
  - Used by a NDT specialist

- **Procedures:**
  - 51-94-40: Ultrasonic Manual
  - 51-94-41: Ultrasonic Phased Array
  - …



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A350 ANDT New tooling referencing

- **NDT tooling** referenced by **Airbus codes** (ID)
  - **Specification** approach
  - **T**echnical **D**ata **S**heet → **key** tooling **parameters** for the **inspection**
- **Objective**
  - **Guide** Maint. Eng., A/L & MRO on **up to date data**
    - **Clearer** tooling **Reference & Description**
    - **Easier** NDT **alternative tool selection** by NDT inspector (level II/III)
  - **Homogenise & Standardise** tooling
  - **Identify & manage** properly tooling **config. & obsolescence**

Key tooling parameters to ease tool selection & alternatives

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A350 ANDT New tooling referencing- Example

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AJ-A-51-94-41-00AAA-355A-A
Issue: 001 - Date: December 31, 20
12

Accidental Damage Large Areas - Mor
site - Test for cracks and other defects

" On A/C : 0007-0008

3. Tooling List

ID	Item	Designation	Key Parameters	Tool de Pr
USP-DDAE	1) Search Unit	Search Unit	<1>	5L64NW
UWP-ADAA	2) Wedge	Wedge	<2> 0 Degree 20 mm (0.787 in) Delay Line	SNW1C U87002
UIP-CDSA	3) Instrument	Ultrasonic Equipment	<3>	OMNIS PAUT16 (OMNIP
	4) Calibration Block	Calibration Block Set	<4>	CALIBR STANDA
	5) Calibration Block	Calibration Block Set	<4>	STANDA CALIBR
	6) Wheel Encoder	Wheel Encoder		ENC1-5

<1> Couplant: Any water-soluble couplant, for example ZGF.
<2> Couplant for wedge assembly: Oil or similar high viscosity couplant.
<3> System Software MXU-2.OR7 was used in the development of this procedure.

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AJ-A-51-90-01-00AA0-040A-A
Issue: - Date:

Manual:
Selected applicability: 0007

USP-DDAE

ULTRASONIC SEARCH UNIT

1. BASIC SPECIFICATION

USE	PHASED ARRAY
NUMBER OF ELEMENTS	64 ELEMENTS
FREQUENCY	5MHz
GEOMETRY	66*19*25
TASKS	SEE DMC-AJ-A-51-94-41-00ZZZ-355Z-A

2. DRAWING

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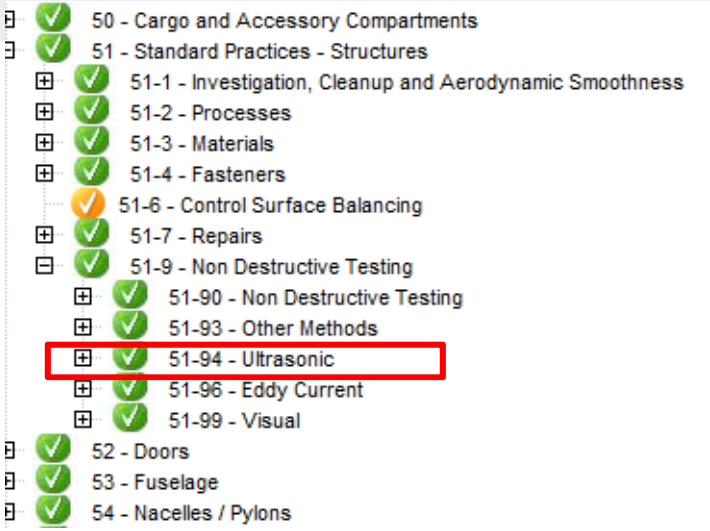
A350 ANDT procedures for NDT specialists

- **Procedures: Impact damage on composite**
  - 51-94-40: Ultrasonic Manual
  - 51-94-41: Ultrasonic Phased Array



  - ➢ Both procedures alternatives
  - ➢ Recommended to use the phased array as far as possible
  - ➢ Wheel probe recommended for fuselage inspection

NDT specialists to be trained/familiar with Utrasonic's Phased Array technology

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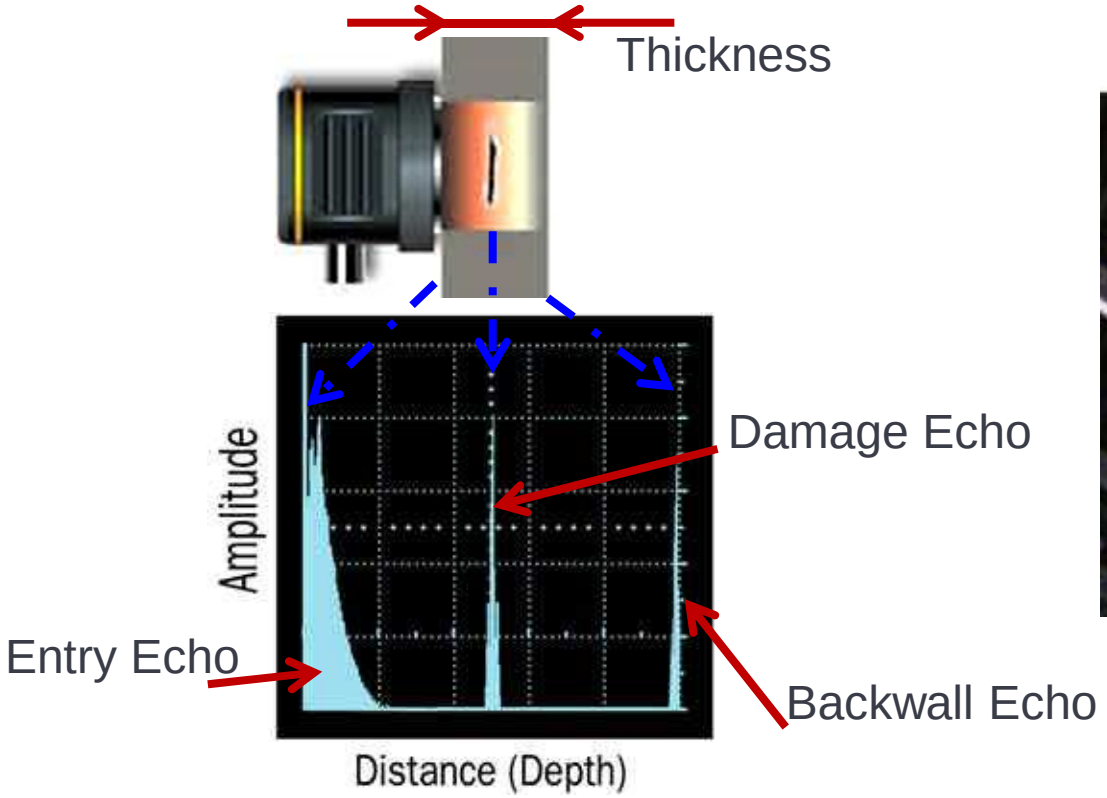
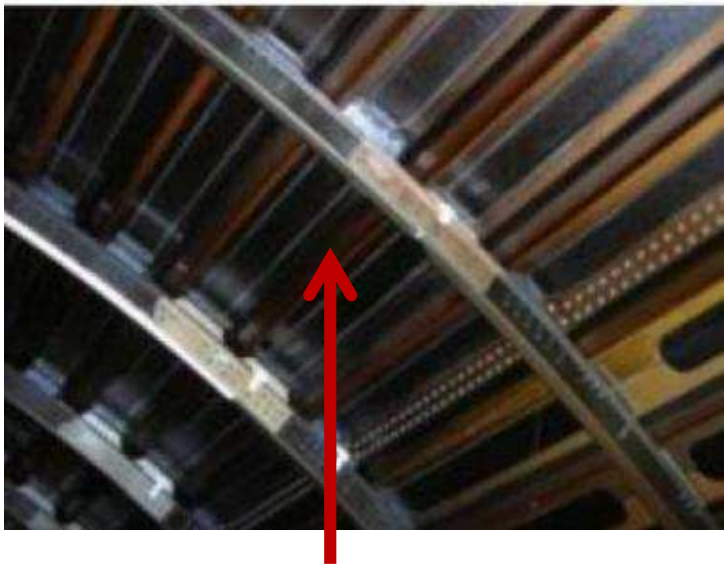
A350 ANDT procedures for NDT specialists

- **Single element probe – A-scan inspection principle**



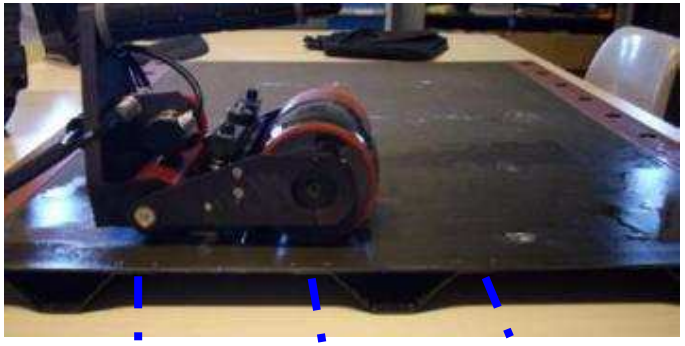
A/C structure - Interior view

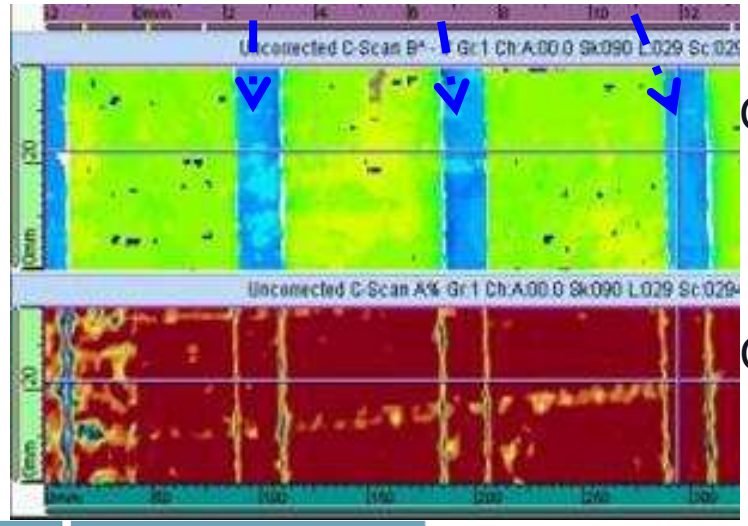


UT A-scan inspection needs experience and time

A350 ANDT procedures for NDT specialists

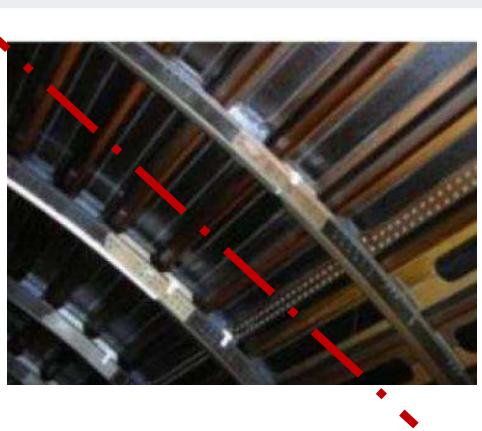
- **Phased Array - C-scan example**



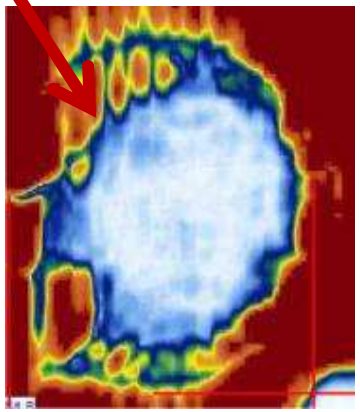


C-scan thickness
"time of flight"

C-scan amplitude



Typical damage → Irregular form



NDT specialists to be trained/familiar with Utrasonic's Phased Array technology

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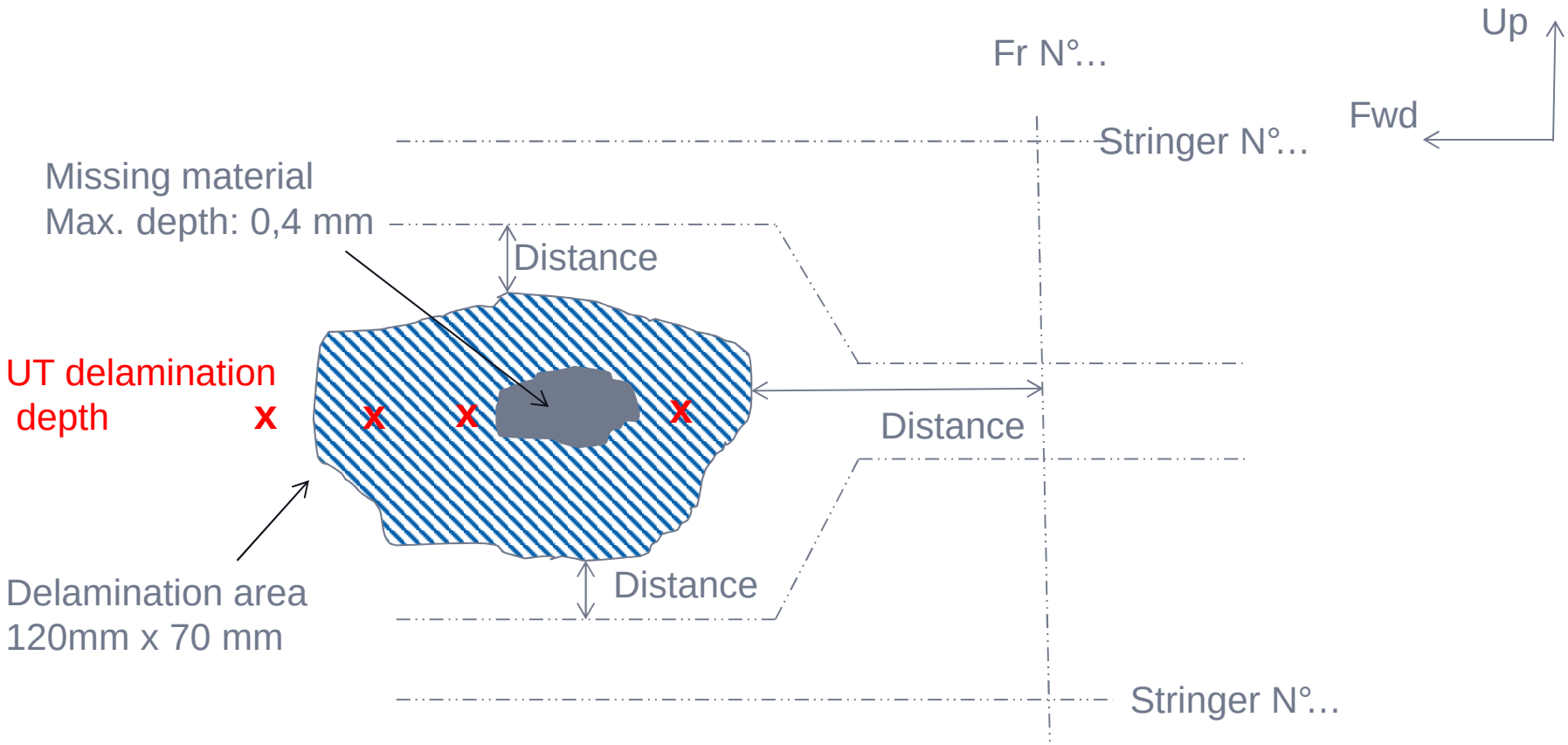
Delamination Damage Reporting



Note: No stringer disbond

New delamination depth measurement to be included

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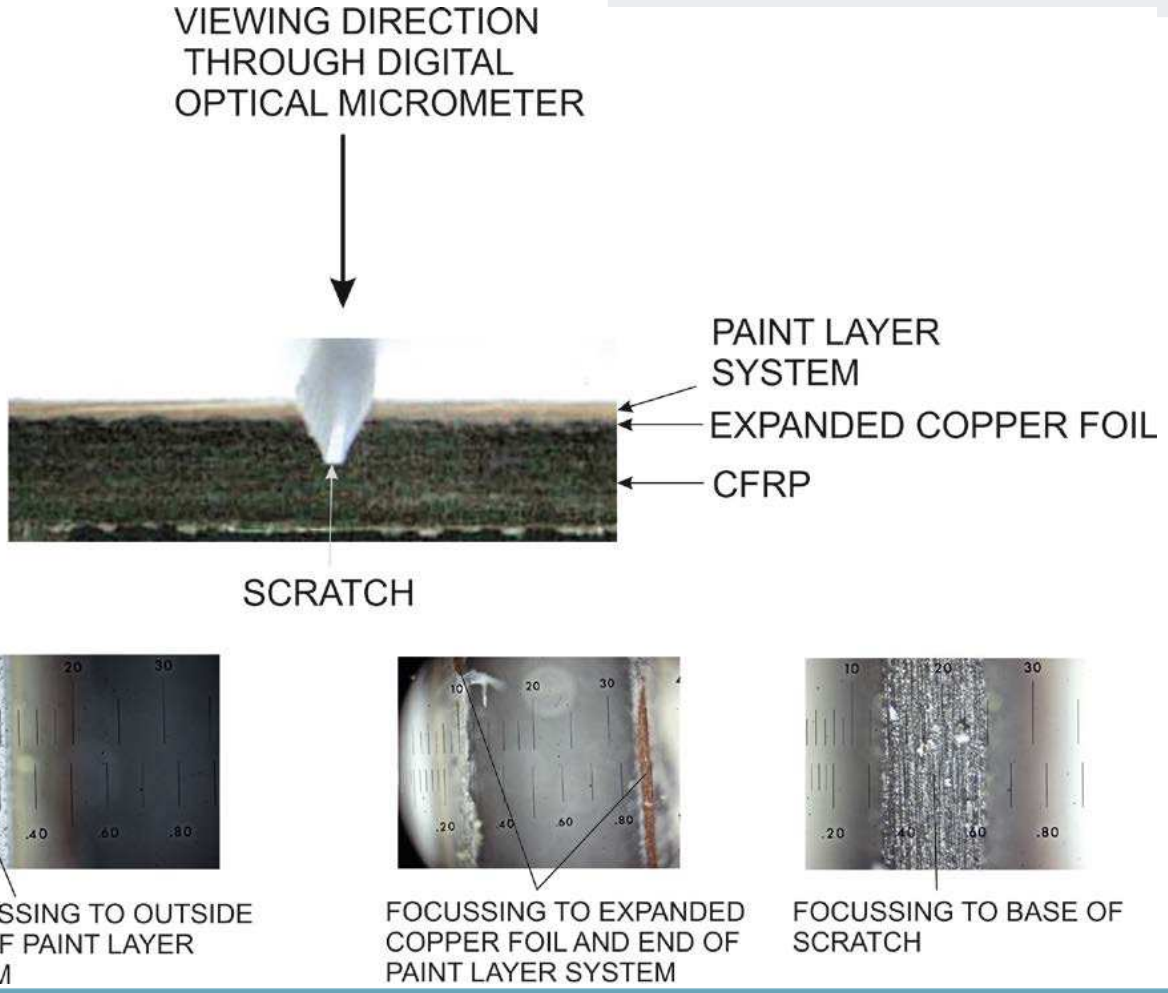
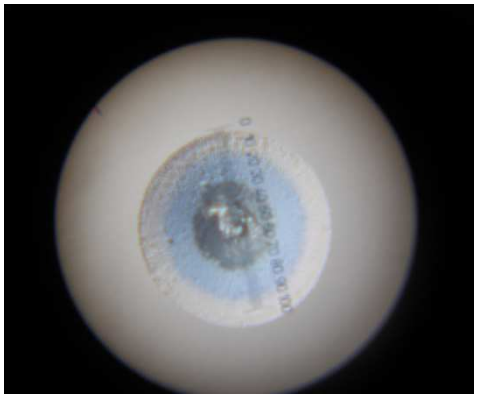
A350 ANDT procedures for Non-NDT specialists
Scratch Depth measurement



ANDT 51-93-30

A350 ANDT procedures for Non-NDT specialists
Paint thickness assessment

- **Paint borer**



ANDT 51-93-4x candidate dedicated to radom

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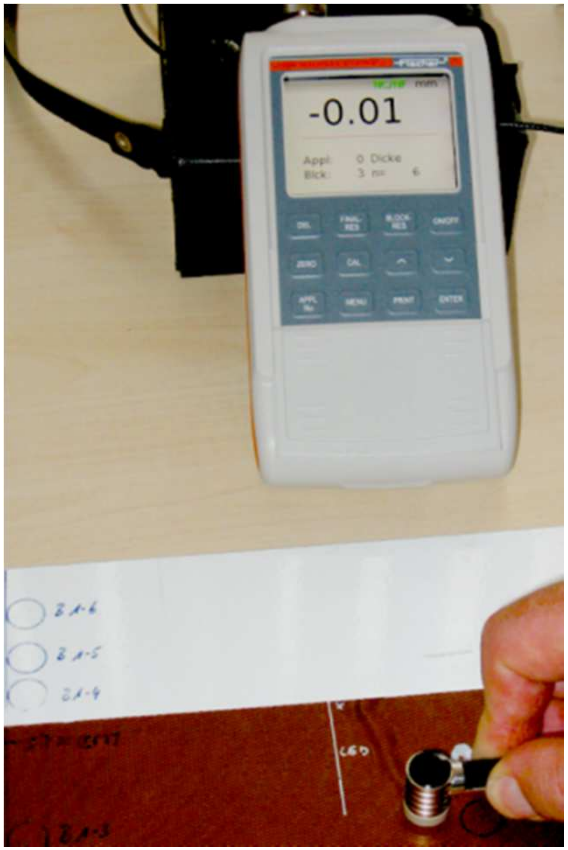
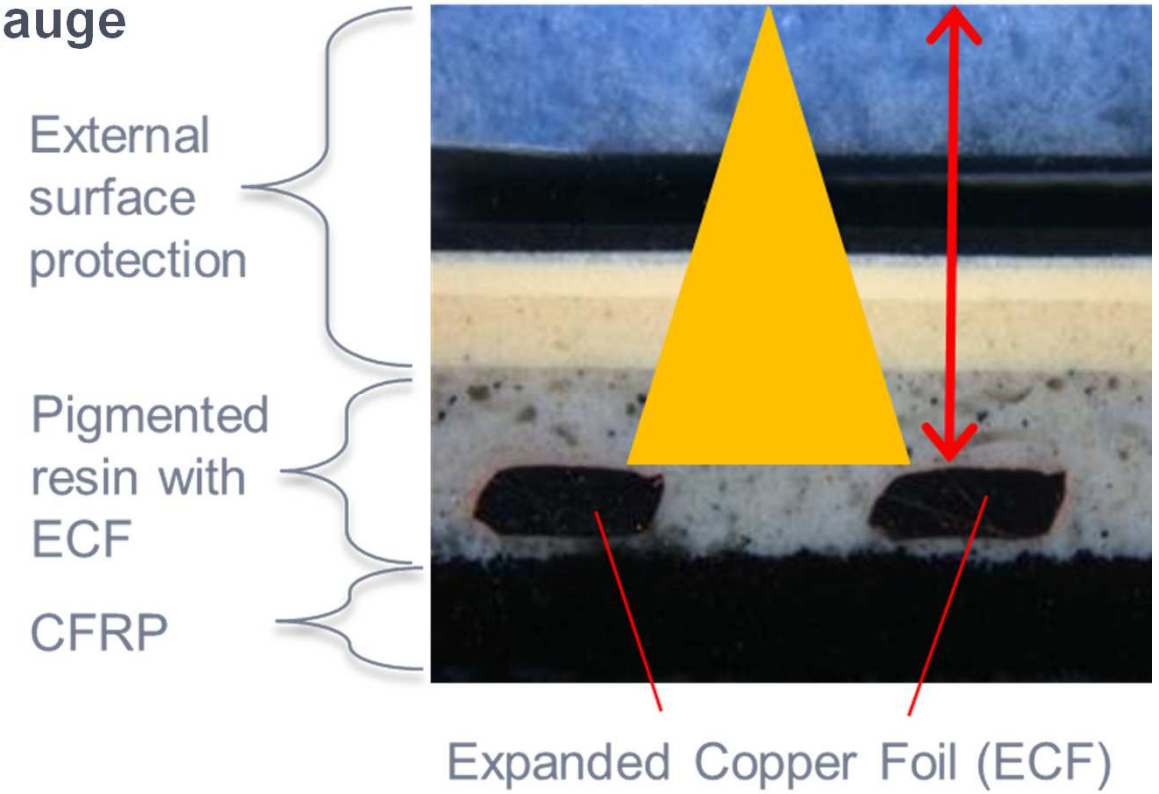
A350 ANDT procedures for Non-NDT specialists
Paint thickness assessment

- **Advanced Eddy current gauge**





ANDT 51-93-4x candidate after repair

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A350 ANDT procedures for Non-NDT specialists
Paint thickness assessment

- **Microwave solution**

Microwave is applicable on ECF as well as on the CFRP substrate without ECF.

ANDT 51-93-4x candidate dedicated to paint shop

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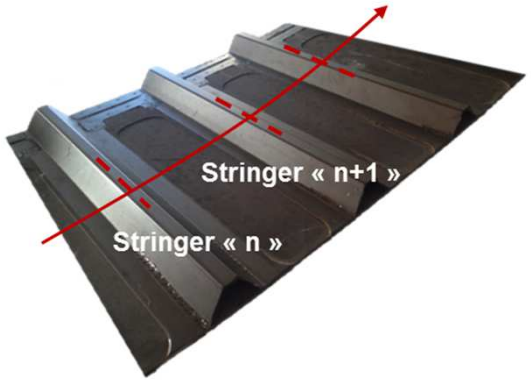
A350 ANDT procedures for Non-NDT specialists
Fuselage damage assessment

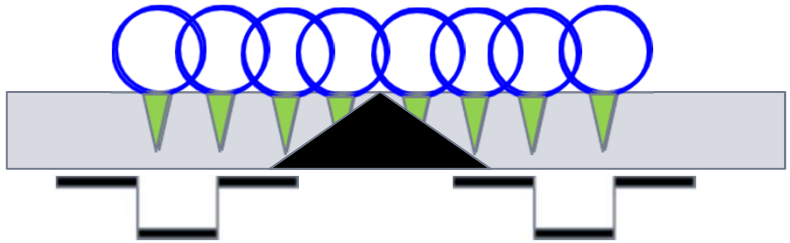
- **“Line tool” : In-service benefits**
  - Prevent flight delay and cancellation due to NDT personnel availability
  - Provide quick and reliable statement
  - Easy impact localisation for recording

- **“Line tool” : Functions**



A350 ANDT procedures for Non-NDT specialists
Fuselage damage assessment

- “Line tool” Airbus patent : Delamination detection function



A/C release

Need for NDT assessment

No calibration / No need for internal knowledge of the structure

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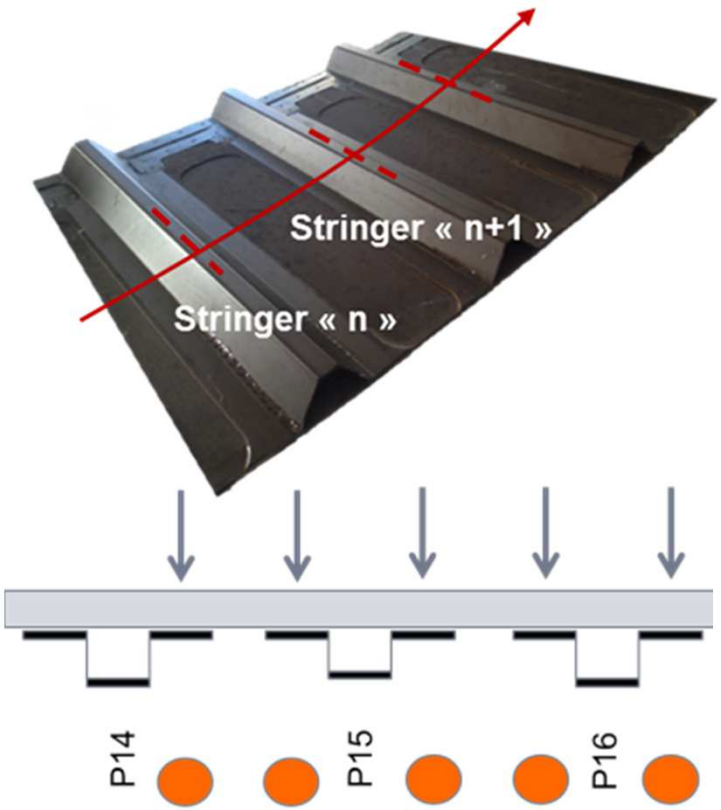
A350 ANDT procedures for Non-NDT specialists
Fuselage damage assessment

- "Line tool" Airbus patent : Stringer counting function



- Packaging
  - 600mm x 400mm x 200 mm
  - not exceed 8kg
- Design
  - For Airport usage
- Weather conditions
  - (-20℃/+55℃)
  - IP54 compliant.
- Stored
  - A/C cabin
  - cargo tempered conditions
- Battery
  - Autonomy 2H minimum
  - keep full as long as possible
  - fast charge on A/C

Useful to quickly identify stringer in the inspection area

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Conclusions:

- General procedures & methods ready at Entry Into Service
- New breakdown & Task numbering
- Dedicated chapter for Non NDT specialists
- Key tooling parameters to ease tool selection & alternatives
- NDT specialists to be trained/familiar with Utrasonic's Phased Array technology
- Line Tool is ready for Entry In-Service
- Airbus working on advanced solutions

THANK YOU