Assisted Diagnosis Solutions for Fast Decision Making

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Czech Society for NDT and European Federation for NDT in collaboration with GUARANT International will organize

11th European Conference on Non-Destructive Testing

October 6–10, 2014, Prague, Czech Republic
Company Profile

- **Core business:** worldwide NDT (Non-Destructive Testing) services & solutions, mostly for the Aerospace market
- **Shareholder:** AIRBUS GROUP company
- **Locations:** France, Germany, Mexico, Russia, Singapore, South Africa, Spain, UK
- **More than 20 years** of experience
- **Activities:** training, inspections (in service & manufacturing), consultancy, engineering & products
- **Approvals:** COSAC, EN4179, NAS 410, EN 9100 – ISO 9001-2000, EASA, FAA PART 145, CESSNA
Contents

1. Context
2. Possible Improvements
3. Smart NDT tools’ Characteristics
4. Assisted Diagnosis
5. Conclusions & Continuation
1.1. **Standards** about operators’ certification: **EN4179 / NAS410**

<table>
<thead>
<tr>
<th>Certif. level</th>
<th>Training</th>
<th>Experience</th>
<th>French certificates (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT₁, ET₁ or RT₁</td>
<td>40 hours</td>
<td>400 hours</td>
<td>1404</td>
</tr>
<tr>
<td>UT₂, ET₂ or RT₂</td>
<td>80 hours</td>
<td>1600 hours</td>
<td>2599</td>
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</table>

Two **special cases**:

- Direct readout instruments (e.g. thickness gauges, conductivity measurements, etc.)
- Level 1-Limited

### Certification Table

<table>
<thead>
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<th>Certif. Level</th>
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<tbody>
<tr>
<td>UT₁L, ET₁L or RT₁L</td>
<td>10 hours (25%)</td>
<td>40 hours</td>
<td>?</td>
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1. Context

1.2. Lack of Inspectors
- Limited number of courses and graduations in NDT
- Long duration to get required experience
- High age of inspectors in average

1.3. Resulting Production Ranges
- Most of NDT operations are final checks (when components have the highest added value)
- Few intermediary NDT operations along the manufacturing process

1.4. NDT perceived as an Extra-Cost
Though it actually increases the products value, so that they are delivered in conformity with the quality requirements
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2. Possible Improvements

2.1. **Direct Readout Instruments**

- Display measurements in dimensional or electrical units either as digital readout or an analog display
- Do not require special skills or knowledge to set up the instrument

2.2. **Level 1-Limited**

- Employer certification level
- Exam: 10 + 8 questions (against 40 + 30 for Levels 1 & 2)
- Validity: 1 year (against 5 for Levels 1 & 2)

These two drivers led us to develop a new generation of instruments:

**Smart NDT tools**
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3. Smart NDT tools’ Characteristics

3.0. What **Smart NDT tools** are?

- ‘Containers’: NDT instruments developed & patented by AIRBUS Group Innovations, industrialized & distributed by Testia / NDT EXPERT. **USB Peripherals**, powered & driven by any PC or tablet running with Windows

- ‘Contents’: software suite incl. **assisted diagnosis** modules dedicated to **aerospace applications**, for experts or beginners

3.1. **Packaging for rough environments**

**Smart** UE1 Max

UT + ET + Resonance

**Full HD 1920 x 1200**

**Smart** U32 Max

UT + UTPA
3. Smart NDT tools’ Characteristics

3.2. **Evolutivity** boosted by

- Growing computation capacities of standard PC (USB peripherals)
- Open programming of the firmware
- Compact packaging

**Video**

Standard PC for process monitoring

Industrial rackable PC for scanning machines
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4. Assisted Diagnosis

4.1. Drilling of Laminates

- Hole #
- Planarity
- Coupling
- Diagnosis
- Fracture?

Hole number: 1; Diameter: 4.80 mm; Thickness: 4.15 mm; Position: X:150 Y:30

Delay lines
4. Assisted Diagnosis

4.2. Detection of Delaminations + Stringer Counting

The “Line Tool” is a challenging project to:

- Provide B1 mechanics with an easy-to-use means to perform the inspection of visual damages on A350XWB composite fuselage.
- Allow B1 mechanics to release A/C when no delamination is found on the fuselage skin.

Courtesy of AIRBUS
4. Assisted Diagnosis

4.3. Indications Sizing

“Trick”: running as an invisible task
4.4. **Thickness Grid Measurements** speed-up after blending corroded areas

Currently: 5 hours

"Trick": running as an invisible task

Alternative: 10 min.
Several solutions were developed to assist operators in the diagnosis phase, and release faster components in manufacturing plants and aircrafts in maintenance:

- Detection of delaminations around drilled holes
- Detection & sizing of damages after impacts
- Thickness measurements after blending or machining

These solutions are available on the Smart NDT tools, which are designed to respond to industry problems, mostly in the aerospace sector:

- Lack of certified inspectors,
- Human factor affecting inspections reliability,
- Use of UT1-L and ET1-L operators for simple inspections after each manufacturing step (in addition to final NDT performed by experts) to repair or reject bad components as soon as possible
Upcoming software applications with Smart NDT tools

- Cracks removal: detection of loss of Al cladding on metallic fuselage
- Corrosion: automatic sizing of affected surfaces
- Drilling in laminates: automatic sizing of delaminations…

Other Progress Directions:

- Automatic sorting of components tested by machines (accepted vs rejected – see presentation during session 22 on Thursday)
- Geolocalisation
- Augmented reality
- Remote assistance with ‘OMA’…

Main Driver: to easy the work of inspectors…
• Many **thanks** to all the colleagues from AIRBUS Group who have been contributing to develop **Smart NDT tools**

• **Any question?**

• **Demonstrations**: come and visit us to the Booth B7 (Floor 3)

• **Contact**: products@testia.com
Thank you for your attention

www.testia.com