Automation of NDT In-Service: strategy & innovations
Engineering NDT In-Service Team

- Engineering NDT In-Service Team is a transnational team located in 4 sites close to the Design Offices
- Updated harmonized guidelines → Assimilation of NDT experience & lessons learnt of each member for team benefit
- Updated NTM preparation process → from the Request for Feasibility study up to the clearance of “camera-ready” procedures
- Main tasks
  - NTM General & Specific Procedures development
  - NDT for In-Service Technologies development
  - NDT Contributor to Customer Services organization
- (One of) Main challenge(s): knowledge management
Main NDT methods: Conventional ET & UT
Trend: growing PA UT & Visual SDI

LR & SA : Expected new procedures due to Extended Service Goal
Probable similar trend as of Nominal Service Goal

NOTE: All procedures, including general & specific procedures, alternative procedures and existing procedures for ESG and NEO variants
Conventional ET & UT predominant methods in time till A380
Probable similar trend in A380 & A350 (NTM manual in progress)

NOTE: All procedures, including general & specific procedures, alternative procedures and existing procedures for ESG and NEO variants
Strategy

Further develop conventional methods:
- ET
- UT

Develop & implement advanced technologies:
- ET
- UT

Explore and implement new applications:
- Visual
- X-Ray (e.g. DDA)
- Thermography

Develop assisted NDT technologies:
- Hardware & Software
- Linetool family
- Communication
- Data management
NDT AUTOMATION by AIRBUS

The use of methods for controlling NDT processes automatically, especially by electronically controlled systems, to allow NDT inspectors focusing on added-value tasks

- Automation Software
- Automation Hardware
- Collaboration
- Time optimization
- Knowledge management
- Decision making

Focus on NDT
NDT Automation

**AIRBUS & SUPPLIERS**
- Instruments
- Sensors

**ADVANCED NDT**
- Digital Detector Arrays
- Back-Scattering X-Ray
- Portable Tomography
- Smart NDT Tools Tools V2
- Data viewer/analyser
- Automatic sizing
- Localisation of damages
- Augmented reality applied to NDI

**CONVENTIONAL NDT**
- UT Phased-Array
- Wheelprobe
- Dolphicam
- ET Array
- Improved SRM Access
- Online Maintenance Assistance

**SOFTWARE**
- SMART NDT TOOLS
- DENTTOOL
- LINETOOL
- CLADTOOL

**APPLICATIONS**
- 3D printed Tools
- UT-excited Thermography
- SHM

**SUPPLIERS**
- Instruments
- Sensors

**NOTE:** Non-exhaustive list
NDT Automation Hardware & Software

Data viewer/ analyzer
Automatic sizing
Inspect & Acquire data

Open with analyzer
Automatic sizing

Web browser based
Cross-platform (Inc. Android & iOS)
Real-time shared “write-on-screen”
Inspection area + instrument
Voice & video
Cross NDT method

NDT Inspector
Operator

NDT Expert

Structure Expert

Validate Ref 1
Accurate location of damage on structure for further processing

Validate Ref 2

Localisation of damages
Reference & triangulation of location

Structure Expert

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## NDT Automation Hardware & Software

<table>
<thead>
<tr>
<th>Linetool</th>
<th>Cladtool</th>
<th>Structural Health Monitoring</th>
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</thead>
<tbody>
<tr>
<td>Impact Damage Detection</td>
<td>Clad removal detection</td>
<td>• Scheduled SHM</td>
</tr>
<tr>
<td>UT PA</td>
<td>Eddy current</td>
<td>• Fast damage detection in daily common events</td>
</tr>
<tr>
<td>Wheelprobe</td>
<td>Embedded Diagnosis</td>
<td>• Damage detection in areas with scheduled inspection requirements and long/difficult accessibility tasks</td>
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</tbody>
</table>

### AirCOBOT
- Daily, transit / hangar visual inspections
- Inspection traceability
- Autonomous diagnosis
- Reliability, repeatability and safety improvement
- Faster visual inspection
- Day & Night
- Expandable
NDT Automation Scenarios

Airport “Look around”

Upper parts VISUAL inspection

Autonomous visual inspection of fuselage, wings, stabilizers and engines

Automatic report

DroNDT

AirCOBOT

Lower parts VISUAL INSPECTION

Ready for Flight

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NDT Automation Scenarios

Airport “NDT”

- e.g. AOG

Report ALL Info (Augmented Reality)

Further NDT needed

Damage confirmed & sized

NDT Needed

Report with Finding

Doubts cleared by NDT Expert

NDT Report issued

Automatic localization (Augmented Reality)

Online SRM Access

Ready for Flight

NDT Report issued

Doubts cleared by NDT Expert
NDT Automation Scenarios

Scheduled NDT in Hangar (e.g. MRO)

- e.g. distributed maintenance

Remote-controlled climbing / crawling robot with wireless HD video camera and exchangeable NDT electronics

Upper parts HD visual inspection – Real time augmented reality

Moving robot with wireless HD video camera and exchangeable NDT electronics

DroNDT

Crawler

Moving robot
NDT Applications

One-side NDT Technologies

Back-Scattering X-Ray
NDT of metal & composite structures
Outer & inner structures
Minimum radiation

Portable Digital X-Ray
NDT of composite structures
Outer & inner structures

UT excited thermography
NDT of composite structures
Outer structures
Wrap-up

• Simple use of advanced technologies: KEEP IT SIMPLE
• Increase efficiency of inspectors: Focus skilled NDT inspectors on critical NDT steps
• Increase data availability for maintenance follow-up / decision making
• Adapt automation to each scenario & user
• Contribute to A/C availability & Maintenance schedule management
• Comply with requirements from Authorities
• Comply with Operators needs
Thank you for your attention

Airbus Engineering NDT In-Service