

Presented by

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## Infrared thermography and In Service applications

Appropriate qualification and certification for personnel.

- **INTRODUCTION**
- AIRBUS NTM APPLICATIONS
- OVERVIEW OF NDT CERTIFICATION STANDARD
- OBTAINING APPROVAL FOR PERSONNEL
- CONCLUSION

# INTRODUCTION

- Infrared thermography is being introduced as a routine NDT task in AIRBUS NTMs
  - ▶ Elevator & rudder structural inspection
- Some of the main NDT certification standards are not going deep into the detail about the infrared thermography method
  - ▶ Many operators raised the question to AIRBUS for advice on how to get appropriate qualification and certification for personnel

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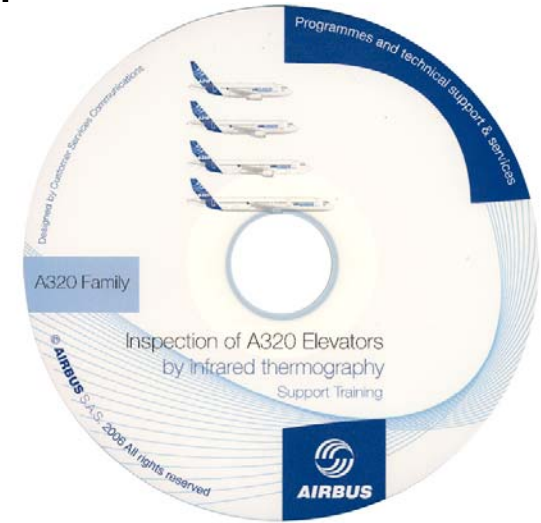
# AIRBUS NTM applications

## Why thermography methods apply to sandwich parts ? (elevator, rudder)

- ▶ Capable of detecting low quantities of entrapped fluid compared to the liquid crystal method
  - With infrared thermography a quantity as low as 10% in water filled cells can be detected
- ▶ Quicker and easier than x-ray
  - For example, time needed for inspecting the entire surface of an A320 elevator is around 2 to 4 hours (would be 2 working shifts with X-Ray)

# AIRBUS NTM applications

- In order to assist the operators, AIRBUS provides a dedicated training course (3 to 4\* days):
  - ▶ 1 day academic :
    - infrared radiation basic principle
    - Layout of the structure to be inspected
  - ▶ 2 to 3 days practical works :
    - Practice on real parts & samples
- The tooling (camera & monitor, blankets, controller ...) can be loaned from AIRBUS spares (Heavy Maintenance Desk)
- Also Airbus provide In Service inspection services thru the Working Party department (Part 145 approved)




*\*duration depends on the number of heating methods (e.g., for elevators inspection with blanket, oven, fridge )*

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# Overview of NDT certification standard

- EN 4179/NAS410\* gives the requirements for the five commonly established methods  
(UT, ET, PT, RT, MT)
- EN4179/NAS 410 suggested for methods like infrared thermography, to use as a guideline the requirements of the established methods (training hours, work experience, examination conditions)

EUROPEAN STANDARD	EN 4179
NORME EUROPÉENNE	
EUROPÄISCHE NORM	December 2005
ICS 49.020	Supersedes EN 4179:2000
English Version	
Aerospace series - Qualification and approval of personnel for non-destructive testing	
Série aérospatiale - Qualification et agrément du personnel pour les contrôles non destructifs	Luft- und Raumfahrt - Qualifikation und Zulassung des Personals für zerstörungsfreie Prüfungen
This European Standard was approved by CEN on 30 September 2005.	
CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.	
This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.	
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\* EN4179:2005 is technically equivalent to NAS 410 Revision 2

# Overview of NDT certification standard

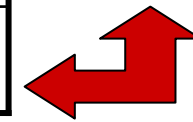
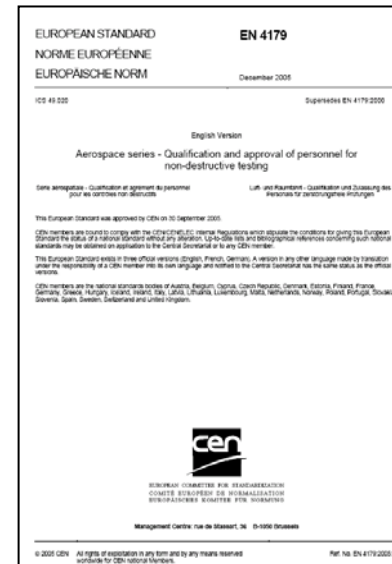
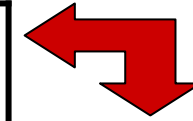
- It is therefore –reasonably- possible to take for thermography the requirements from UT , ET, or RT

Method	Level 1	Level 2 (with level 1 experience)
ET,UT, RT	40	40

Minimum formal training requirement (hours) for levels 1 and 2

Method	Level 1	Level 2 (with level 1 experience)
ET,UT, RT	400	1200

Minimum experience requirement (hours) for levels 1 and 2



# Overview of NDT certification standard

- What about the others standard ?
  - ▶ Examples:
    - ATA 105 also only partially addresses the thermography method
    - SNT-TC-1A covers in more detail the infrared thermography (numbers of question, content of the training, ...)
  - ▶ FAA has published advisory circular and memo
    - AC 65-31A
    - AIR 200 Best Practices

# Overview of NDT certification standard

## Some definition from EN4179/NAS410

- **Qualification** : the skill, training, knowledge, experience and when applicable the visual acuity required for personnel to properly perform to a particular level.
- **Certification** : a written statement by an employer that an individual has met the applicable requirements of this standard
- **Outside agency** : an independent or national body providing training and examination of NDT personnel [...]
- **National aerospace NDT board (NANDTB)** : an independent organization [...] recognized by the nation regulatory agencies to provide or support NDT qualification and examination [...]
- **Written practice** : a procedure that describes the control and administration of NDT personnel qualification and certification.



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# Obtaining approval for personnel

- One of the frequently asked question is :

*could Airbus certify the NDT personnel in thermography  
or in other words*

*are the Airbus training certificate valid as NDT  
certification.*

- **Answer** : In fact Airbus training course can be used as justification of course completion - *training is ONLY one step in the process for qualification of personnel -*

**Therefore the AIRBUS training certificate is not in itself evidence of NDT certification.**

# Obtaining approval for personnel

## Solution example n°1 :

Background : the certification rules applicable to the operator is based on third party certification (responsibility under both employer and the **NANDTB**)

Issue 1: to get a level 2 in thermography is too lengthy (around a year) to fit in with the maintenance scheduling. Airbus currently recommends this operator to obtain a level 1 limited certification for their staff for elevators application.

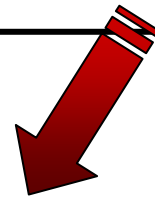
# Obtaining approval for personnel

Example n°1

AIRBUS training fulfils the requirement of EN4179/NAS410 in term of minimum training hours for a level 1 limited



Method	Level 1	Level 2 (with level 1 experience)
ET,UT, RT	40	40



EN4179 requirement regarding the formal training hours for a level 1 limited is 25% of requirement hours for a level 1:

$$25\%(40 \text{ hours}) = 10 \text{ hours}$$

**Airbus course duration (3 days # 24 hours) exceeds the requirements from EN 4179**

Issue 2 : level 1 limited is not addressed (but not forbidden) by the operator NANDTB rules, therefore it is not possible to get a level 1 limited.

- The operator discussed with their Authorities based on our proposal to use a level 1 limited scheme, setup with an **outside agency** for a formal examination.
- To complete the qualification of their personnel (to gain experience), the involved staff participated in several inspections performed by Airbus Working Party.
- The operator updated their **written practice** to document the use of level 1 limited for infrared thermography applicable to AIRBUS NTM elevator inspection.

# Obtaining approval for personnel

## Solution example n°2 :

Issue : to get a certified level 1 or 2 in thermography is too lengthy to fit with the maintenance schedule of this MRO.

Airbus invited local Authority of this MRO to attend as observer on the training course.

The stipulations of PART145 appendix II AMC\* 145. A.30 (f) and the training course are sufficient to demonstrate competence to perform the task, provided staff used the same equipment as the one demonstrated during the training.

\*AMC : Alternative means of compliance

# Obtaining approval for personnel

Example n°2

To complete the qualification of their personnel (to gain experience), the involved staff participated in several inspections performed by an other MRO.

The MRO updated their **written practice** documenting the approval of their personnel for infrared thermography applicable to AIRBUS NTM elevator inspection.

# Obtaining approval for personnel

## Solution example n°3:

- Background : This operator already has some certified level 2 in thermography
- Issue : The operator wanted those personnel to be familiarize to the A300-600 rudder inspection procedure.
- A one day “on the job training” has been organized by AIRBUS to brief and demonstrate to their thermography level 2 personnel, the inspection procedure.

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# Conclusion

- The way to obtain approval for personnel for a non standard –*non established*- method is not unique:
  - ▶ It depends on the certification standard applicable to the operator
  - ▶ It is a requirement to setup a discussion between Airline/MRO and their authorities on this topic
  - ▶ In the frame of EN 4179/NAS 410 the use of level 1 limited should be consider to initiate a certification process
  - ▶ Of course vision examination must be valid
- Whatever the consensus there is a need to document the solution into the **written practice**

# Conclusion

AIRBUS is supporting the Airlines/MRO in their maintenance with :

- ▶ Dedicated training course (free of charge)
- ▶ Tooling available on loan at Airbus spares department
- ▶ Inspection services (thru Working Party), where the Airline/MRO gain work experience on the method with Airbus team

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