



Additive Manufacturing for Aerospace

NANDTB/30 policy for 3D non-film Update

James Willcocks

01 October 2024

This information is provided by Rolls-Royce in good faith based upon the latest information available to it; no warranty or representation is given; no contractual or other binding commitment is implied.



Contents

1 – Overview of NANDTB/30

2 – Minimum Requirements for
Personnel Approval in 3DNF

3 – Approval Process for Lead ATO

4 – Current Status of Personnel
Approval for Aerospace

5 – Future Work

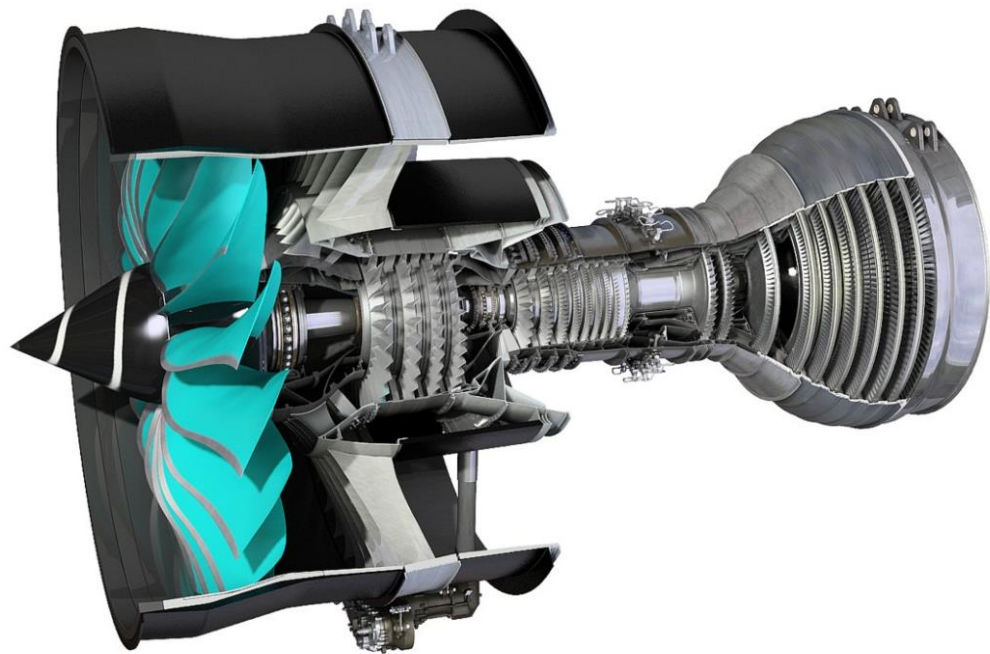


Image : © Rolls-Royce plc



Overview of NANDTB/30

- Airworthiness regulations have mandatory NDT Requirements (EN4179).
 - Externally qualified outside agencies
 - Approved Trainer / Examiner's
 - Internally qualified NDT Personnel
 - Approved internal Level 2 / Level 3 NDT inspectors
 - Company procedures for X-ray CT
- Previously no personnel approval route for X-ray CT.



Image : © Rolls-Royce plc



Overview of NANDTB/30

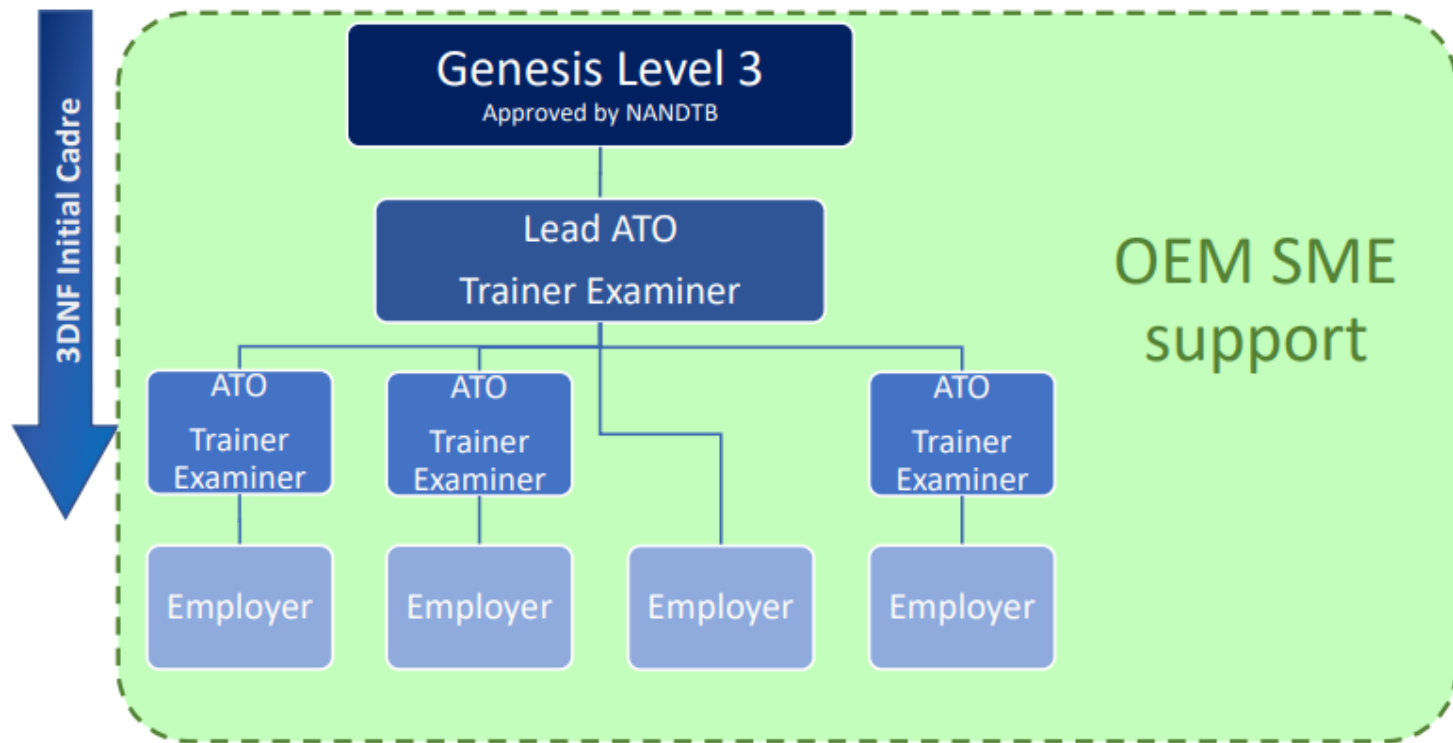
- National Aerospace NDT Board (NANDTB) is an independent national aerospace body chartered by aerospace prime contractors and recognised by the CAA.
- NANDTB/30 working group and Policy created to establish approval requirements of Internal / External NDT Personnel.
- X-ray CT (3D Non-Film) will be a sub-technique within Digital Radiography Approval.
 - Initially only read-across from Digital Radiography Approval.
 - Approval requirements for X-ray CT approval from other forms of RT now established
- Interim Policy expires Sep 2026
 - <https://www.bindt.org/NANDTB/UK-NANDTB-Documents/>



Image: © BINDT



Overview of NANDTB/30





Minimum Requirements for Personnel Approval

- **Direct qualification to Level 1 / 2 (with no previous qualification)**
- **Parallel qualification to Level 1 / 2 (with no previous qualification)**
In conjunction with a 2D Non-Film RT (2DNF RT) technique, e.g. Computed Radiography (CR), Digital Radiography (DR),
- **Supplementary qualification for Level 1 / 2 / 3**
Personnel previously qualified in a 2DNF RT sub-technique, eg CR, DR.
- **Supplementary qualification for Level 1 / 2 / 3**
Personnel previously qualified in the Film RT technique.
- *Note: The policy does not cover qualification for metrology applications.*



Minimum Requirements for Personnel Approval

- Appendix 1 to NANDTB/30: Computed Tomography Training and Qualification

DIRECT	Level 1 RT(CT) ONLY		Level 2 RT(CT) ONLY	
	Training	Experience	Training	Experience
None required	40	200	80	800

PARALLEL	Level 1 RT(CR/DR) + RT(CT)		Level 2 RT(CR/DR) + RT(CT)	
	Training	Experience	Training	Experience
None required	56 See Note 1	220 See Note 1	96 See Note 1	880 See Note 1

SUPPLEMENTARY	Level 1 adding RT(CT)		Level 2 adding RT(CT)		Level 3 adding RT(CT)	
	Training	Experience	Training	Experience	Training	Experience
RT 2DNF (CR/DR)	16	20	24	80	24	80
Film	32	40	48	200	48	200

- Note: CT-specific formal training hours shall be within 25% to 75% of the total*
- These are minimum requirements training / experience hours can be longer if needed*



Approval Process for Lead ATO

1 – General Training

Equivalent general experience e.g. CT Lectures.

(NANDTB/30 States Min 24 Hours classroom-based CT theory)

2 – Specific Training

16 Hours of related, blended classroom/practical training, delivered by OEM's / Genesis L3.

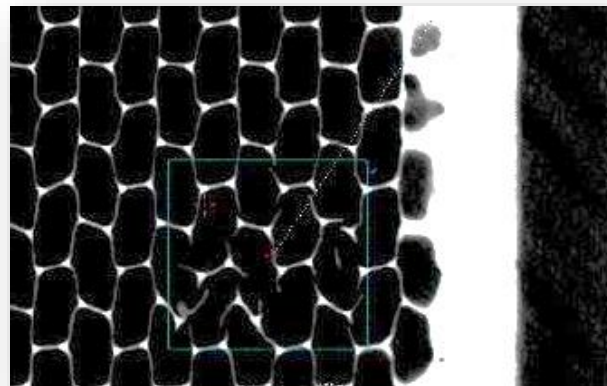
3 – Experience Hours

Min 80 Hours Practical Consolidation Training.

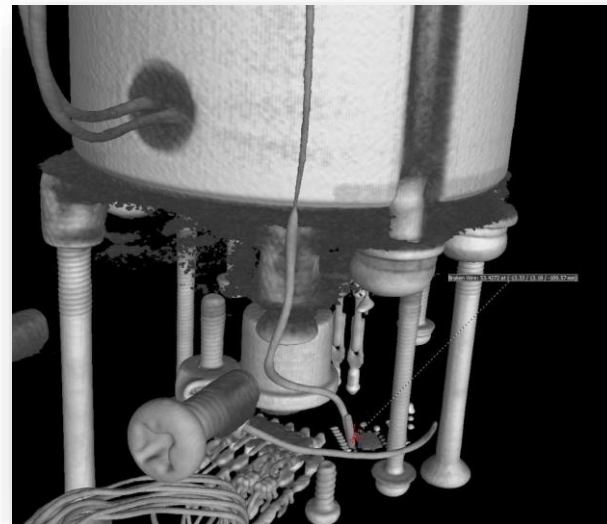
Completed Competency Matrix.

4 – Examinations

- 3DNF General Theory Exam (CT Principles)
- 3DNF Specific Theory Exam (CT Specifications)
- Practical Exam (Scanning and Acquisition, and Technique Setting)



Composite Sample ROI : © Rolls-Royce plc



3D Image of Motor : © Rolls-Royce plc



Approval Process for Lead ATO

Practical Examination – Scanning and Acquisition

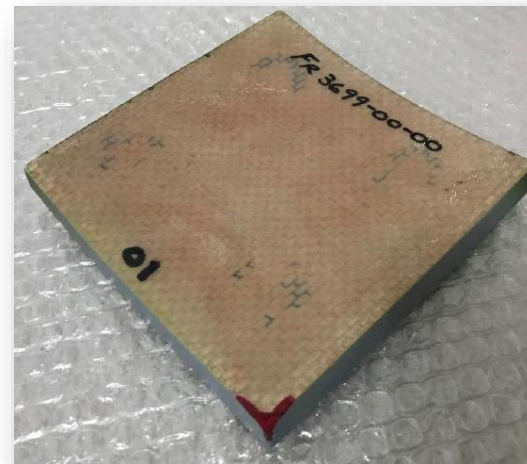
- **Scan 2 components in Accordance with Technique Instruction**
 - Sample 1 - Weld Component
 - Sample 2 - Composite Component

- **Section 1 – Test Specimen Processing**
 - Selection of Parameters
 - Component Set-Up

- **Section 2 – Process Control and Image Evaluation**
 - System Control Checks
 - Analysis and Reporting using Reporting Template



Weld Sample: © Rolls-Royce plc

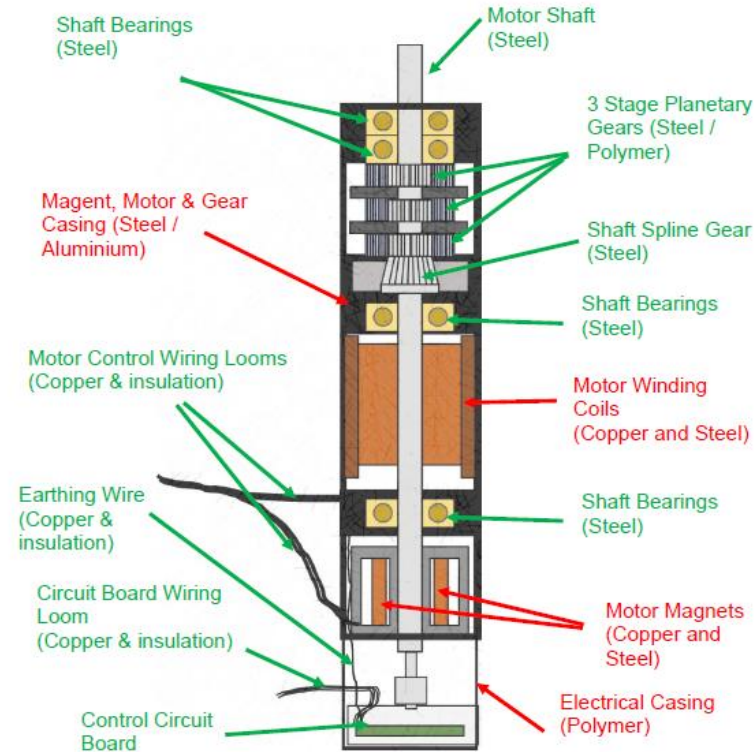


Composite Sample: © Rolls-Royce plc

Approval Process for Lead ATO

Practical Examination – Technique Setting

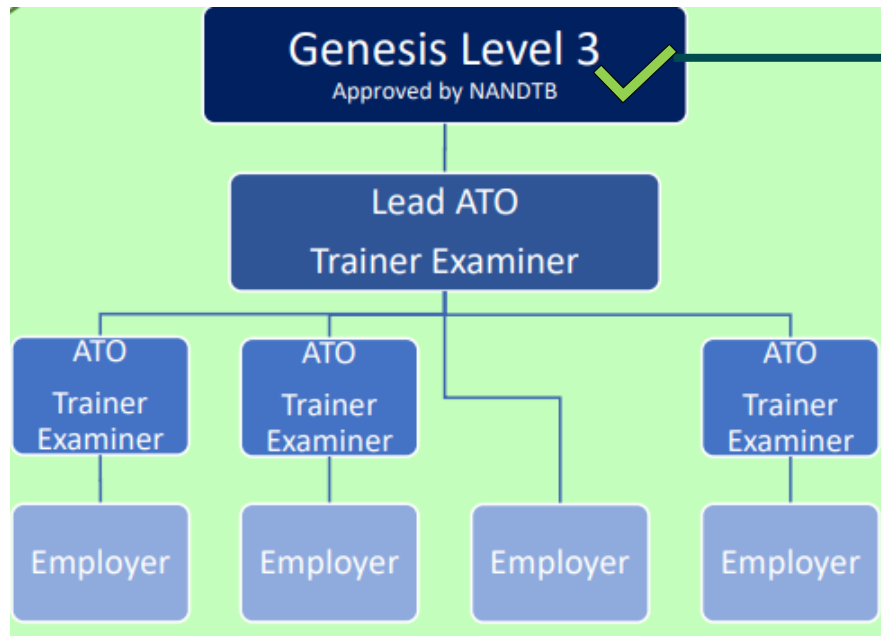
- **Create Technique Instruction for Motor assembly**
 - Devise scanning and Fixturing Method
 - Write Technique Instruction
 - Report findings in Reporting Template
- **Section 1 – Test Specimen Processing**
 - Selection of Parameters
 - Component Set-Up and Acquisition
- **Section 2 – Process Control and Image Evaluation**
 - System Control Checks
 - Analysis and reporting using reporting Template



Motor Schematic: © Rolls-Royce plc



Current Status of Personnel Approval in Aerospace

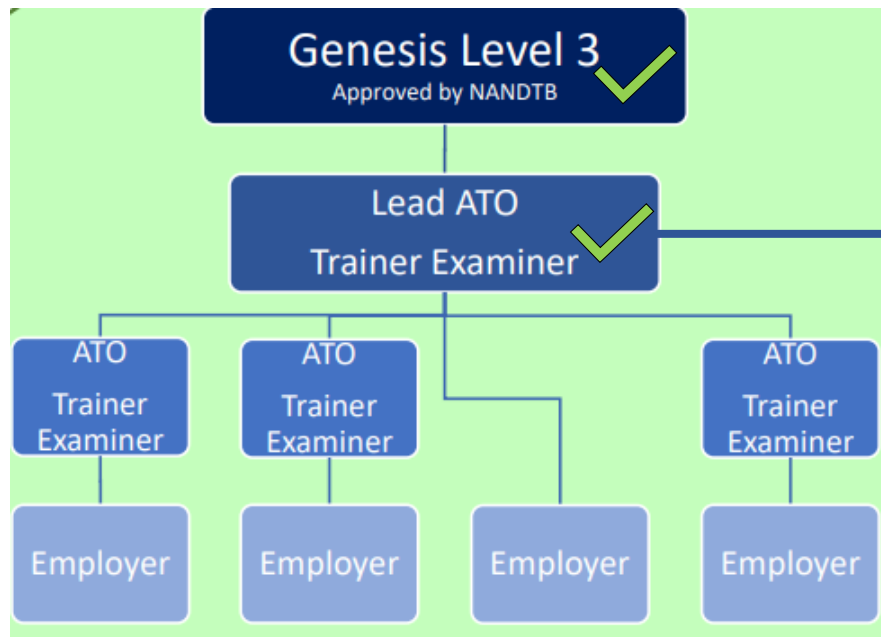


- James Willcocks (Rolls-Royce Plc.)
- Appointed by UK NANDTB as Aerospace Industry Genesis Level July 22.
- Enabled training and approval Lead ATO to begin.

3DNF RT qualification hierarchy © BINDT



Current Status of Personnel Approval in Aerospace

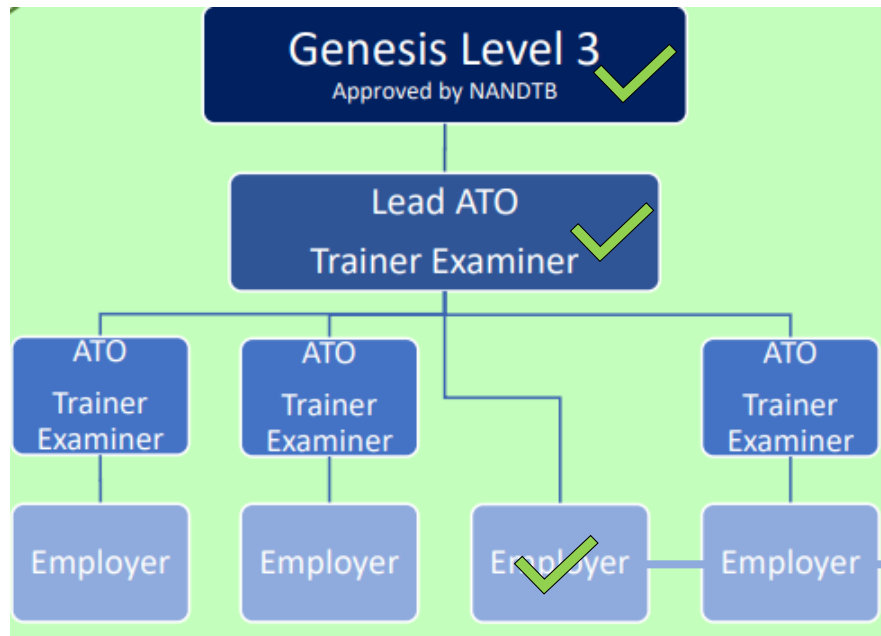


3DNF RT qualification hierarchy © BINDT

- David Blacklock (International School of Aerospace)
- Examined by Genesis Level 3.
- Approved by UK NANDTB October 23.
- Certification of employers could begin directly by Lead ATO.
- Other interested ATO's:
 - IMECHE
 - SWS NDT
 - Testia



Current Status of Personnel Approval in Aerospace



3DNF RT qualification hierarchy © BINDT

- 3 RAF 71 Squadron personnel certified
- 3 Rolls-Royce personnel certified
- 2 The Welding Institute personnel certified.
- Other interested employers:
 - BAE Systems
 - Intertek NDT



Future Work

- Additional employer certification directly by Lead ATO.
- Certification of interested ATO's by Lead ATO.
- Encourage other interested ATO's and employers to come onboard.
- Transition of WG/30 into steady state policy.
- Move group towards sharing of best practise and methods for CT once steady state reached.



Questions?