

# Aerospace Non-Destructive Testing for the UK Military

Presentation to Aerospace Testing Expo 2005

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# Scope of Presentation

- NDT Mission and Vision
- NDE Team Key Activities
- Team Organisation
- NDT Demonstrations
- The Future of NDT in the UK Military

# NDE Team

## Our Mission

To impart Intelligent Reasoning using Subject Matter Expertise in Aerospace Non-Destructive Testing within the UK Military

## Our Vision

Be the Recognised Military Centre of Excellence for Aerospace Non-Destructive Testing

# The Customer



# NDE Team Key Activities

The evaluation, development, introduction and support of Non Destructive Testing techniques and resources, and the provision of a deployable Non Destructive Testing and technique validation capability.



# Aircraft Integrity Monitoring & Equipment Support Team

- Equipment Repair & Calibration
  - NDT
  - Vibration Analysis
  - Rotor Track & Balance
  - Wear Debris Monitoring
- Depot Services



# Technique Development

- Develop, validate and issue inspection techniques in response to IPT requirements
  - Fixed Wing at RAF St Athan
  - Rotary Wing (Deployed Aircraft) at Gosport
- Subject Matter Experts for Tri-Service Topic 5Gs
- Close liaison between IPT, Design Authority (DA), Aircraft Integrity Monitoring (AIM) material specialists and QinetiQ failure analysts for optimum solution
- DA techniques validated and converted for in-Service application

# Technique Development Current Work

- VC10 Fatigue Type Record
- Tornado Life Extension Programme
- Jaguar- outer wing
- Canberra tailplane & teardown
- Nimrod-Lap Joint Mapping
- Merlin-Half hub and blades
- Lynx-Blade Inspection
- Tristar under-belly skin

# Training

## Tri-Service School of NDT

- Single focal point for Tri-Service NDT training

### Courses Provided

- NDT Technician
- NDT Operator
- NDT Appreciation



# Training

Accredited by the British Institute of NDT



# Equipment and Future Technologies

Provide advice and assistance to Defence Procurement Agency (DPA) Integrated Project Teams (IPTs) on all NDT issues for new and future aircraft.

- Typhoon
- Nimrod MRA4
- ASTOR
- Lynx 2
- A400M
- JSF

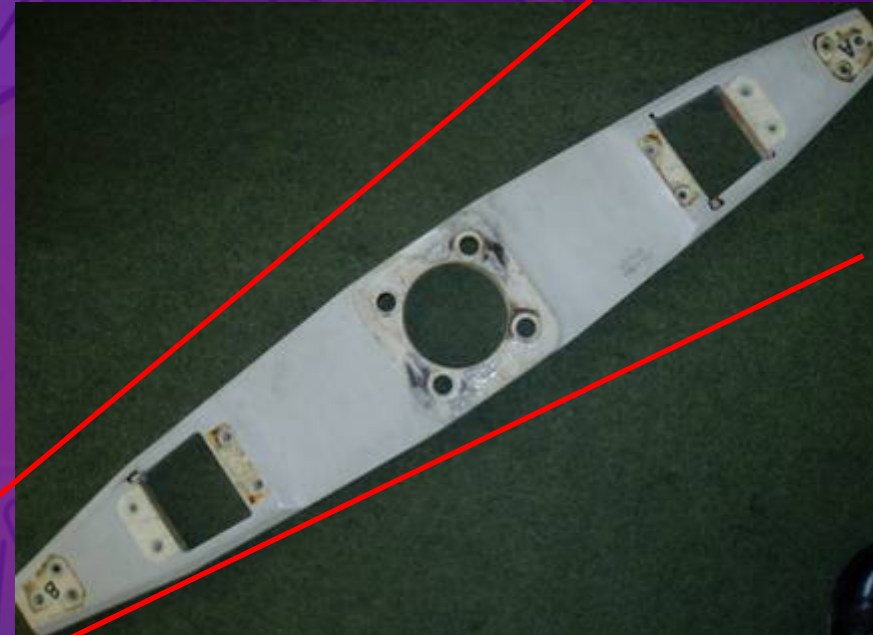


# Equipment Evaluation

- Support of In-Service NDT Equipment
- Evaluation of new equipment and advice during procurement
- Introduction into service of new equipment
- Technology/capability upgrades
- Novel Inspection challenges

# ONGOING INSPECTION CHALLENGES

## THE MERLIN HALF HUB



# Equipment Evaluation

## Primary Disciplines and In-Service Equipment:



- Visual Aids
- Penetrant Flaw Detection (PFD)
- Magnetic Particle
- Eddy Current
- Ultrasonics
- Radiography



# Equipment Evaluation



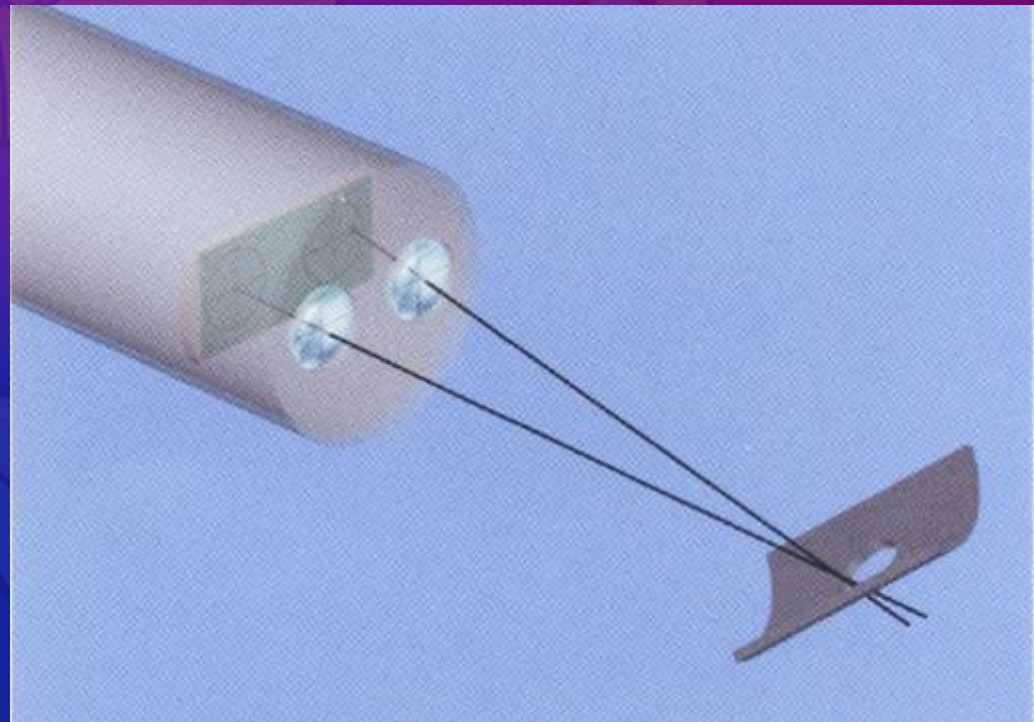
- Introduction into service of the new Switched Mode Advanced Radiation Technology 160E 1.5S. Portable x-ray set
- Introduction of new Radiographic Enclosures on a 2-year rolling programme



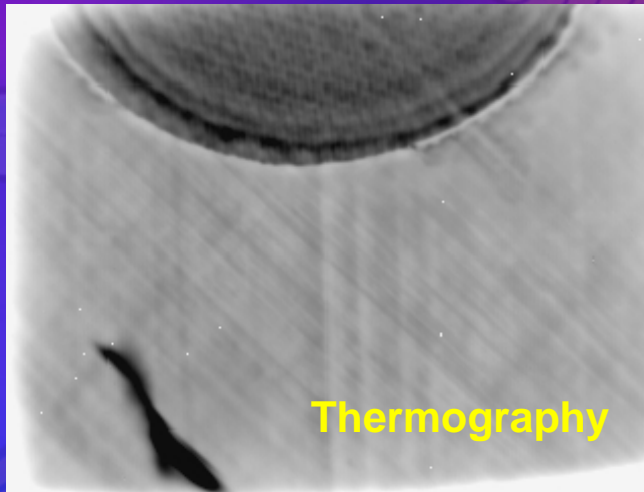
# Equipment Evaluation

## SAVING MONEY ON ENGINE CONCESSIONS

- Need to precisely quantify engine damage on Tornado F3 RB199 Engine
- In-service equipment unsuitable
- NDET tasked to produce a System Requirement Document & evaluate equipment



# Equipment Evaluation New Technology



Thermography



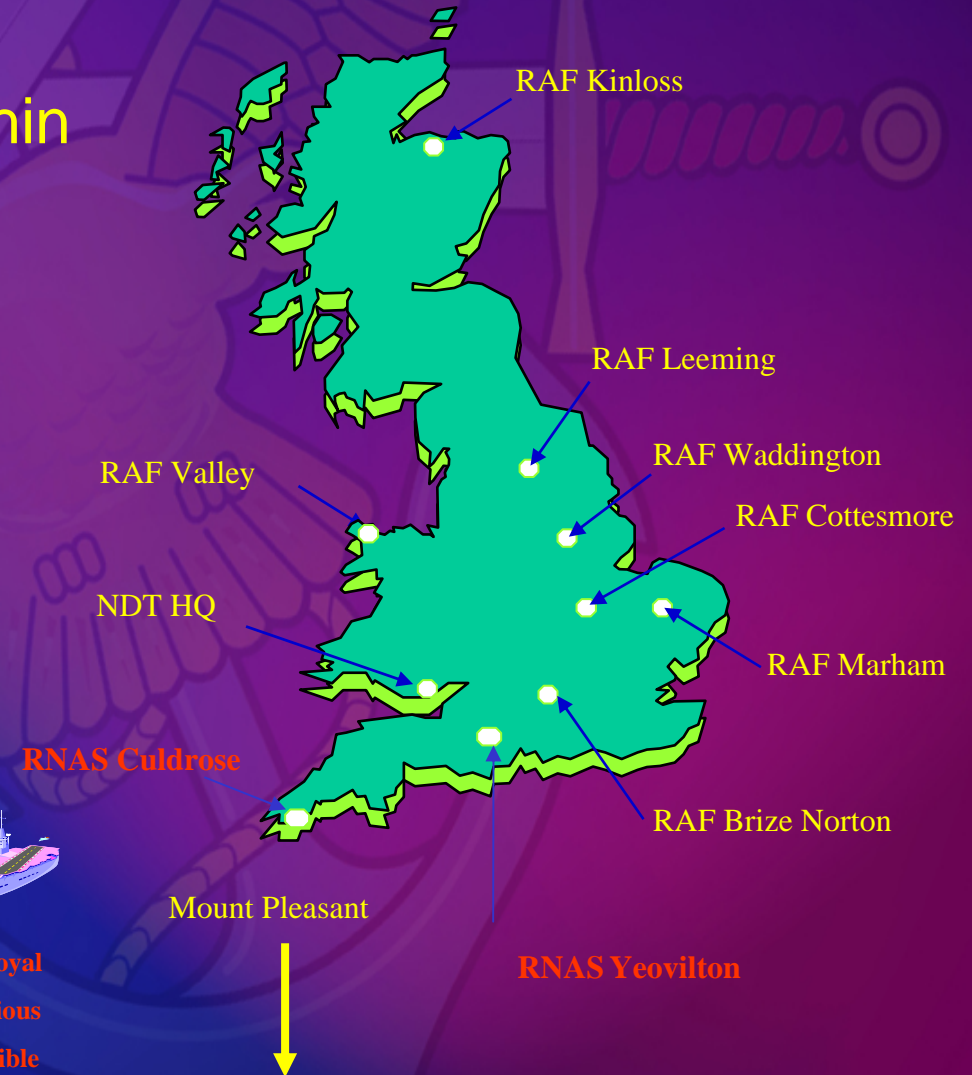
Digital X-Ray



Phased array probes

# Regional NDT Service

- Each Team covers Units within geographical area
- Locations & manpower matched to RAF & Army requirements
- REME personnel integrated into RNDTT at Marham
- Rapid response to tasks
- All recent Operations supported



## Research & Projects

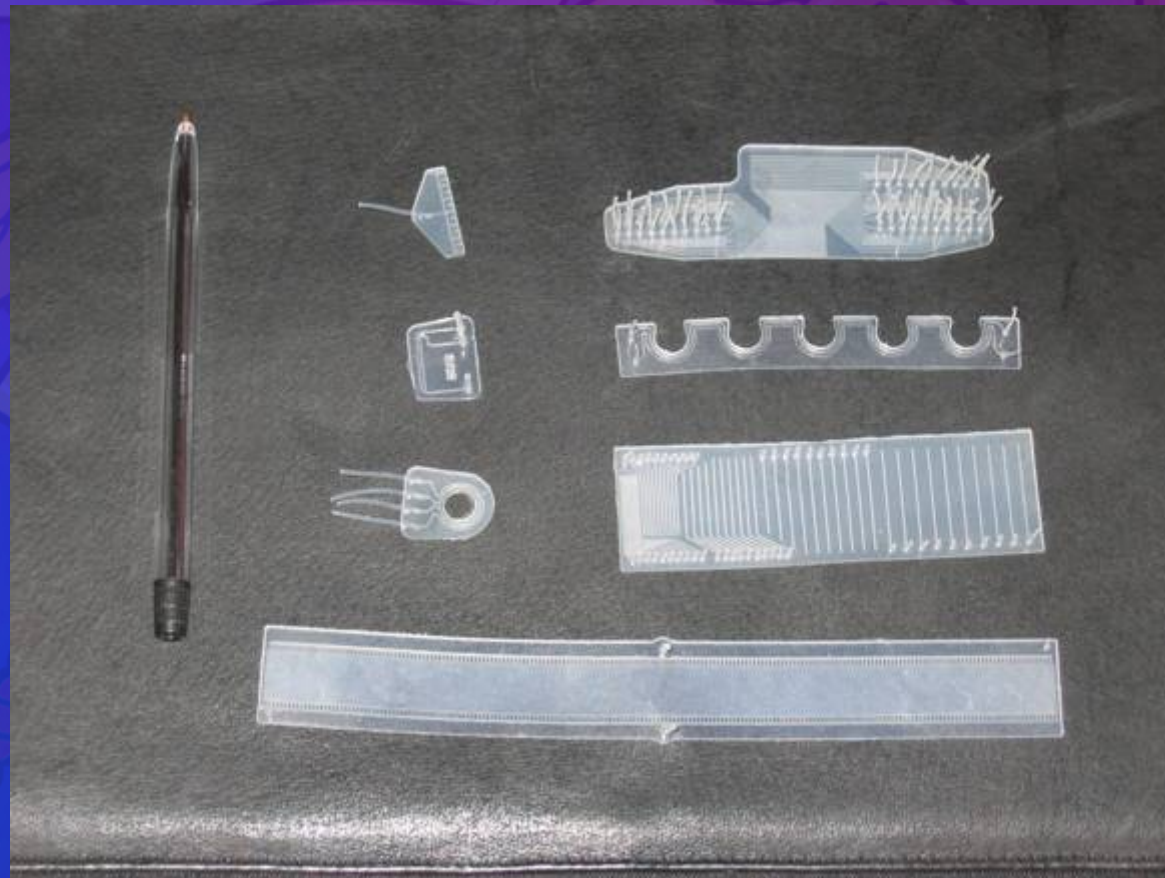
- Consolidate and support all current NDT technique development for the UK military air environment.
- Coordinate specific future NDT research and development projects to service those techniques used to meet the inspection requirements of all aircraft operated by the UK Military.

# Research and Projects

- Crack detection beyond the 2<sup>nd</sup> layer using pulsed eddy current technology
- Full Waveform Capture and Automated Analysis of large area scanning data
- Fault detection in composite honeycomb structures using low frequency vibration Membrane Resonance methods
- Embedded sensors to identify and monitor crack development

# Research and Projects

## Embedded Sensors



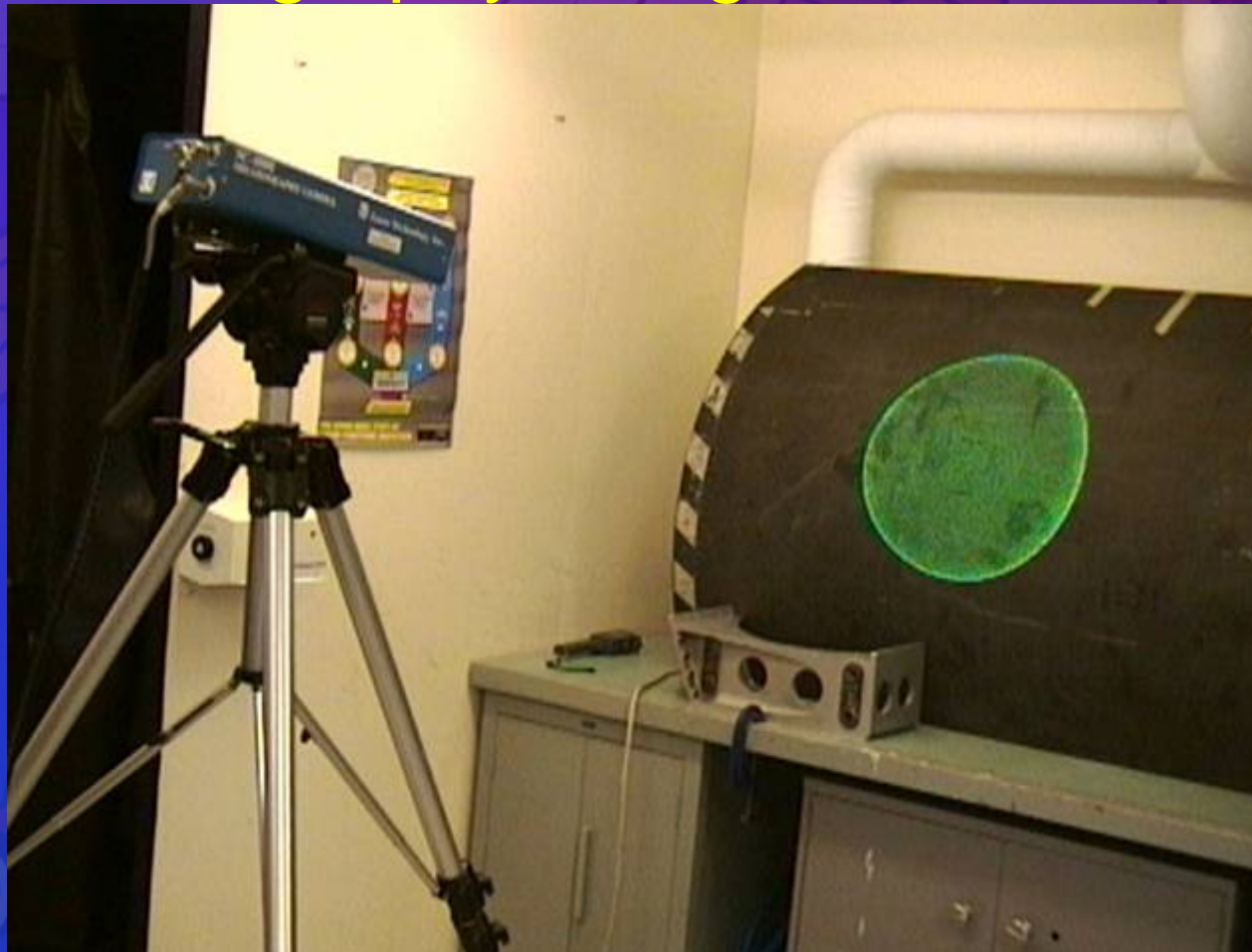
# NDT Demonstrations

## Area Scanning Ultrasonic Pulse/Echo Technique



# NDT Demonstrations

## Laser Shearography using Free Standing Laser



# NDT Demonstrations

## Laser Shearography using Vacuum Hood



# NDT Demonstrations

## Remote Viewing Aids

Rigid Endoprobes

Endoscope Camera

Stereo Measuring  
Systems

Snake Eye



# NDT Demonstrations

## Tap Testing on Composite Sandwich Structure



# Future Goals for Military Aerospace NDT

- Aim to improve capability:
  - Detection of small faults deep within structure
  - Detection beyond 2nd layer
  - Detection of faults around installed fasteners
  - Reduce ac prep requirements
  - Reduce inspection time
  - Automation
  - Condition Monitoring

# SUMMARY

- NDE Team deliver solutions and/or advice.
- NDT is a flexible and powerful tool in maintaining aerosystems structural integrity.
- A wide variety of techniques are available.
- Time, cost and reliability are the driving factors for the development of better NDT inspection systems.
- Aim of NDE Team by the application of NDT is to increase aircraft availability and thereby reduce the cost of ownership.



**NDT-WORTH THE TROUBLE?**

**North West Scotland**

**South West England**

**ASK THE AIRCREW!**

