



Aerospace Testing Symposium
September 2022



THE NDT OPERATOR OF 2050

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BAE Systems Air

My Career at a Glance

- 1999 – Started at British Aerospace Ltd
- 2005 – First level 2 approval
- 2013 – First Level 3 approval
- 2014 – Awarded Member Grade of the BINDT
- 2014 – Became Chair of Aero Forum
- 2016 – Appointed RL3 BAE Systems Air
- 2016 – Appointed voting member of UK NANDTB
- 2018 – Voted in as Chair of the UK NANDTB
- 2019 – Became Chair of Technical Committee & Joined BINDT Council
- 2021 - Appointed 'licensed Technologist' for Product Verification



BAe Hawk



Panavia
Tornado-ADV



Netma
Eurofighter
Typhoon



Lockheed Martin
F35 Lightning II

That's

Nearly **25** Years in

NDT!

THE NDT OPERATOR OF 2050

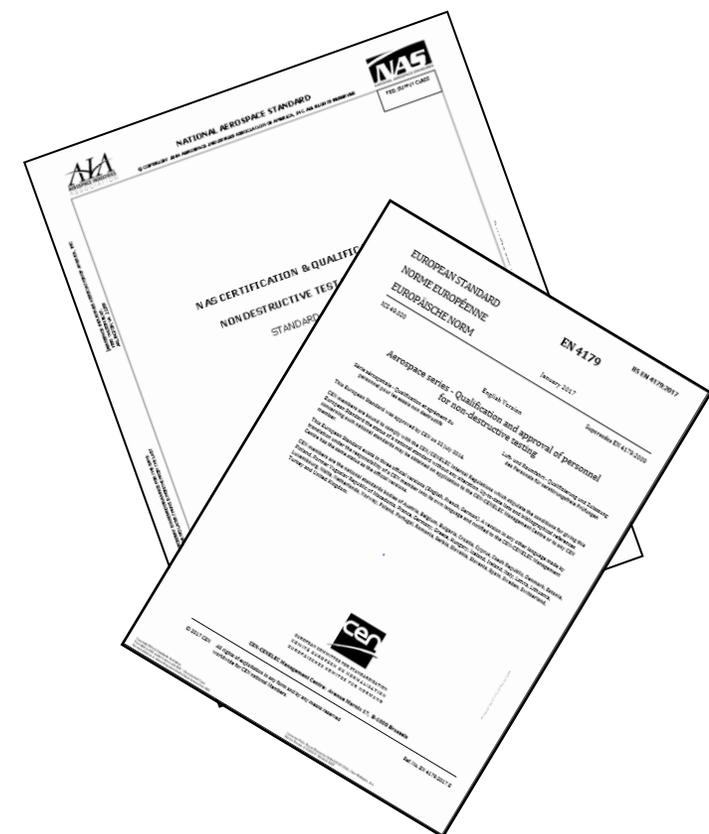
Factors that shape the roll



The Tool box of equipment and Technology



Training, Experience & Qualifications



Regulatory Constraints

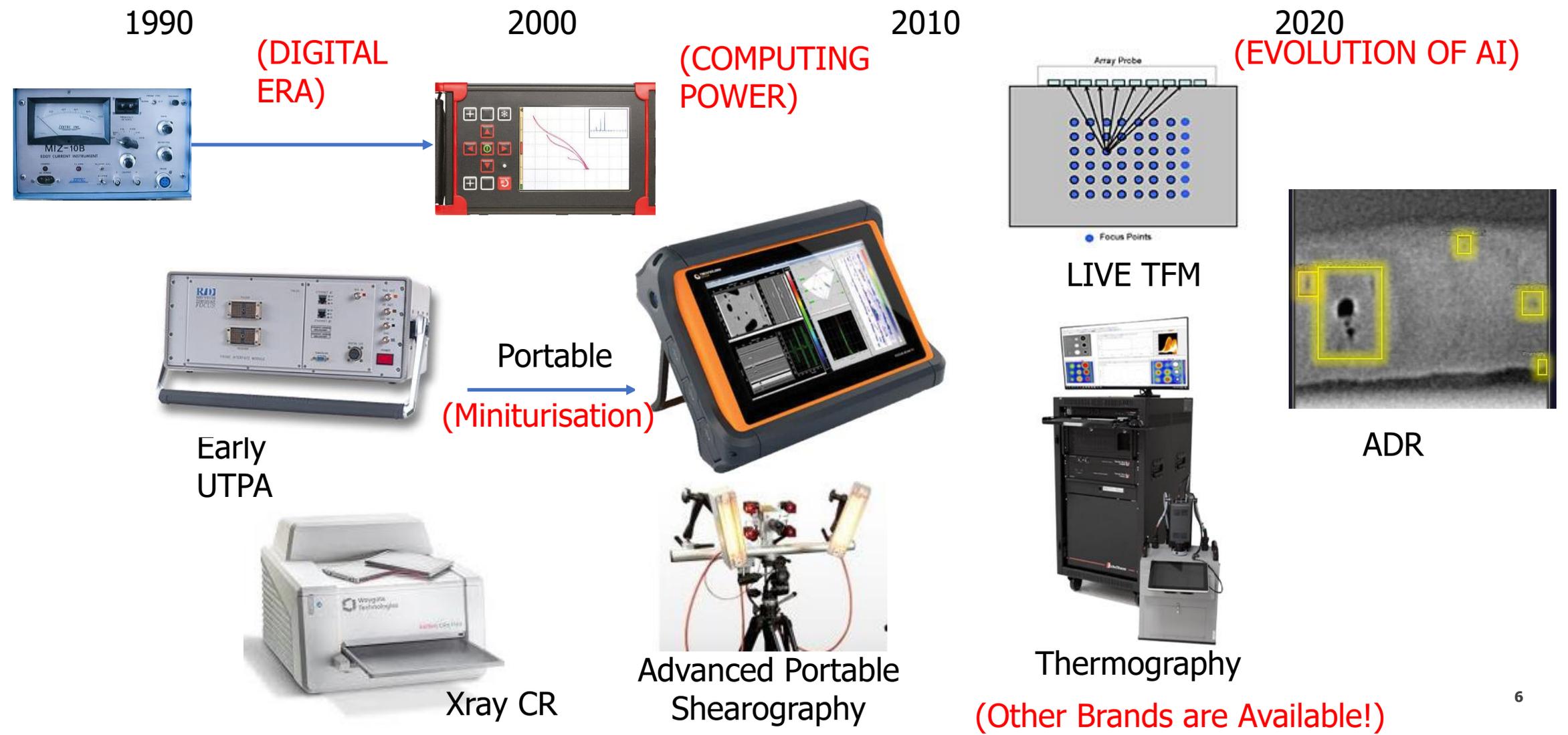
BACK IN THE DAY....

The Tool Box

- C-scans system had electrostatic paper to plot the scan and we had to do multiple scans on thick components.
- Eddy Current Sets had needles!
- Shearography and Digital Radiography were 'emerging' technologies in industry
- UT Contour following systems were just about becoming available commercially – but ran in DOS!
 For other curved surfaces we used a MOUSE!
- Portable sets were not very portable – remember the old B1!
- 1MB was still a big file! (memory cost £1/MB)
- Procedures stated that equipment had to warm up before use
- Flaw locations were captured on sheets of acetate overlaid on the structure.



Technology & Equipment Timeline



Back in the Day....

Training, Experience and Qualifications

- On the Job training was the most effective route to Qualification and learning the NDT 'Trade'
 - ANY Time spent on NDT counted for any method (1600 hrs for UT & RT)
 - Direct Level 3 approval was still allowed
- Formal Class room training was still mandated (80 hrs for UT & RT)
 - Content appropriate to the equipment of the day.
- Equipment we had was by all accounts fairly simple – Point & Shoot! And very visual based
- Technique development required lots of broken bits or bespoke test pieces to be made with a trial and error approach to develop settings.

Most data was acquired manually and Data was reviewed live by the inspector and in some cases the record of inspection was actually in 'hard copy'

Back in the Day....

Back in the Day to Now...

SO WHAT'S CHANGED?

Today.....the toolbox

Automation, Technology, Complexity

- The **systems** we have now are vastly **more complex** –
 - Complex contour following systems as opposed to the 2 axis flat scanners – 64 axis closed loop systems
 - Eddy Current arrays and impedance plane imaging
 - Magnetic cameras
- **Computing power** has greatly moved on
 - Faster data acquisition and data processing – real time FMC, 4D XCT – most phones today are more powerful than the PCs we had in 2000
- **Equipment** is far more **portable**
 - Battery technology, processors, touch screens etc.
- Equipment has **greater control** – remote in some instances
 - Remote visual inspection systems – RR have an on wing PFD inspection technique through a 8mm hole!
 - Drone based inspections (wind turbines)
 - Remote connected inspections allow data to be viewed offsite - live
- Equipment can even be installed for more **permanent monitoring**
 - Data we get is real time and logged, AI driven analysis to show early damage
 - Results fed into **simulation** programmes for better mapping and prediction of growth

Today....

Training, Experience & Qualifications

- OJT hours reduced (800 UT & RT) far more focus on quality of OJT and only applicable to one method
- Formal training more regulated.
 - More aligned/standardised training across the globe
 - Harmonised Standards
 - BINDT Apprenticeship scheme
 - RCNDE EngD programme
- Introduction of NADCAP, Aerospace Boards

The NDT Operator of 2050

So what will their role look like....

- **Higher educational requirements** will increase driven by the need to understand the technology we will need to use:
 - BINDT Apprenticeship scheme
 - RCNDE Graduates
- **Simulation** will play a significant part in the development, qualification and verification of inspection techniques.
- **In line & in-process inspection** data may replace or at least supplement post manufacture inspection – move to Product verification.
- **Digital twin** and use of advanced technology to detect onset of failure as oppose to detecting actual failure
- **Challenging** – coping with new exotic materials.
- **DATA** – data science will also influence our decisions
- Combination of **High and Low Integrity** techniques to balance data produced

The NDT Operator of 2050

So what will their role look like....

- I may not be around in 2050, but **many of you will be** and will help to shape what an NDT/Product Verification Engineer role may look like.
- Whether we will ever get to a point where we have
 - level 4 inspectors,
 - fully autonomous inspection and sentencing,
 - Ability to detect something breaking before its broken...

The tool box and available technology is going to be the dominating factor in shaping the NDT operator of the future, with methods/techniques that haven't been invented yet becoming 'common'

NDT Operator of 2050

So really I've got no idea!

But thanks for listening and I am sure together we will figure it out.