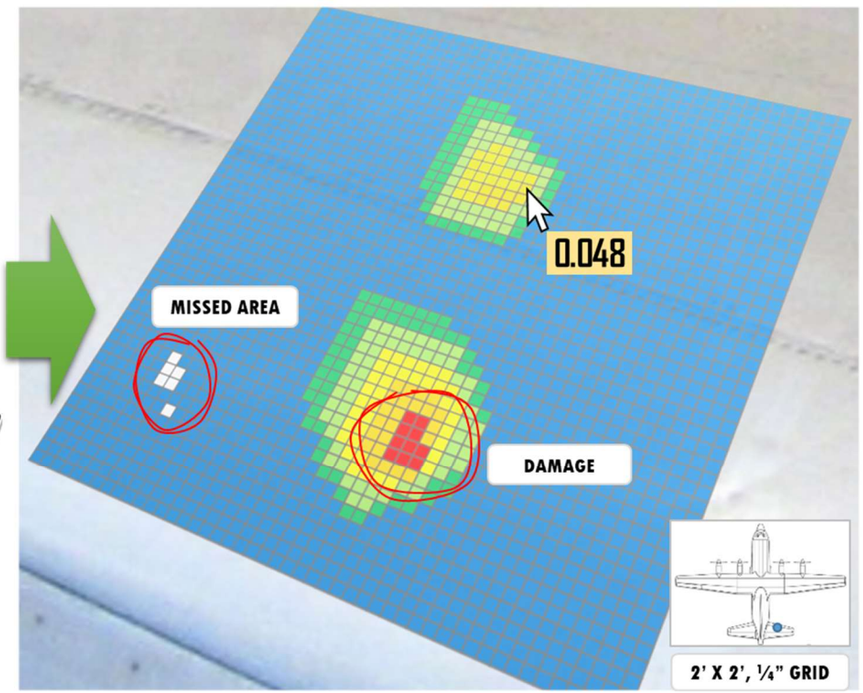
CYBERNET
AMPLIFYING HUMAN PERFORMANCE THROUGH ADVANCED TECHNOLOGY

TINKER AIR FORCE BASE

TRACKER
Mobile C-Scan Generation

NDT
NONDESTRUCTIVE TESTING FORUM



Improved NDT Surface Inspection Efficiency and Deliverables with NDI Tracker for Mobile C-Scan Generation

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Tracker Background

- Started in 2010 as a NASA Small Business Innovative Research (SBIR) project for tracking large area inspection of rockets using thermography
- Discovered immediate application with Air Force in 2015 for ¼-inch grid UT inspections. Miniaturized Tracker tech for highly mobile, rapid setup
- Current NDI Tracker in active use at Tinker Air Force Base since 2019
- New customers: NASA Armstrong (2022), Robins AFB (2023), Antelope Valley Community College (2023)
- **Continuously evolving and innovating NDE/NDI/NDT tracking technology for the last 13 years**

Tracker Operation

- Frame the inspection area with 3 or 4 barcode markers
- Camera tracks location of probe by its target attachment
- Tablet displays and records readings from inspection device
- **As long as camera can see the target you're good!**

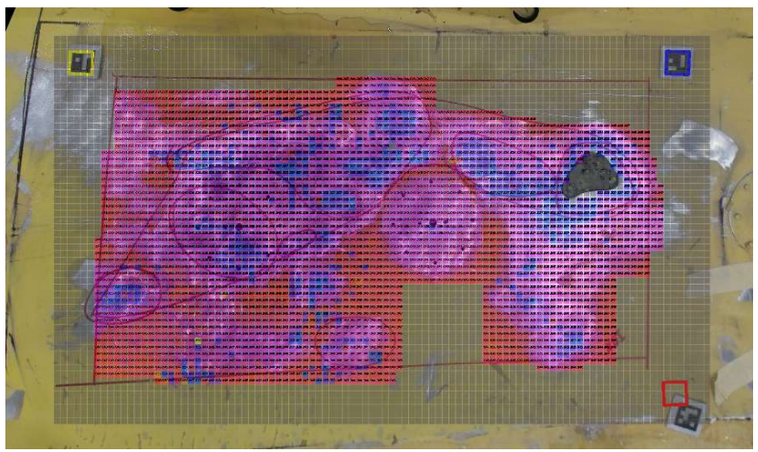
¼" Grid UT Scan by Tinker AFB

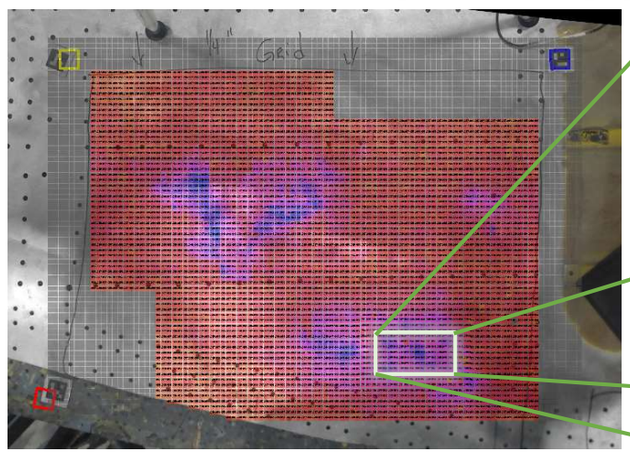
Case Study: Tinker Air Force Base

- Mapping out corrosion or remaining thickness of blended areas on wing and body skin by handheld UT thickness measurements
- Long and tedious day to do ¼-inch UT grid of 5'x5' areas. Paper & pencil, one inspector transcribing readings called out from another inspector
- Difficult to communicate in words and drawings exactly where inspection area is. Limited contextual information of inspection area of the aircraft. Miscommunication causes re-inspection delays
- **Any tracking solution requires: rapid setup, high mobility, must be "dummy-proof", must show diagram of scanned areas**

Tinker Case Study Results

- **Faster inspections** down from 1 day to less than half a day
- **Fewer labor hours** no longer requires 2 people to do the work
- **Better communication** between inspectors and engineers with color-mapped C-Scan deliverable
- **Increased POI** with real-time coverage mapping at time of inspection





Results for NASA Armstrong

- Mapping thicknesses values around windows where there is corrosion damage, and mapping defects in wing attach points
  - "The structural engineers love pictures and data so this is helpful for them to make decisions."
  - "I also like it because it is useful for training. It helps trainees visualize, and it's a good tool for explaining how to properly do a damage map. It's also a good tool to demonstrate how scanning speed and coupling can affect the outcome."
  - **"The biggest benefit in my opinion is the direct support. I've been able to ask you questions and you have not hesitated to help me out and send me files. Most "big" companies want to nickel-and-dime us every time we make a call."**

Now Adapting for Robins AFB

- ½ inch grid bond testing to map disbonds and delamination of honeycomb wing and body skin composites and also cargo floor panels

- Bondmaster 600 integration with pitch-catch and resonance probes

- Microsoft HoloLens 2 integration to show scanned areas

Tracker Benefits

- **Improved communication by quick identification of areas of concern with color-mapped C-Scan deliverable**
- Time and cost savings
- Simple, smooth integration with hand-held inspections
- Range of modes: full tracking, manual mode (remote controlled), paperless (fill in custom grids without camera)
- Custom annotations, grid color spectrum, and digital PDF & CSV output
- Saves camera view and top view pictures in PDF for inspection context

Tracker Benefits

- Range of camera mounting options facilitate most inspection scenarios:
  - Lightweight compact expandable tripod
  - Suction cup snake arm mount for fuselage
  - Gooseneck clamp for tight inspection areas

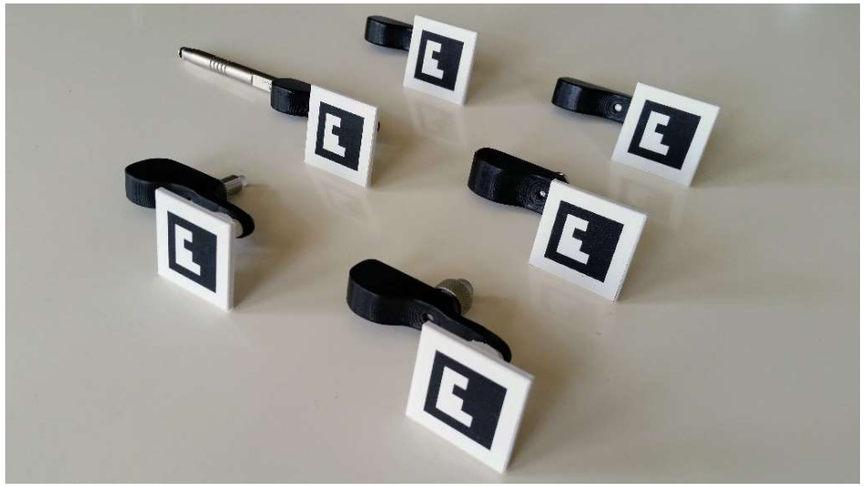
- Leapfrogging feature allows extending the inspection session to adjacent areas up to three times. Useful for long and narrow inspection areas
- **Rapid setup in 5-10 mins from 29 lbs rolling case**

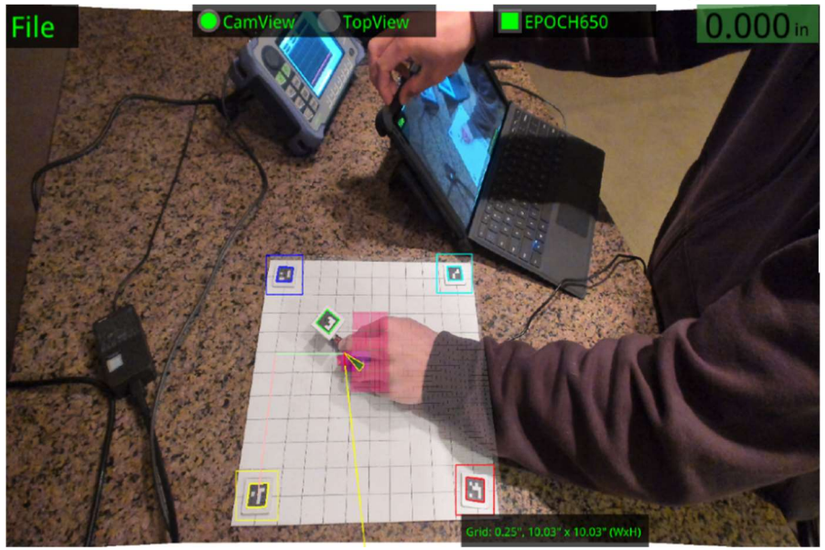
Tracker Advantages

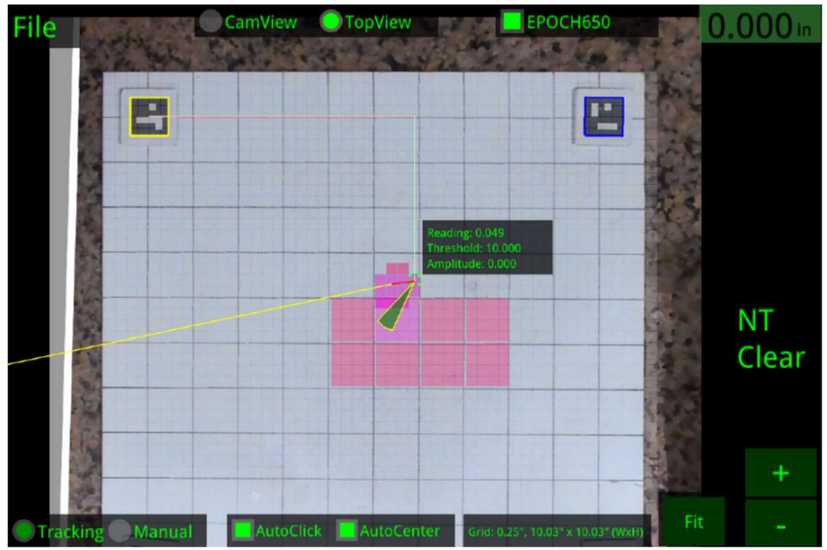
- Simple to use with minimal training, User's Guide included
- Wide range of existing tracking target attachments, including universal attachments for most cylindrical probes
- Custom attachments for probes made to order
- Compatible with Ultrasonic, Bondmaster, Eddy Current (Q1'24), and other devices with serial-over-USB connection
- **Designed with input from dozens of inspectors with varying experience**

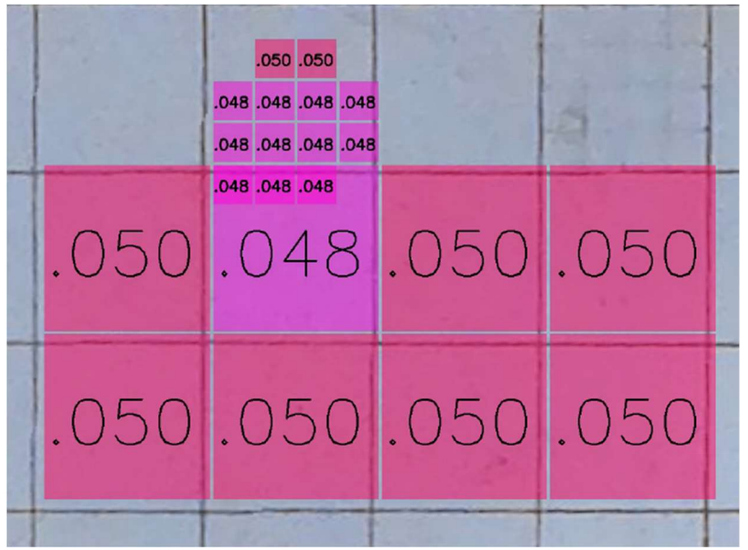
Tracker Advantages

- Passive targets: no batteries or extra wires
- Lightweight, durable target attachments
- Smooth tracking: 30 frames per second
- Multiple inspection grid layer sizes allowed









When to Use the Tracker

- **Inspections that don't lend to automated C-Scan generating equipment**
- Small/medium area inspections not worth setting up automated system, but large enough to be time consuming to manually grid up and inspect
- Dished out areas and curved surfaces that require hand-held inspections
- Needing to ensure complete inspection coverage at time of inspection

Who Benefits from the Tracker

- **NDT Managers and inspectors doing hand-held surface inspections**
- NDT Teams performing highly mobile, fast tempo inspections in the field
- NDT Managers wanting to modernize their techniques, enhance their deliverables and communications, and make inspections more efficient
- Instructors/trainers of the latest cutting edge NDT tools and techniques

Tracker Kit

- Government & Academic pricing available
- Government customers: SBIR Phase III, sole-source contract vehicle available
- Quote on inspection modules, attachments, and quantity needed

Specifications

Software: Tracker Version 3
Setup Time: 5-10 mins
Operating Time: 3-5 hrs
Interface: USB 3.0
Remote Control: Included
Output: PDF, CSV
Camera Range: 1-5ft
Camera Resolution: 4K HD
Frame Rate: 30 frames/sec
Marker Size: 1.25in
Tracking Precision: 0.25in
(1mm resolution, 1/32-in pixel size)
Inspection Area: 5ft x 5ft, extendable with leapfrogging
Modes: Full tracking, Paperless (paper-pencil substitute)
Camera Mounts: Suction cups (on-fuselage), Clamp (tight areas), Tripod Arca-type quick release (on ground / platform lift / inside hull)
Devices Supported: Olympus Epoch 650, GE USN 60, Olympus Panametrics 38DL Plus, Bondmaster 600, Nortec 600D (Q1'24)
Custom Probe Grips: Olympus M116, M208, V110, Sonopen, GE Alpha, CHG201, Pitch Catch S-PC-P12/P13/P14, and others
Universal Grips / Target Holders: Most Cylindrical Transducers, Resonance S-PR-3/4/5, and Eddy Current Right-Angle Metal Shaft

Case Dimensions: 21.2in x 16.0in x 10.6in
Weight (including rolling case): 29 lbs
Primary Applications: Aviation NDI/NDE/NDT
Current Customers: Tinker AFB, Robins AFB, NASA Armstrong, Antelope Valley Community College

Contact Us to Learn More:

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Follow Up

- Stop by Exhibit Booth #1 to see live demos and try the Tracker yourself!
- What inspections could you use a Tracker-generated C-Scan for?
- Questions and feedback welcome for shaping the next version of the Tracker to make your inspections more efficient and effective

  ›› **Contact Kevin Tang:** ktang@cybernet.com

Thank You!