

62ND ANNUAL A4A/NDT FORUM



Director of Aircraft Liaison Support Engineering

- Graduate of The Ohio State University, Columbus, Ohio
- B.S. AAE Engineering, June 1981
- 38 Years of Experience

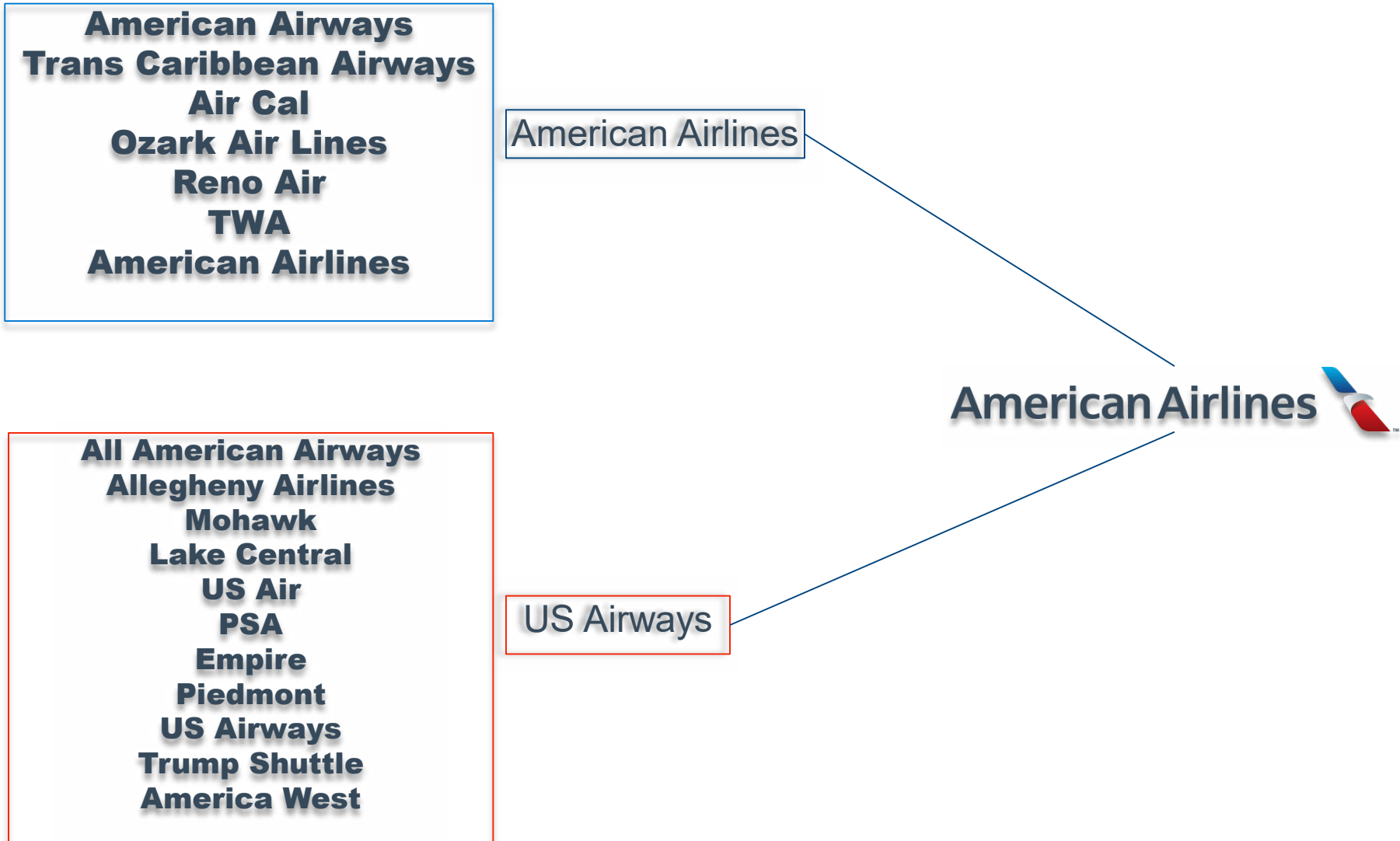
Current Role –

- Oversees a department of 106 engineers and 4 managers, that are located between Charlotte, Dallas, Pittsburgh, Tulsa, Mobile, San Antonio, and San Salvador.
- 32 Engineers work in a 24/7 Support Center that is always open.

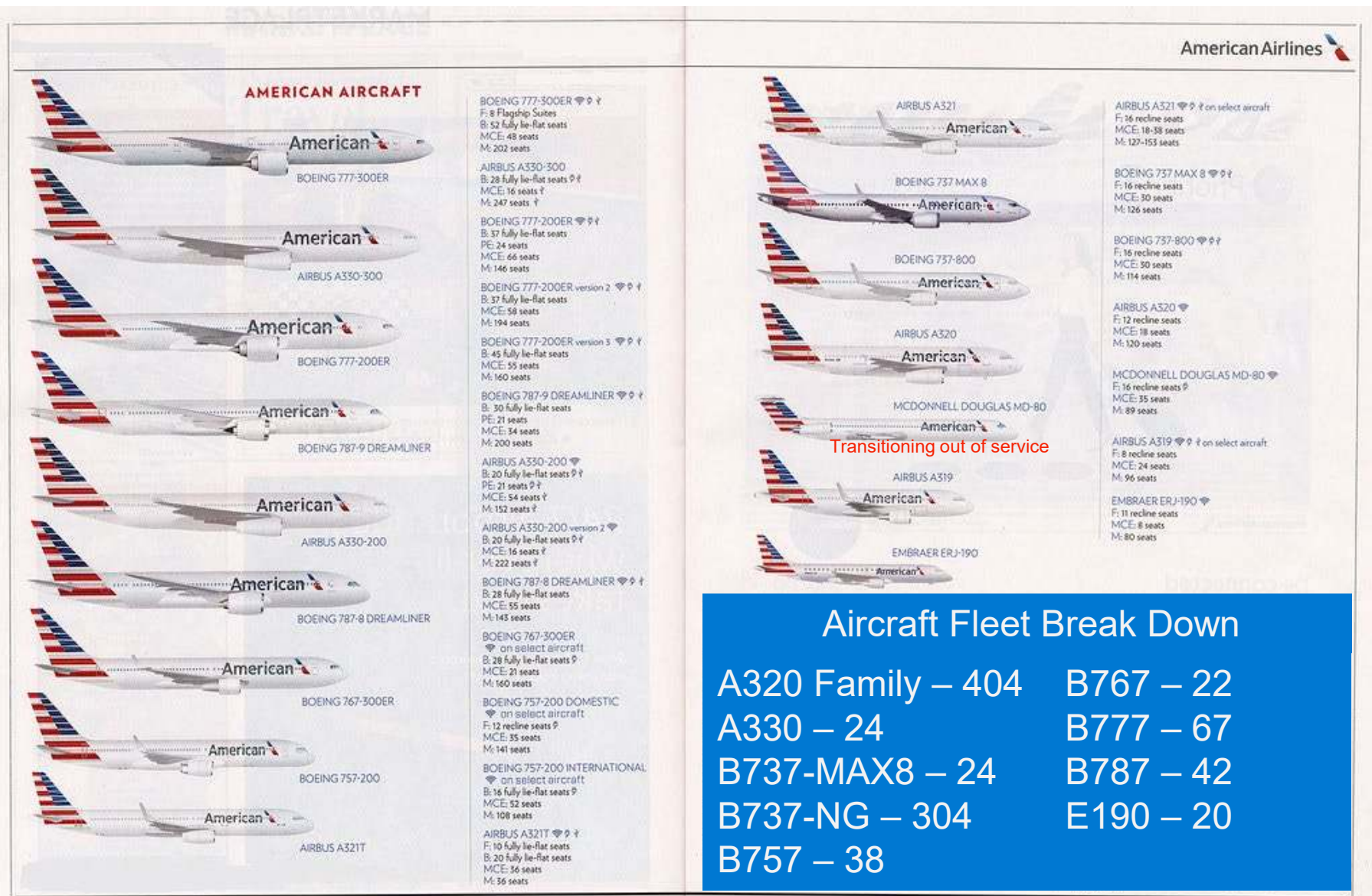


- **American Airlines (AA) Engineering is the technical authority within the airline operations and provides technical oversight and assistance to the Maintenance and Operations Departments.**
- **Our mission is dedicated to providing safe, reliable, well maintained aircraft at a reasonable cost along with providing value to our customers.**
- **AA Engineering is on-duty around the clock all year round ...**
 - **24-hours a day,**
 - **7-days a week,**
 - **365-days a year!**

Our History



The AA Fleet



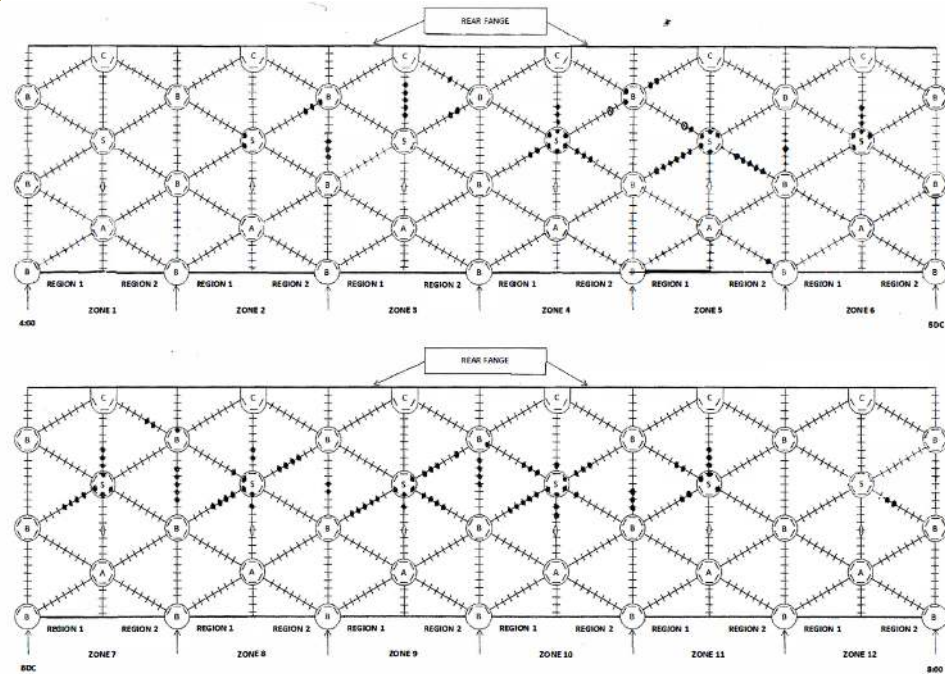
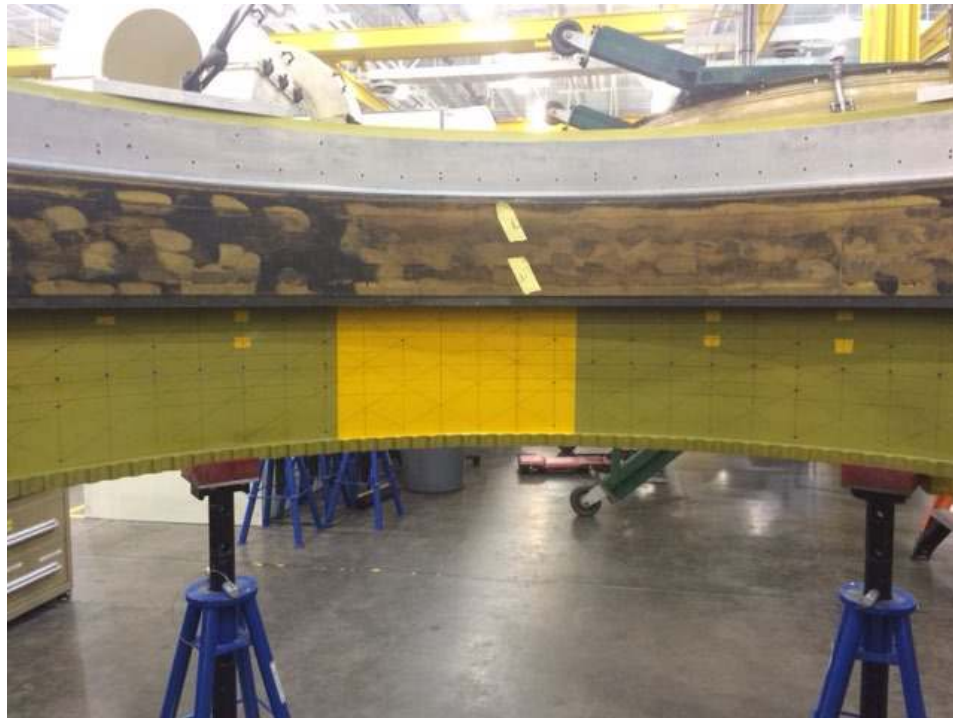
- 6,233 Daily Departures
- 806 Aircraft airborne during peak hours
- 12,131,772 Gallons of Fuel Consumed Daily
- 357 Cities Served Daily
- 557,368 Average Daily Passengers

- 14 Stations with Inspections Capabilities
- 508 Total Inspectors
 - 400 Perform some type of NDT inspection
 - 50-60 of those are full time NDT
- Over 4800 man hours of work assigned per night
- Over 8000 Engineering Documents created per Year

How Does Engineering Utilize NDT

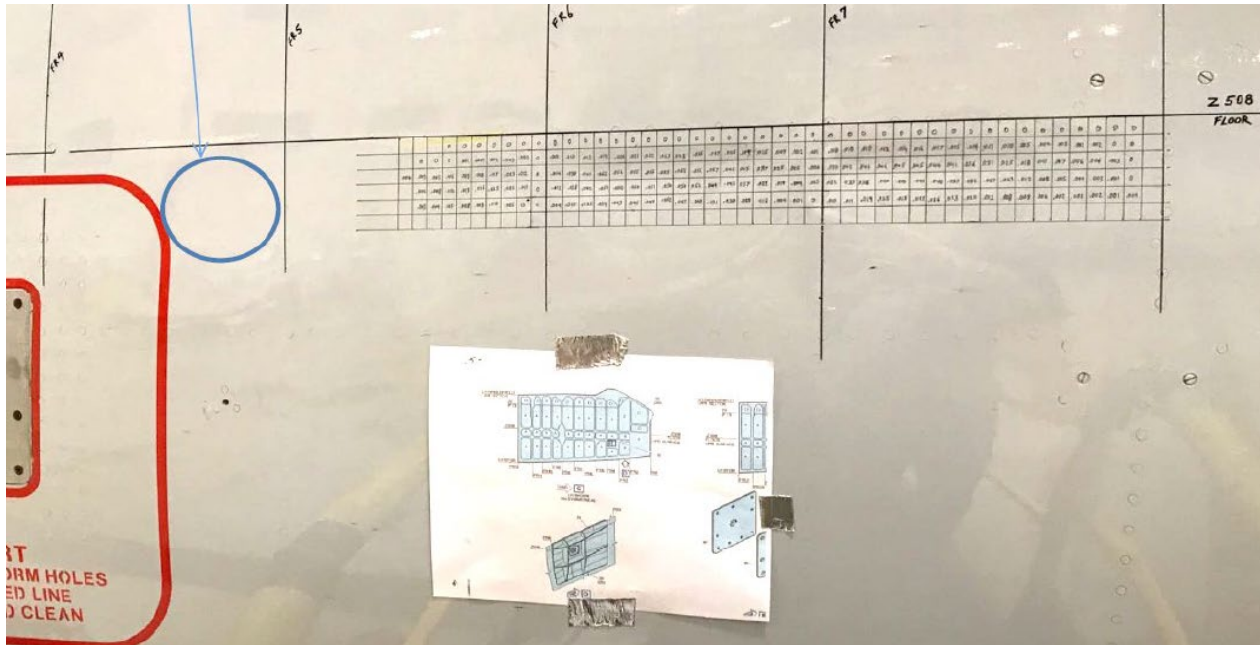
- Eddy Current
- Ultrasound
- Radiography
- Magnetic Particle
- Fluorescent Penetrant
- Acoustic Emission
- Infrared
- X-Ray
- Phased Array
- 8-Tree dentCHECK – Newly purchased

RB211 Fan Case Corrosion Mapping



Ultrasound Testing

Jetbridge contact to A/C Fuselage



HFEC Inspection to Grid Map

[illegible][illegible]

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	.002	.001	.008	.010	.010	.012	.014	.016	.017	.015	.014	.013	.010	.005	.004	.002	.001	.002	0	0		
	.005	.004	.030	.042	.046	.046	.045	.045	.044	.041	.036	.031	.025	.018	.010	.007	.006	.006	.003	0		
	.004	.005	.029	.035	.038	.040	.040	.040	.037	.032	.027	.022	.012	.008	.005	.004	.003	.001	0			
	.001	0	.010	.011	.019	.025	.023	.028	.026	.013	.010	.012	.008	.008	.004	.002	.002	.002	.001	.001		

Mapping Grid of 796 Wing



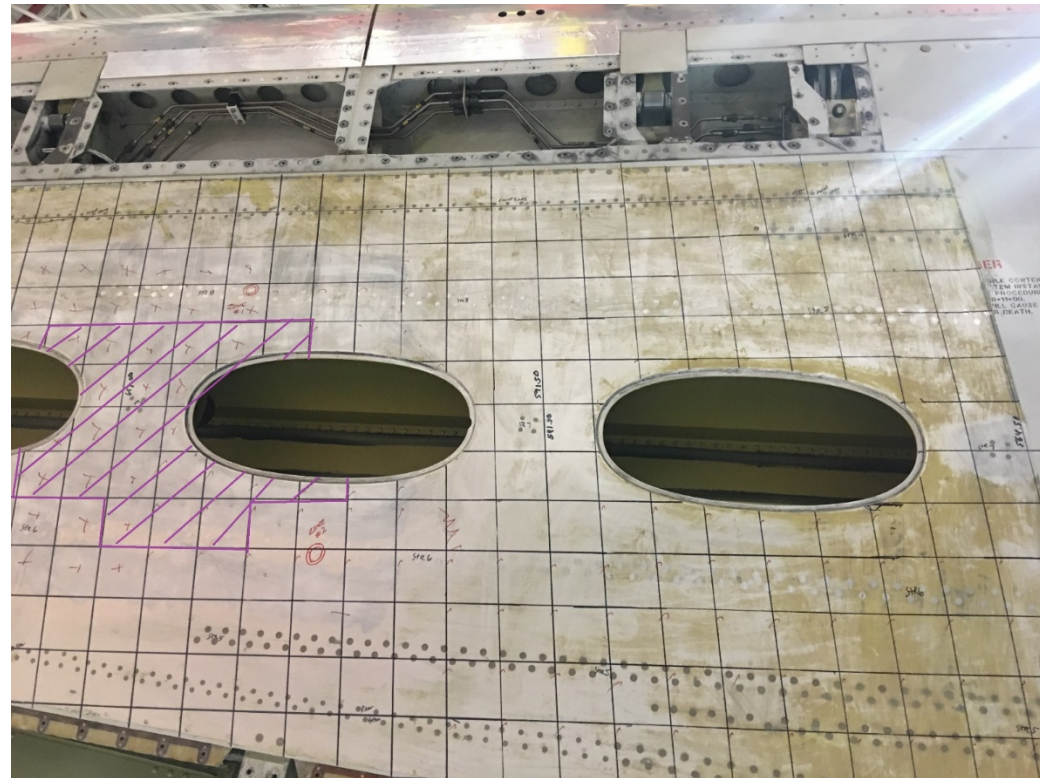
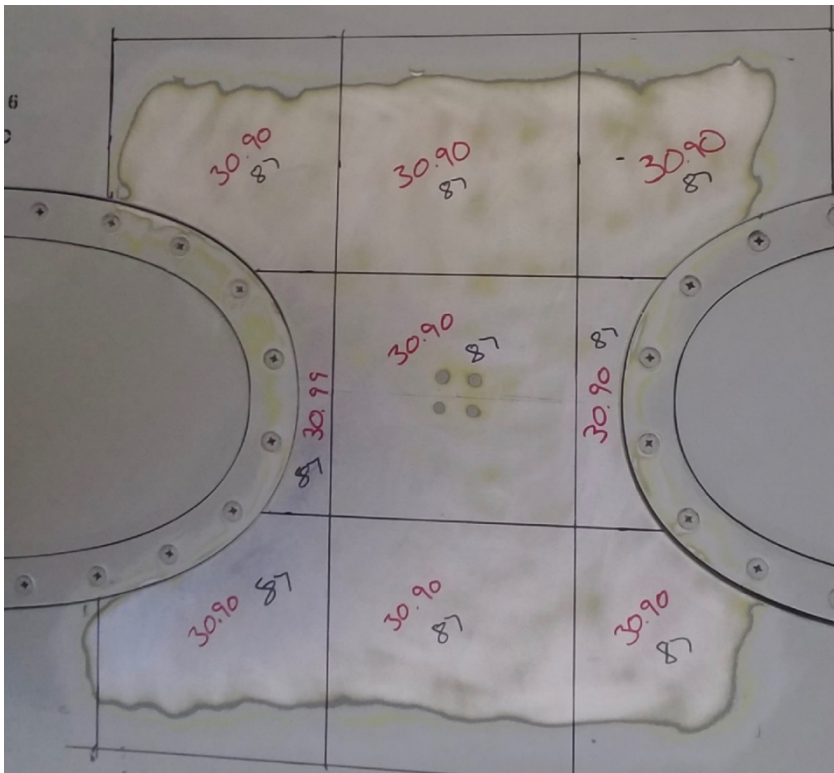
Full Wing Grid used for HFEC and Ultrasonic Thickness test mapping, Roto-probing at fastener locations also done

Heat Damage To Under-Wing

UT and Conductivity Testing due to high heat
EXPOSURE



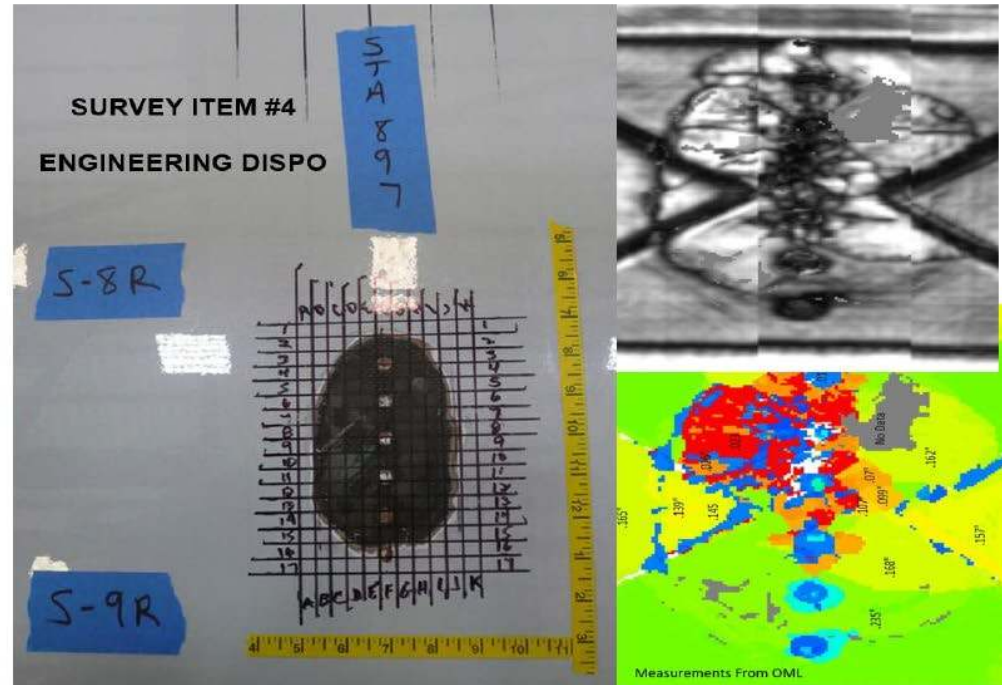
Under-Wing Mapping Cont.



Composite fuselage lightning strike damage

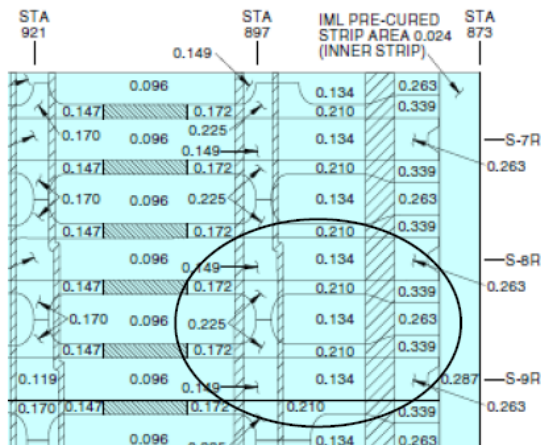


Ultrasonic inspection of composite fuselage skin

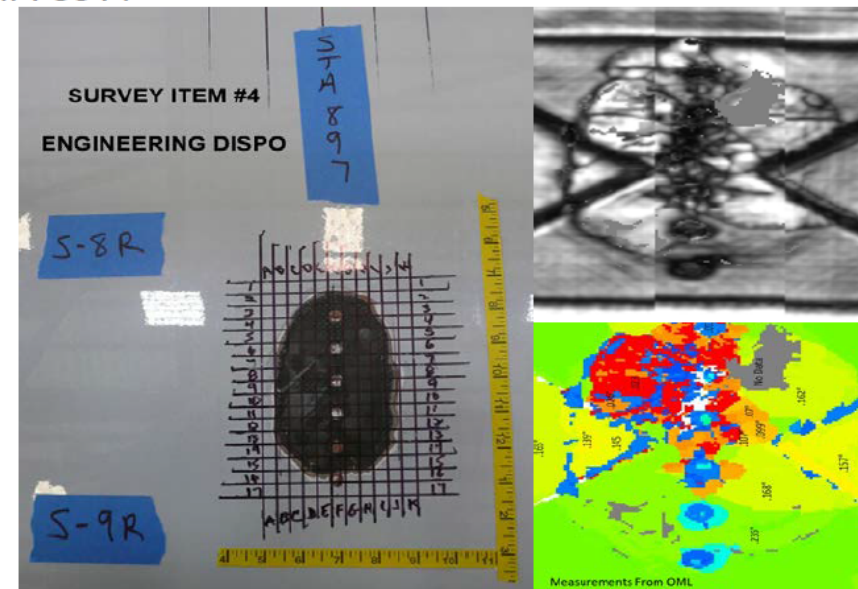


Inspection findings

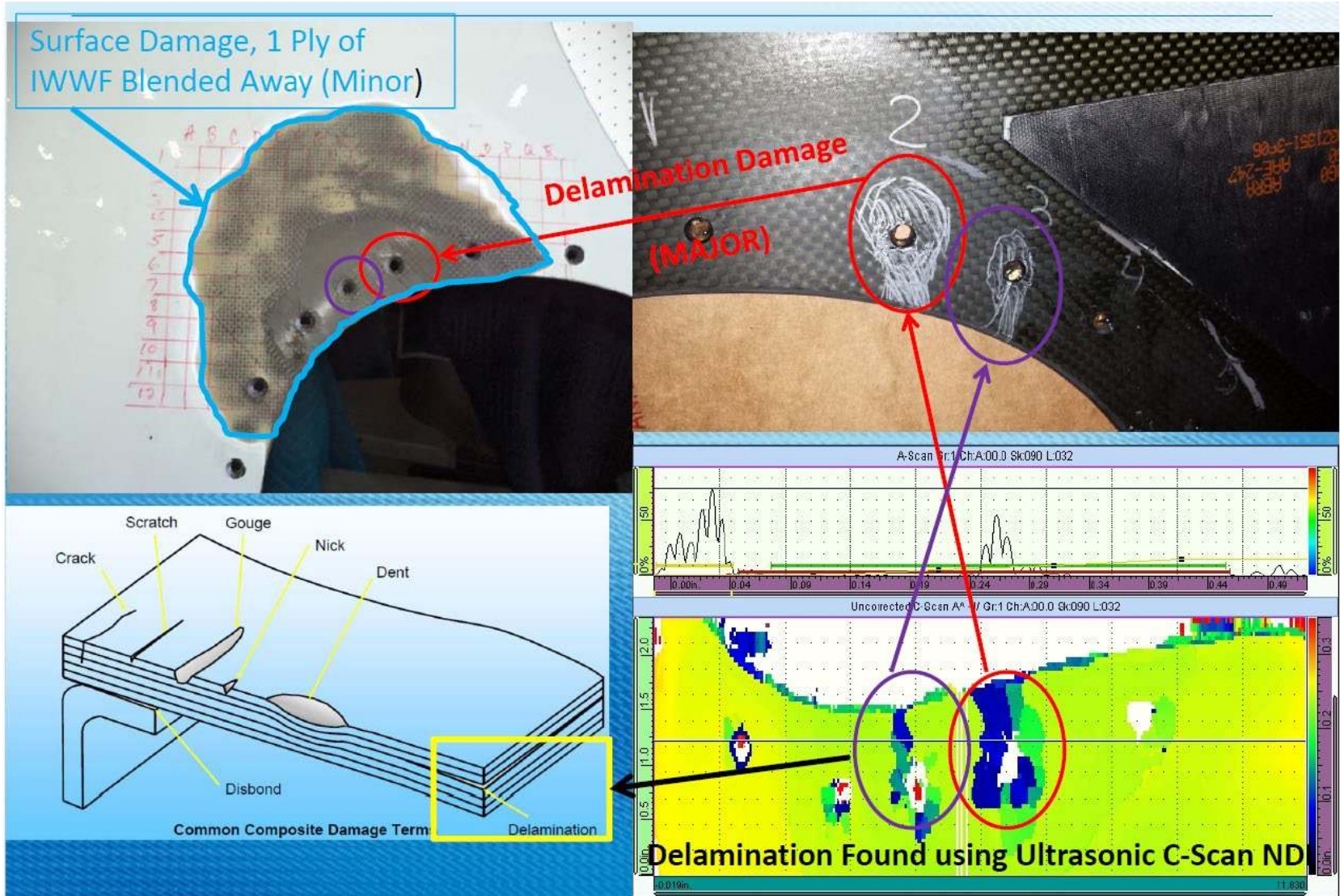
- FASTENERS AT JOINT DEFINITIONS 1.1 THRU 1.6 HAVE BURN MARKS. OML C-SCAN AND GUIDED A-SCAN PERFORMED WITH **MULTI-PLANAR DELAMINATION NOTED MEASURING** APPROXIMATELY 5.5" X 8.5", UP TO A MAX DEPTH THROUGH THE THICKNESS OF THE **SKIN** AND **2 PLYS OF THE UNDERLYING STRINGER FLANGE**. IN ADDITION, 2 PLYS HAVE BEEN REMOVED. SUSPECT **STRINGER DELAMINATION DISBOND**. IML A-SCAN PERFORMED ON SHEAR-TIE FOOT WITH NO DAMAGE INDICATIONS. IML A-SCAN PERFORMED ON EXPOSED SURFACES OF SKIN AND STRINGER FLANGES WITH THE FOLLOWING DAMAGE NOTED. STRINGER 9R UPPER FLANGE DISBOND FWD OF STA 897. STRINGER 8R LOWER FLANGE DISBOND AT STA 897.
- Skin Damage 15 plies deep from OML.*
- Underlying Stringer is disbonded from skin.*



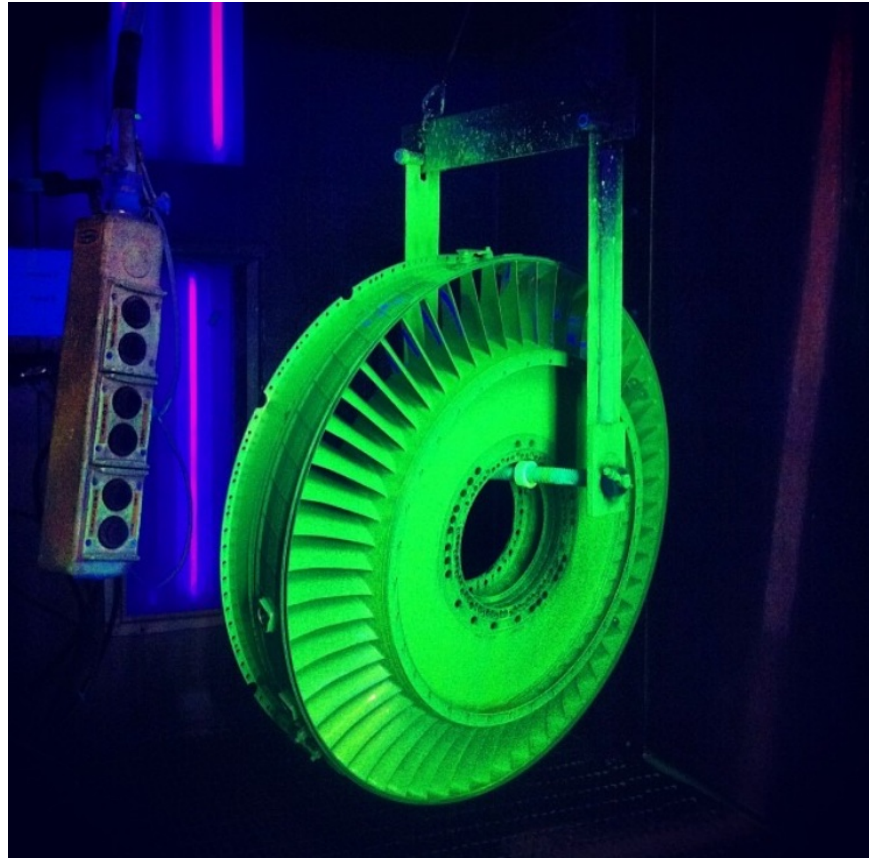
Complex
Internal
Structure
(stringers,
butt splice
joint, etc)



Lightning strike damage to composite fuselage



FPI for cracks on Engine Front Bearing Housing



New Technologies of the Future

- C360 Powered Cameras
- DJI Drones

FIXED-CAMERA AIRCRAFT IMAGING SYSTEM



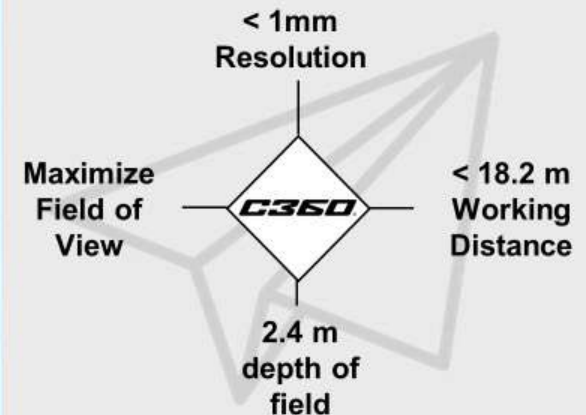
With its partners **C360 Technologies** and **Boeing**, American Airlines is investigating new ways to complete detailed visual inspections with integrated repair plan disposition...

...Using fixed-camera arrays equipped with advanced imaging capabilities and processing pipeline.

FIXED-CAMERA INSPECTION SYSTEM DEVELOPMENT

American Airlines facilitated and validated the advanced development of a fixed-camera aircraft imaging system

- Installed at Pittsburgh Maintenance Center
- Supporting local company **C360 Technologies**
- Effort provide foundation for automating process through repair plan dissemination



TECHNICAL REVIEW - WHAT DOES THIS SYSTEM DO?



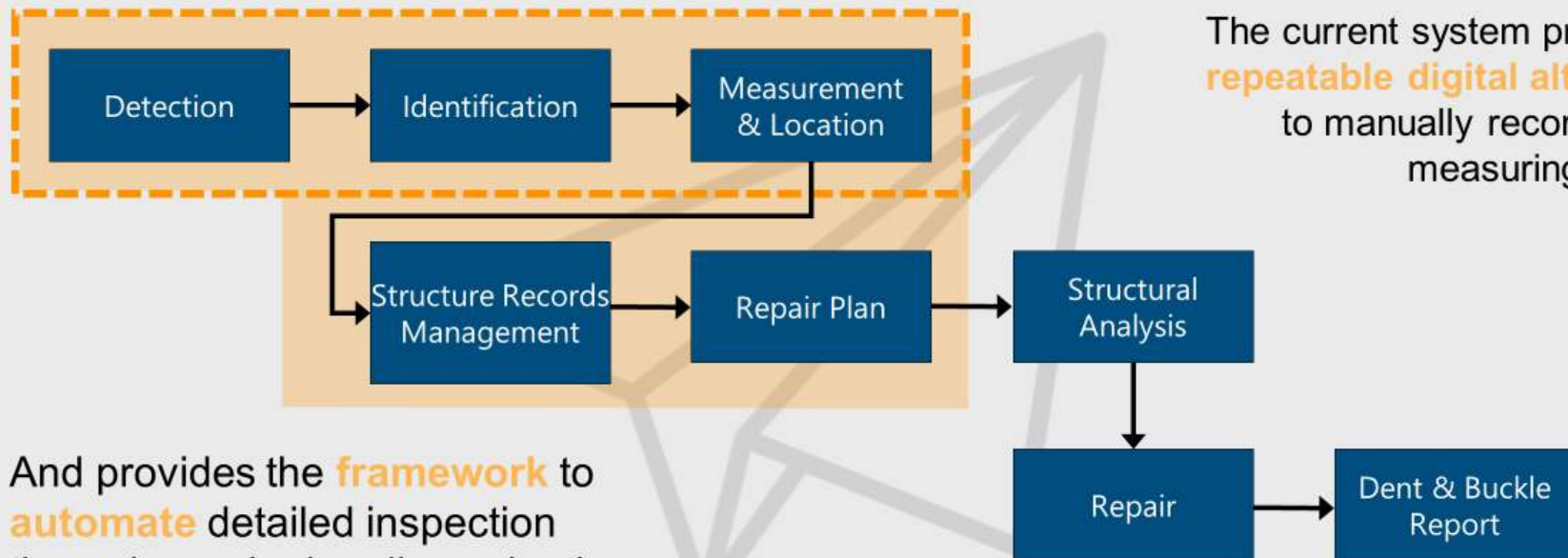
The system images **tiny** defects on airframes from **big** working distances by capitalizing on vibration.

It displays the imagery via a convenient application interface for localization, identification, and measurement.

TECHNICAL REVIEW - WHAT DOES TODAY'S SYSTEM DO?



TODAY'S AIRCRAFT INSPECTION ENVIRONMENT



PARTNERED IN DRIVING VALUE TO AIRCRAFT INSPECTION

Collect

Detect

Disseminate

C360

American Airlines



BOEING

REL-1

- Imaging only solution
- Images categorically reviewed by trained operators for queuing of defect locations

REL-2

- MVP imaging solution integrated with analytical defect recognition engine
- Trained operator reviews only sections of the plane indicated by defect engine.

REL-3

- Integrated system with SRM
- Engineer-in-the-loop: reviews and releases the automated SRM direction for each defect

FINAL PRODUCT

- Integrated full surface analysis
- In-situ to operations (e.g. imaging while taxiing)
- Integrated with all defect engines and SRM analysis for disposition

C360
POWERED



Drone Video



**And now here is the guy that
introduced me to NDT**

