CAA-UK/UK Airline Experience with B787 Composite Damage

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Civil Aviation Authority

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The CAA is the UK's specialist aviation regulator. Its regulatory activities range from making sure that the aviation industry meets the highest technical and operational safety standards to preventing holidaymakers from being stranded abroad or losing money because of tour operator insolvency.

- 787 Composite Repairs
- Occurrence Reporting & Just Culture
- CAA Surveyor Training

UK B787 Fleet

- Deliveries started in May 2013
- Current fleet size is 46 expected be 50 by the end of the year
- Four Operators

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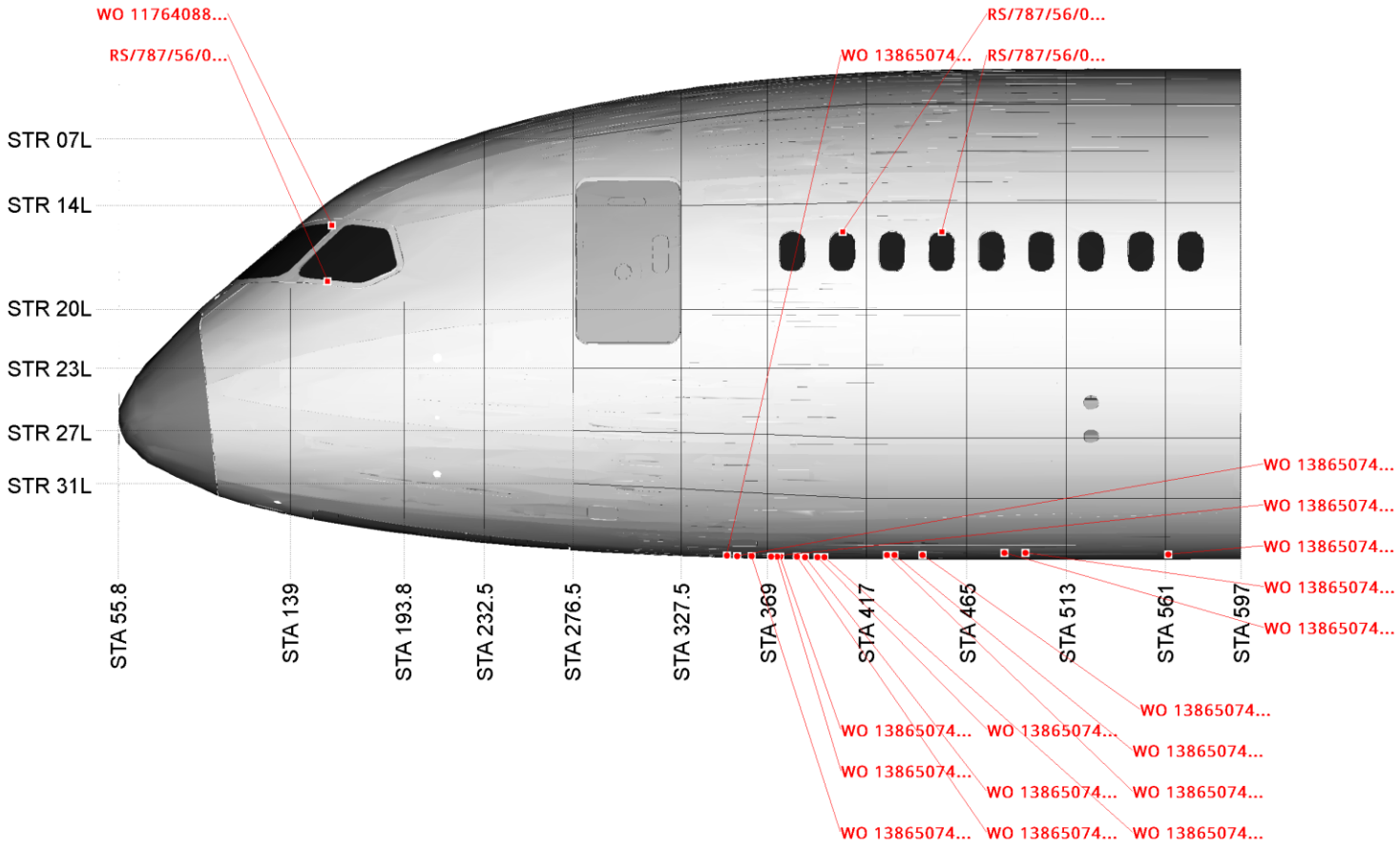
Reported Damage

- Reports from 2 operators.
- One operator has reported 13 incidents of damage on 6 aircraft all entered service between 2013 & 2015.
- The other has reported 40 incidents of damage across 5 aircraft that entered service between 2013 & 2014.

Lightning Strike Damage

- One Operator has repaired 82 lightning strike damage sites on 4 aircraft.
  - 71 fuselage
  - 11 wing
- The other has repaired 13 lightning strike damage sites on 2 aircraft.
  - 11 fuselage
  - 2 wing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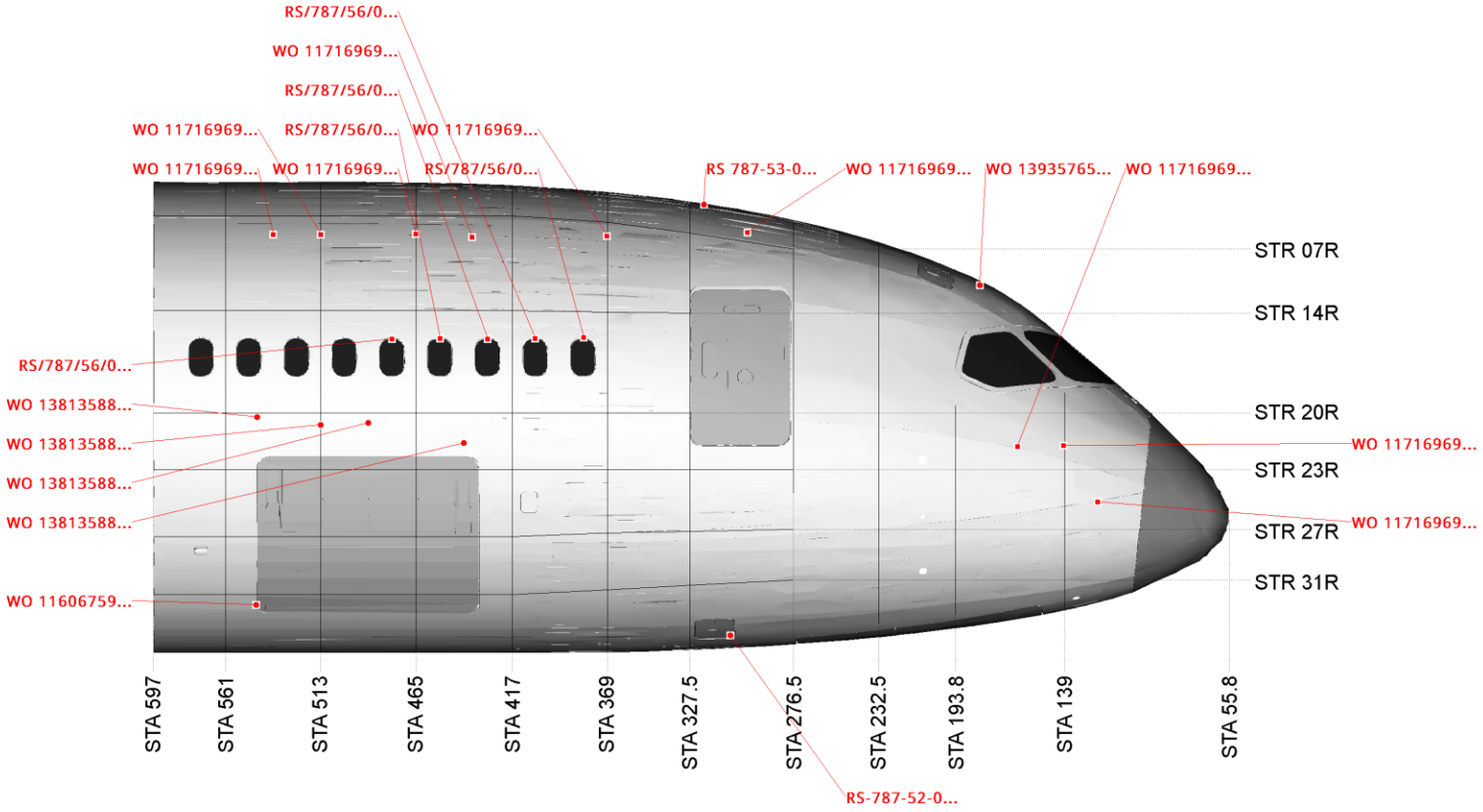
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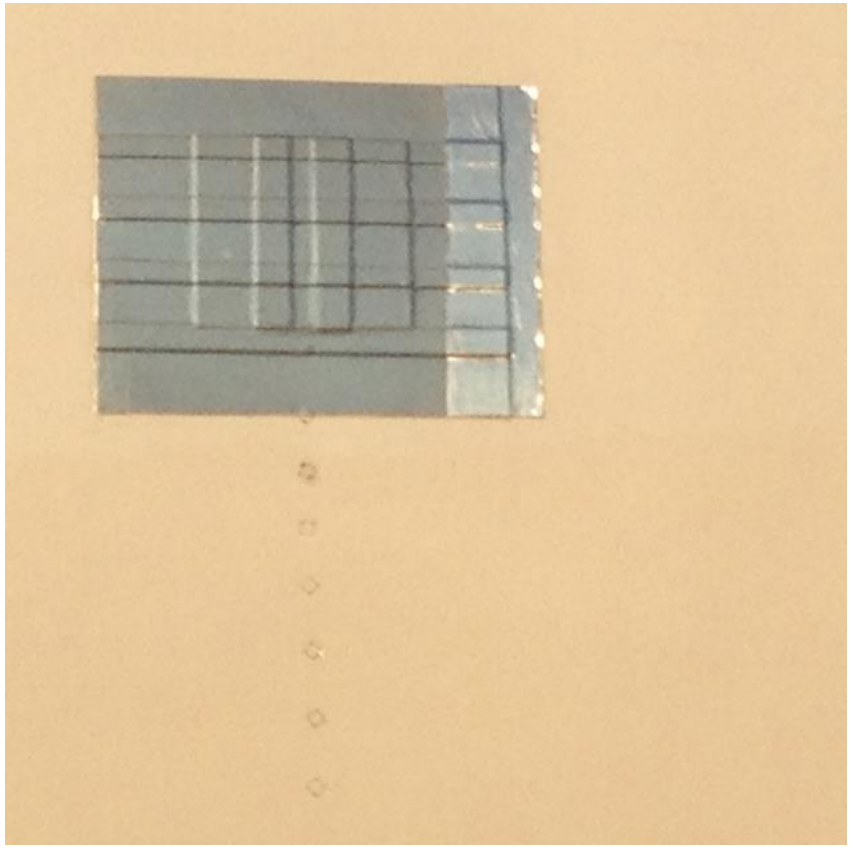
Types of Repair

- Paint restoration
- Speed Tape Repair Time Limited
- Resin Sweep Repair (Time limited or Permanent)
- Wet lay up and re-protection.
- Fastener replacement generally associated with composite repair action
- Ti foil restoration.

Time Limited Speed Tape Repair

Not a UK registered aircraft



Ti Foil Restoration

Lightning strike damage at STA 597 circumferential splice joint RH

Repair in 2 Parts

Part A

Temporary repair for 800 flight cycles or 12 months Tap test, light abrasion to remove damaged paint and to clean titanium foil, solvent clean and cover with speed tape.

Part B

Permanent repair instructions remove sealant, remove paint pry up and trim the damaged titanium foil, solvent clean, using PR-2001, apply a new piece of titanium foil with a 1.00 inch overlap on each end, apply resin sweep /fair and cure, and refinish.

Impact - Other Damage

- 11 incidents across the two operators involving 7 aircraft.
  - 7 fuselage
  - 3 Wing to Body Fairing
  - 1 Vertical Stabiliser

Types of Repair

- Speed tape time limited
- Resin sweep repair
- Taper blend wet lay up
- Taper blend prepreg lay up
- Fastener repair
- Bolted repair patch/plate

Fastener Repair

An outward dent and delamination on the aft cargo door skin, lower aft corner area. The delamination at variable depths through the door skin thickness.

A temporary fastener (clamp up) repair was accomplished in accordance Boeing approved repair data.

Permanent repair to be embodied within 24 months.

The permanent repair consisted of installing additional fasteners after NDT inspections to establish that the delamination had not enlarged.

Bolted Repair - STA 1281 STR 33L

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Aircraft suffered a hydraulic leak which resulted in damage to the composite fuselage skin. The skin was taper sanded in order to remove the damaged plies all skin plies except for the final BMS 8-276 inner woven ply being removed. The sanded area measured 2.75-inch in the fuselage axial direction and 1.5-inch in the circumferential direction. NTD inspection confirmed no indication of delamination beyond the boundaries of the visible damage.

Bolted patch/plate repair installed iaw principles of SRM principles.

Bolted Repair - STA 363 /STR 40L

During high winds, ground equipment (a set of engineering steps) was blown underneath the fuselage resulting in damage to the outer surface of the fuselage. Visually damage was a deep scoring to the surface finish but with no visible damage to the CFRP outer skin plies.

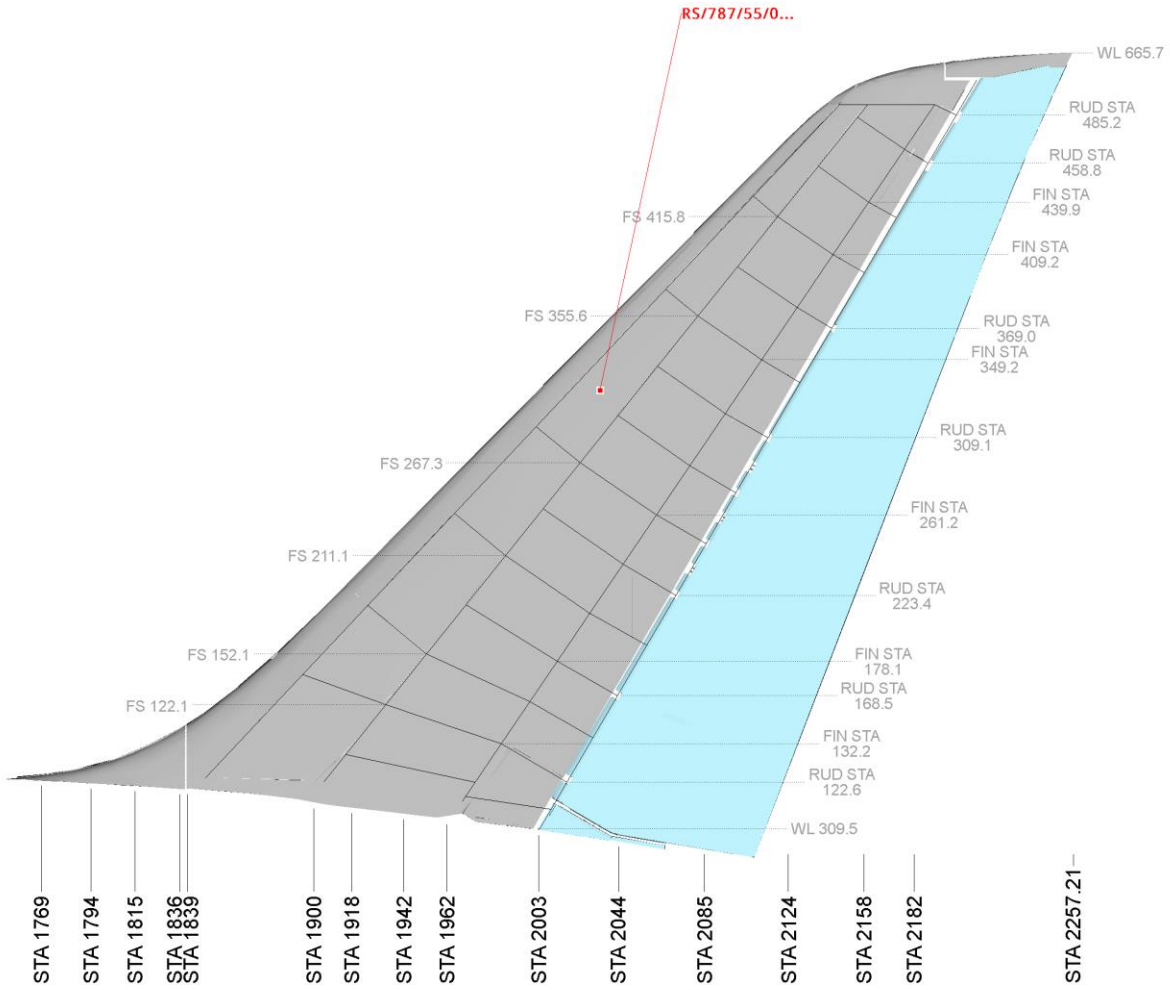
Subsequent NDT revealed a 5” x 1” delamination common to the score and internal visual inspection revealed a 3.5” crack in the stringer heal line.

Repair installed a titanium internal repair stringer and delamination-arresting fasteners in the fuselage skin.

Vertical Stabiliser

During Phase check an out of SRM limits dent was found on the left side of the vertical. Boeing approved a time limited Speed Tape repair with repeat inspections.

Permanent repair a ply by ply prepreg lay up after scarf blend, restoration of lightning protection aluminium foil and finishing the repair as per SRM.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Occurrence Reporting & Just Culture

The CAA is actively promoting Just Culture occurrence reporting in line with Regulation (EU) 376/2014 on the Reporting, Analysis and Follow-up of Occurrences in Civil Aviation, throughout our regulated industry.

CAA Composite Training

All CAA Airworthiness Surveyors will attend a composite repair training course. Bespoke 5 day course based on the FAA/EASA composite repair training course given by Abaris.

40 approximately 50% have completed the course.

All SAFA inspectors (5) have been given composite training.

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Thank you