Service Request Data

SR #	4-5836857664		
Subject	Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground		
Customer Due Date	18-Jul-2023 09:00 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)		
Current Due Date	03-Aug-2023 08:59 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)		
Priority	Critical	Customer Name	Hainan Airlines
SR Status	Solution Provided	Field Base	
SR Owner	Pham, Thomas		

Part #	Part Serial #

Product Type	Airplane
Product Line	737
Product	737-800
ATA Code	5610-20

Registry #	Serial #	Variable #	Hours	Cycles	Winglets

References:

/A/ Attachment REF#A

E-mail related to SR#: 4-5836857664

Customer Name: Hainan Airlines

Message Owner: Thomas Pham

Message Sent: 17-Jul-2023 04:01 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)

Message #: HNA-HNA-23-1578-01C

Communication Status: Done

Communication Type: Request

From: Fu, Fangzhou

Due: 18-Jul-2023 09:00 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)

Field Base:

To:

Cc: Tao Zhang, Jing Zeng, Fangzhou Fu

Airplanes:

Registry #	Variable #	Serial #	Hours	Cycles	Winglets

References:

/A/ Attachment REF#A

Repair Approval Requested: No

Subject: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

Body:

FROM: THE BOEING COMPANY
TO: Hainan Airlines (HNA)
[MESSAGE NUMBER:HNA-HNA-23-1578-01C] Request
MESSAGE DATE: 17 Jul 2023 0402 US PACIFIC TIME / 17 Jul 2023 1102 GMT

Your message has been received. If a response has been requested, it will be provided on or before 18-Jul-2023.

This message is sent to the following:
Fangzhou Fu, at Hainan Airlines
Jing Zeng, at Hainan Airlines
Tao Zhang, at Hainan Airlines

SERVICE REQUEST ID: 4-5836857664
PRIORITY: Critical
ACCOUNT: Hainan Airlines (HNA)

DUE DATE: 18-Jul-2023
PROJECT:
PRODUCT TYPE: Airplane
PRODUCT LINE: 737
PRODUCT: 737-800
ATA: 5610-20

SUBJECT: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

REFERENCES:
/A/ Attachment REF#A

DESCRIPTION:
==========
Several NO2 windshield crack events has happened to the 737NG fleet of HNA recently and please refer to REF#A for details. HNA noticed that all of this happened on the ground and are in heating phase.No arcing sign has been found and HNA doubt that heating on the ground may be the cause for these cracks.It would be appreciated if Boeing could help reply the followings:

DESIRED ACTION:
==========
1.What may be the reason for these windshield cracks on the ground?
2.Are there any ways to identify or predict the possible No2 windshield ,which will has a crack for the case above?
3.HNA notice that there are steps to heat the windshield on the ground in FCOM.Could Boeing help specify the reason of heating windshield on ground in FCOM since HNA doubt long time heating is related to these cracks?
4.Are there any suggestions to do for preventing these crack events?

HNA is looking forward to your reply soon!

Fangzhou Fu
fzhou.fu@hnair.com
18508946385(mobile just for the day and please call 0898 65772112or 0898 65772113 for 24 hour)

When present, attachment names are listed below this line:

Attachment: REF#A.docx

2OJ43XF

(Note: MyBoeingFleet portal login is required to access link in the Service Request System)

E-mail related to SR#: 4-5836857664

Customer Name: Hainan Airlines

Message Owner: Thomas Pham

Message Sent: 18-Jul-2023 06:53 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)

Message #: HNA-HNA-23-1578-02B

Communication Status: Done

Communication Type: Boeing Response

From:

Due: No Action Required

Field Base:

To: tao_zh@hnair.com,fzhou.fu@hnair.com,zengjing@hnair.com

Cc:

Airplanes:

Registry #	Variable #	Serial #	Hours	Cycles	Winglets

References:

/A/ HNA-HNA-23-1578-01C
/B/ Attachment REF#A
/C/ 737 No.2 Non-Ideal Conditions
/D/ 737 No.2 Thermal Edge Break Maintenance

Repair Approval Requested: No

Subject: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

Body:

FROM: THE BOEING COMPANY
TO: Hainan Airlines (HNA)
[MESSAGE NUMBER:HNA-HNA-23-1578-02B] Boeing Response
MESSAGE DATE: 18 Jul 2023 0653 US PACIFIC TIME / 18 Jul 2023 1353 GMT

The following message is distributed to the following people at Hainan Airlines:
Tao Zhang, Fangzhou Fu, Jing Zeng
Service Request ID: 4-5836857664

Product Type: Airplane Product Line: 737Series/Product: 737-800 ATA: 5610-20

SUBJECT: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

INQUIRY TYPE: Other FAA Form 8100-9 Requested: No Repair Deviation Record Requested: No

REFERENCES:
/A/ HNA-HNA-23-1578-01C
/B/ Attachment REF#A
/C/ 737 No.2 Non-Ideal Conditions
/D/ 737 No.2 Thermal Edge Break Maintenance

DESCRIPTION:

Per Ref/A/ message, Hainan Airlines (HNA) requests the following:

==========
Several NO2 windshield crack events has happened to the 737NG fleet of HNA recently and please refer to REF#A for details. HNA noticed that all of this happened on the ground and are in heating phase.No arcing sign has been found and HNA doubt that heating on the ground may be the cause for these cracks.It would be appreciated if Boeing could help reply the followings:

DESIRED ACTION:
==========
Q1. What may be the reason for these windshield cracks on the ground?

Q2. Are there any ways to identify or predict the possible No2 windshield ,which will has a crack for the case above?

Q3. HNA notice that there are steps to heat the windshield on the ground in FCOM. Could Boeing help specify the reason of heating windshield on ground in FCOM since HNA doubt long time heating is related to these cracks?

Q4. Are there any suggestions to do for preventing these crack events?

HNA is looking forward to your reply soon!

Fangzhou Fu
fzhou.fu@hnair.com
18508946385(mobile just for the day and please call 0898 65772112or 0898 65772113 for 24 hour)

RESPONSE:

Boeing has reviewed Ref/A/ message and provides the following response:

A1) Based on the pattern of the crack provided in the attached photos, the window appears to exhibit a thermal edge break. Thermal edge breaks are caused by a runaway heat condition resulting from the WHCU sensing a cold window, due to non-ideal conditions of the sensor terminals. Please see A4.

A2) At this time, Boeing does not have procedures to predict when a thermal edge break will occur. However, if a crew member reports/describes a cockpit window is hotter than usual or hot to the touch, then it might be an indication there is a malfunction with the window heat system internal to the window or temperature sensors or connections, and/or the window heat control unit. Doing a resistance check of the active temperature sensor to ensure it is within limit at a given temperature, doing a bus-to-bus to ensure the window is using the correct terminal board tap, and ensuring the temperature sensor terminal connection is contamination/moisture free may help reduce future occurrences. Other procedures that can help mitigate this condition from occurring in the future are offered below in A4).

A3) Turning on window heat at least 10 minutes before take-off is required to ensure the vinyl interlayer is at operating temperature, optimizing the bird impact capability of the cockpit window.

A4) If HNA is not already aware, please refer to Ref/C/ and Ref/D/ attachments for non-ideal conditions that can cause a thermal edge break and maintenance recommendations. Assuming that HNA has no crew restrictions for use of the no.2 window, Boeing also recommends informing all crew to clean/wipe off any fluids that migrate into the cabin as a result of opening the no.2 window. This will prevent fluids from accumulating at the window sill drain.

If attachments are referred to, and are not present, please access them by logging into MyBoeingFleet Service Request System or contact your Boeing Field Service Representative.

Service Request System: https://myboeingfleet.boeing.com/bsrs/client/index.html#/communicationsDetail/4-2OJI3U6
(Note: MyBoeingFleet portal login is required to access link in the Service Request System)

Thomas Pham
Service Engineering, Transparencies
Torik Blankson - Manager
Customer Support
The Boeing Company

The following files are attached to this message:
737 No.2 - Non Ideal Conditions that May Lead to Thermal Edge Break.pdf, 737 No.2 - Thermal Edge Break - Maintenance Recommendations.pdf

E-mail related to SR#: 4-5836857664

Customer Name: Hainan Airlines

Message Owner: Thomas Pham

Message Sent: 31-Jul-2023 19:01 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)

Message #: HNA-HNA-23-1578-03C

Communication Status: Done

Communication Type: Reply

From: Zhang, Tao

Due: 03-Aug-2023 08:59 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)

Field Base: BFSHAK-Haikou-China

To:

Cc: Tao Zhang, Jing Zeng, Fangzhou Fu

Airplanes:

Registry #	Variable #	Serial #	Hours	Cycles	Winglets

References:

/A/ HNA-HNA-23-1578-01C
/B/ Attachment REF#A
/C/ 737 No.2 Non-Ideal Conditions
/D/ 737 No.2 Thermal Edge Break Maintenance
/E/ Attachment 5466 left
/F/ Attachment 5709 left
/G/ Attachment 5735 right

Repair Approval Requested: No

Subject: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

Body:

REFERENCES:
/A/ HNA-HNA-23-1578-01C
/B/ Attachment REF#A
/C/ 737 No.2 Non-Ideal Conditions
/D/ 737 No.2 Thermal Edge Break Maintenance
/E/ Attachment 5466 left
/F/ Attachment 5709 left
/G/ Attachment 5735 right

RESPONSE:

HNA received 3 reports that the NO.2 windshield crack on the ground last month,please refer to attachments for the damage pictures, and the information is as below.

5466 left NO.2 PN: 141A4810-37 SN: HHA83609 window panel PN:5-89355-87 SN: 18214H4395 TSI:8271FH CSI:4215CY installation date: 2019.10.12

5735 right NO.2 PN: 141A4810-56 SN:13173H0752 window panel PN:5-89355-88 SN: 15286H7758 TSI:8825FH CSI:4405CY installation date: 2019.07.04

5709 left NO.2 PN:141A4810-53 SN: 16139H1924 window panel PN:5-89355-87 SN: 17214H2627 TSI:7669FH CSI:3748CY installation date: 2019.10.27

For these damage windshield, HNA have some problems:

1. refer to the damage pictures, the crack start points are at the same position of the window, what is the cause? and whether the three window panels belong to same batch?
2. we complete the resistance check of the window heat film on some planes, the resistance is 2 to 3 ohm smaller than the code number resistance range, what is the reason?
3. HNA collected the crack reports happened on the ground, most of the crack happened from MAY to SEP, is the crack related to the hight ambient temperature?
4. To avoid the crack on the ground, is it acceptable to put the WINDOW HEAT switch to ON only when the temperature is below the specific ambient temperature, for example below 10 degrees on the ground? and HNA also suggest the FCOM be revised to put the WINDOW HEAT switch to OFF after landing, and Turning on window heat 10 minutes before take-off when the ambient temperature is high. please help to evaluate.
5. will it decrease the crack possibility to change the terminal lug ID number corresponding to the CODE to a small one, for example, CODE number is H15, then number 1 lug ID is used.
6. does other operators take any measures to avoid the window crack? does boeing has any suggestions?

E-mail related to SR#: 4-5836857664

Customer Name: Hainan Airlines

Message Owner: Thomas Pham

Message Sent: 02-Aug-2023 13:16 ((GMT-08:00) Pacific Time (US & Canada); Tijuana)

Message #: HNA-HNA-23-1578-04B

Communication Status: Done

Communication Type: Boeing Response

From:

Due: No Action Required

Field Base: BFSHAK-Haikou-China

To: tao_zh@hnair.com,fzhou.fu@hnair.com,zengjing@hnair.com

Cc:

Airplanes:

Registry #	Variable #	Serial #	Hours	Cycles	Winglets

References:

/A/ HNA-HNA-23-1578-03C
/B/ HNA-HNA-23-1578-01C
/C/ Attachment REF#A
/D/ 737 No.2 Non-Ideal Conditions
/E/ 737 No.2 Thermal Edge Break Maintenance
/F/ Attachment 5466 left
/G/ Attachment 5709 left
/H/ Attachment 5735 right

Repair Approval Requested: No

Subject: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

Body:

FROM: THE BOEING COMPANY
TO: Hainan Airlines (HNA)
[MESSAGE NUMBER:HNA-HNA-23-1578-04B] Boeing Response
MESSAGE DATE: 02 Aug 2023 1316 US PACIFIC TIME / 02 Aug 2023 2016 GMT

The following message is distributed to the following people at Hainan Airlines:
Tao Zhang, Fangzhou Fu, Jing Zeng
Service Request ID: 4-5836857664

Field Service Base: BFSHAK

Product Type: Airplane Product Line: 737Series/Product: 737-800 ATA: 5610-20

SUBJECT: Query on the crack of NO2 Windshield of 737NG,Which Happened on the Ground

INQUIRY TYPE: Other FAA Form 8100-9 Requested: No Repair Deviation Record Requested: No

REFERENCES:
/A/ HNA-HNA-23-1578-03C
/B/ HNA-HNA-23-1578-01C
/C/ Attachment REF#A
/D/ 737 No.2 Non-Ideal Conditions
/E/ 737 No.2 Thermal Edge Break Maintenance
/F/ Attachment 5466 left
/G/ Attachment 5709 left
/H/ Attachment 5735 right

DESCRIPTION:

Per Ref/A/ message, Hainan Airlines (HNA) inquires the following:

REFERENCES:
/A/ HNA-HNA-23-1578-03C
/B/ HNA-HNA-23-1578-01C
/C/ Attachment REF#A
/D/ 737 No.2 Non-Ideal Conditions
/E/ 737 No.2 Thermal Edge Break Maintenance
/F/ Attachment 5466 left
/G/ Attachment 5709 left
/H/ Attachment 5735 right

RESPONSE:
HNA received 3 reports that the NO.2 windshield crack on the ground last month,please refer to attachments for the damage pictures, and the information is as below.
5466 left NO.2 PN: 141A4810-37 SN: HHA83609 window panel PN:5-89355-87 SN: 18214H4395 TSI:8271FH CSI:4215CY installation date: 2019.10.12
5735 right NO.2 PN: 141A4810-56 SN:13173H0752 window panel PN:5-89355-88 SN: 15286H7758 TSI:8825FH CSI:4405CY installation date: 2019.07.04
5709 left NO.2 PN:141A4810-53 SN: 16139H1924 window panel PN:5-89355-87 SN: 17214H2627 TSI:7669FH CSI:3748CY installation date: 2019.10.27

For these damage windshield, HNA have some problems:
1. refer to the damage pictures, the crack start points are at the same position of the window, what is the cause? and whether the three window panels belong to same batch?

2. we complete the resistance check of the window heat film on some planes, the resistance is 2 to 3 ohm smaller than the code number resistance range, what is the reason?

3. HNA collected the crack reports happened on the ground, most of the crack happened from MAY to SEP, is the crack related to the hight ambient temperature?

4. To avoid the crack on the ground, is it acceptable to put the WINDOW HEAT switch to ON only when the temperature is below the specific ambient temperature, for example below 10 degrees on the ground? and HNA also suggest the FCOM be revised to put the WINDOW HEAT switch to OFF after landing, and Turning on window heat 10 minutes before take-off when the ambient temperature is high. please help to evaluate.

5. will it decrease the crack possibility to change the terminal lug ID number corresponding to the CODE to a small one, for example, CODE number is H15, then number 1 lug ID is used.

6. does other operators take any measures to avoid the window crack? does boeing has any suggestions?

RESPONSE:

Boeing has reviewed Ref/A/ message and provides the following response:

A1) For the 737 No.2 window, there are locations on the window where the heating film outputs more heat than others; Typically at the lower aft edge, upper aft edge, and upper fwd edge of the window. During runaway heat conditions, there will be a large disparity between the temperatures of the hot spots and other locations of the window, resulting in thermal shock fractures that occur adjacent to the hot spots. Based on the serial numbers, these windows do not belong to the same batch.

A2) Assuming that HNA is referring to the resistance range corresponding to each terminal board tap, if a window heat resistance is measured to be lower than the range values of the connected board tap, it means that the window is connected to the wrong board tap. Please refer to AMM TASK 30-41-21-000-801 and ensure that the resistance range of the window is connected to the correct terminal board tap.

A3) At this time, Boeing is unable to confirm the correlation between ambient temperature and thermal edge breaks. However, the reason that a thermal edge break occurs is due to the large temperature disparity between different locations on a window. A high ambient temperature does not cause this large temperature disparity as the entire surface of the window will be heated uniformly. It is much more likely that high ambient

humidity reaching the terminal connectors will lead to a thermal edge break.

A4) Provided that the window is brought up to operating temperature at least 10 minutes prior to take off, Boeing has no technical objection with HNA's proposal. Please see A3.

A5) Boeing does not recommend connecting to a terminal lug that does not correspond with the window's heating film resistance. Each window resistance must be connected to the the correct terminal tap to ensure the same amount of power is provided to the window across different resistance ranges. If a window is connected to a tap with an VAC output that is lower than the tap that corresponds to it's heating film resistance, there may be issues bringing the window up to operating temperature.

A6) Outside of the recommendations provided in the -02B message, Boeing is not aware of other actions that operators are taking. Unfortunately, Boeing does not have any additional recommendations at this time.

If attachments are referred to, and are not present, please access them by logging into MyBoeingFleet Service Request System or contact your Boeing Field Service Representative.

Service Request System: https://myboeingfleet.boeing.com/bsrs/client/index.html#/communicationsDetail/4-2OZAY5L
(Note: MyBoeingFleet portal login is required to access link in the Service Request System)

Thomas Pham
Service Engineering, Transparencies
Torik Blankson - Manager
Customer Support
The Boeing Company