OEM Design Definition Issues

NAVAIR public release SPR-2014-342
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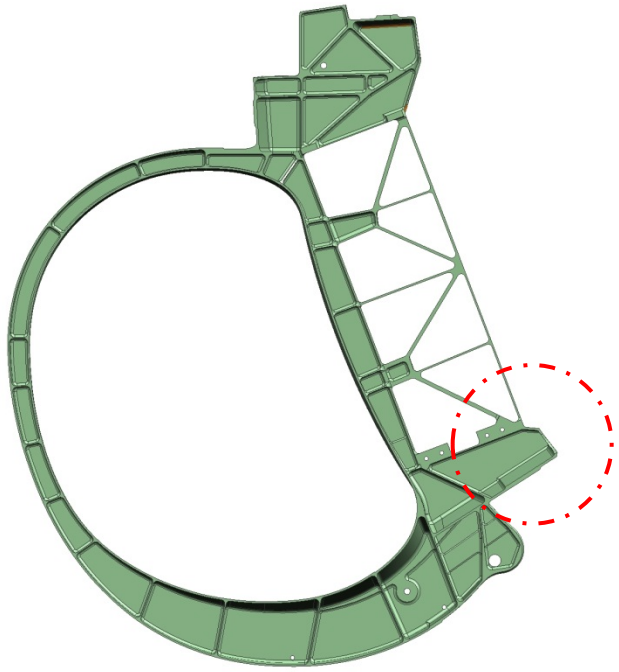
ISSC Engineering Team, FRCSW Code 43353

Presented 28 April 2014 Rick Mendoza

Synopsis

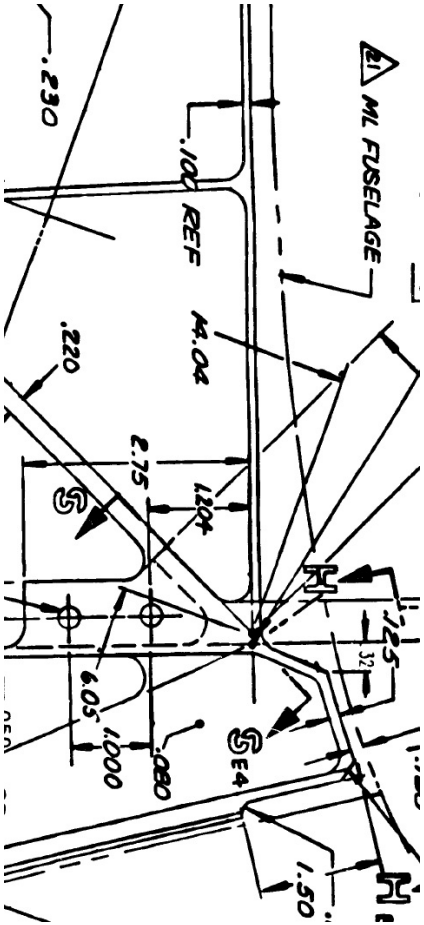
- Existing Manufacturing Process Requires 3D Solid Model for CAM Software.
  - 2D, Blueprint Defined Engineering Data
    - 2D-3D translation subject to Human error.
    - OEM Blueprint can incorrectly define Part.
  - MBD Data
    - Can have quality issues
    - Can incorrectly define part

Misinterpretation of the Blueprint

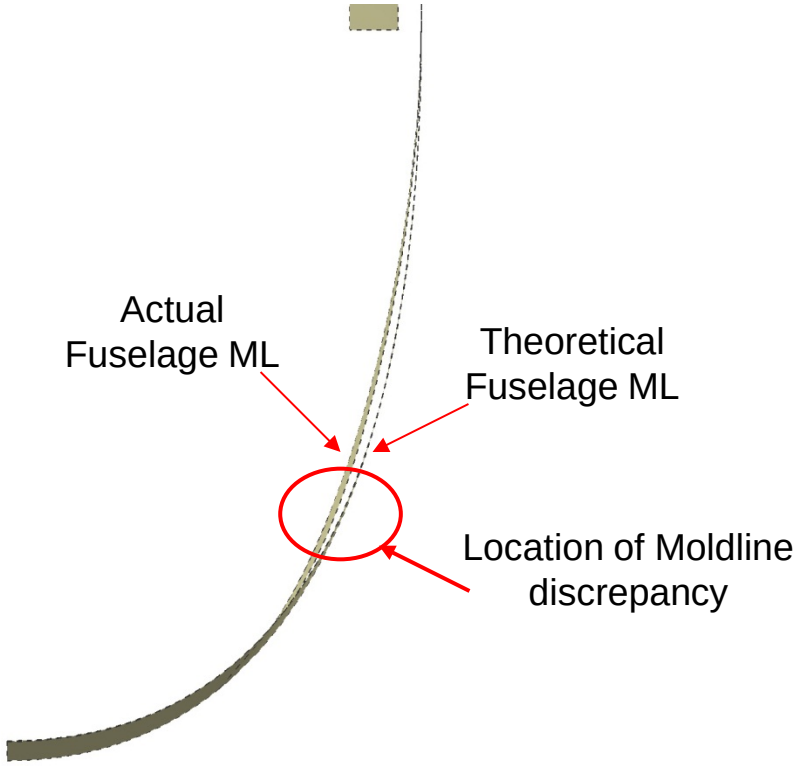


3D Model of Structural Former – Translated from 2D Blueprint

Misinterpretation of the Blueprints



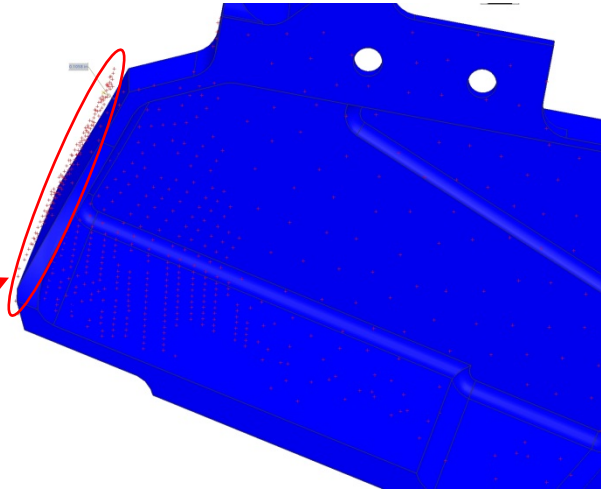
View Looking FWD



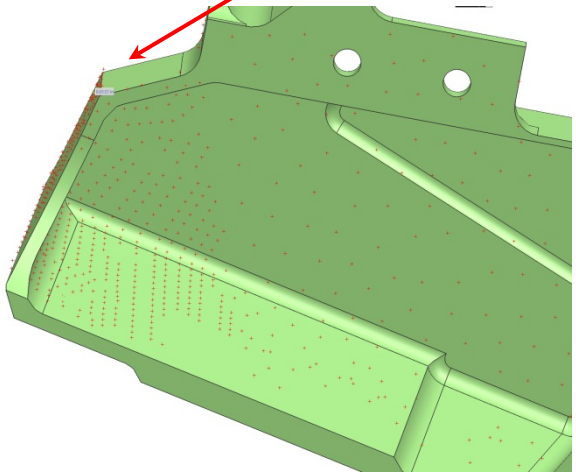
View Looking AFT

Misinterpretation of the Blueprints

Prior to correcting solid model

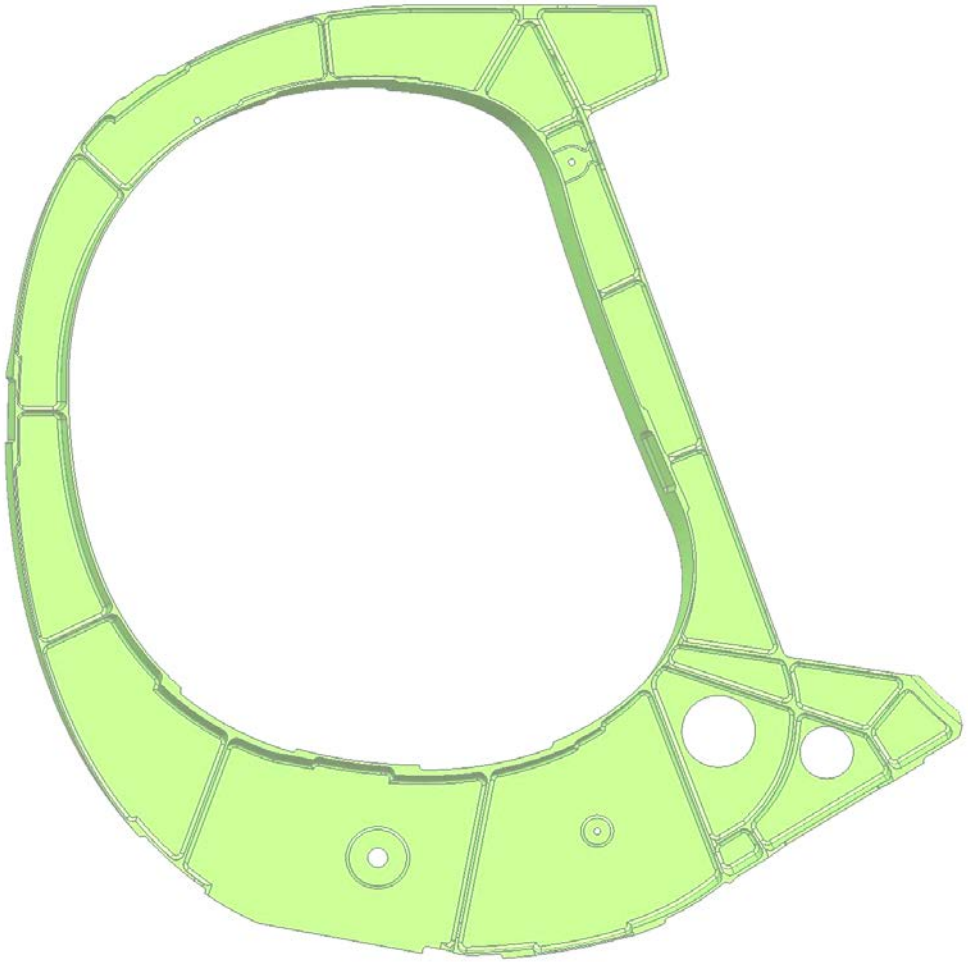


Point cloud data



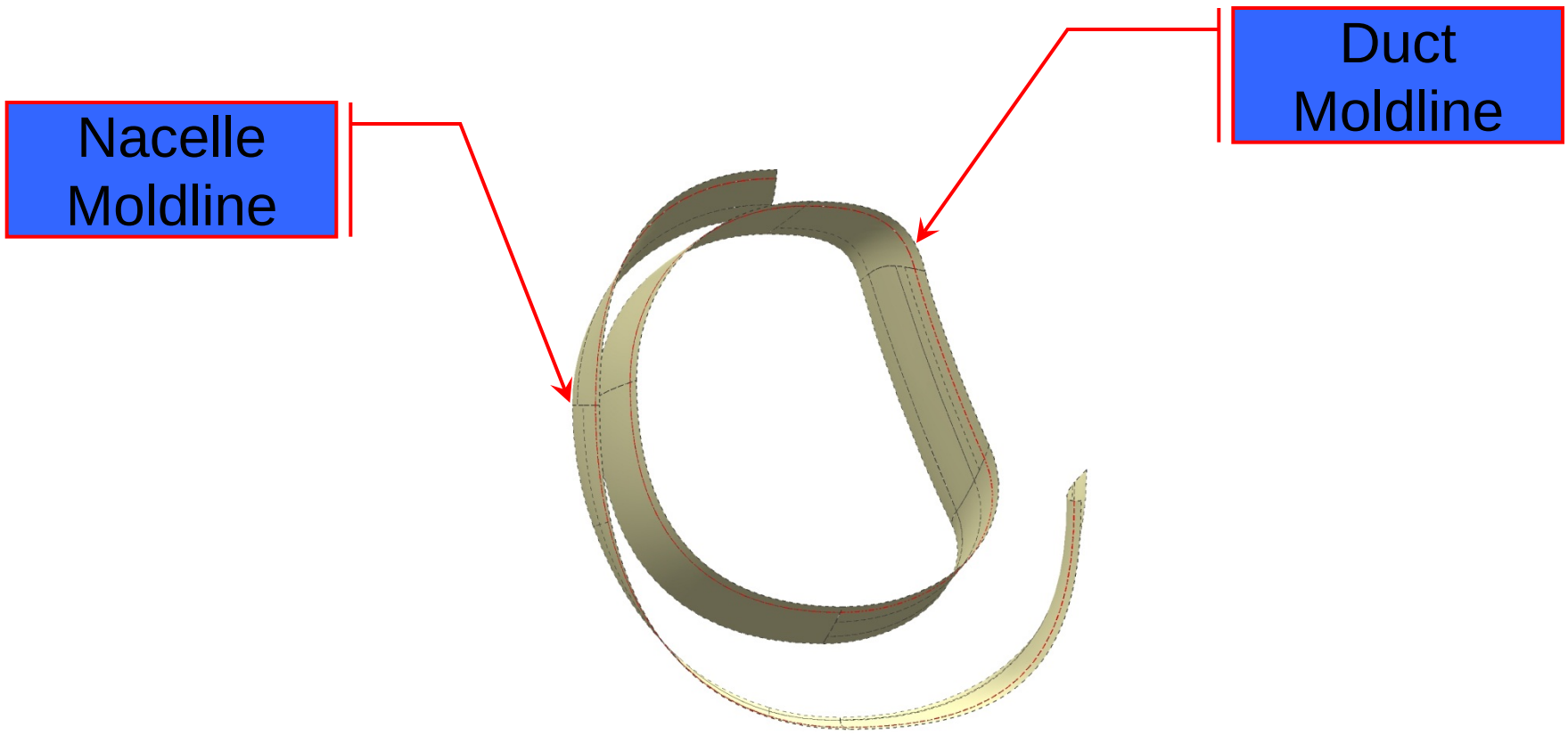
After correcting solid model

Blueprint Errors – Missing information

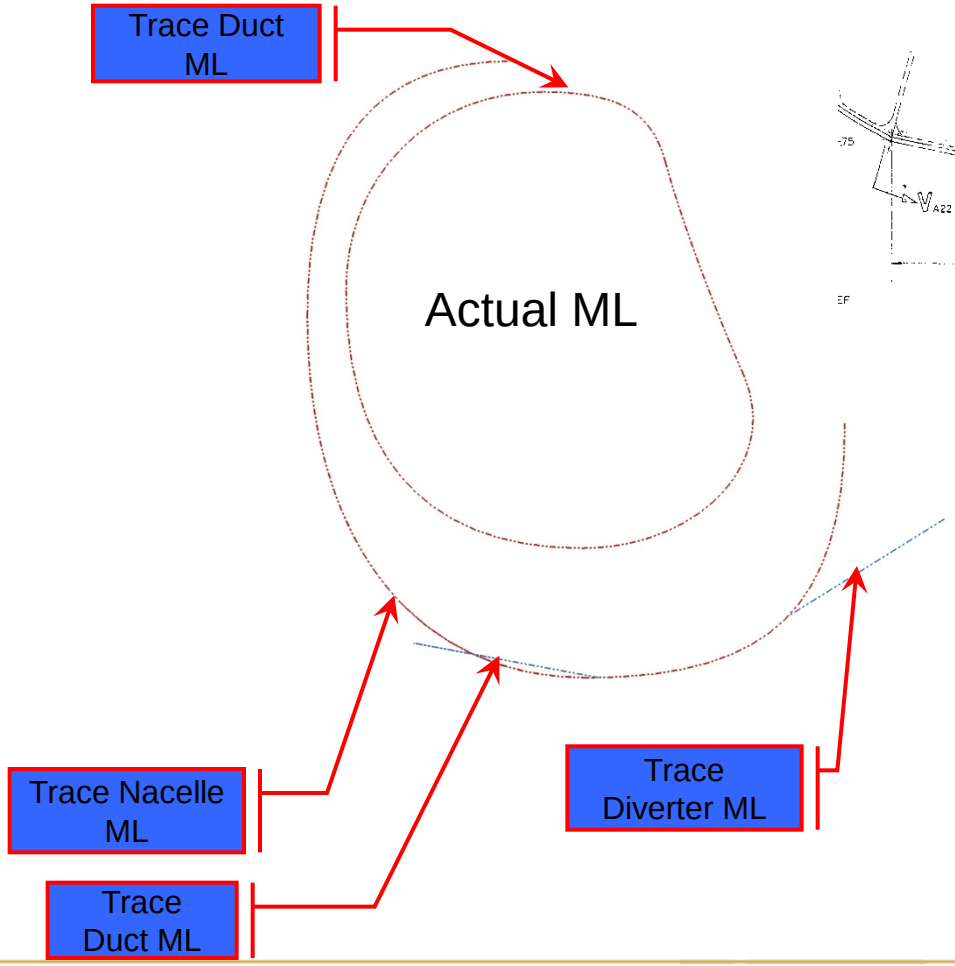


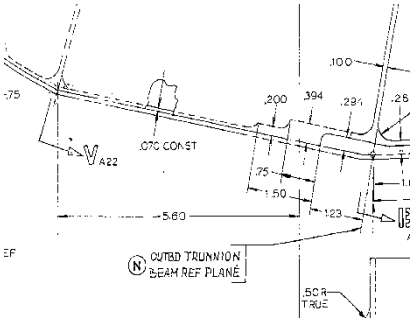
Structural Former

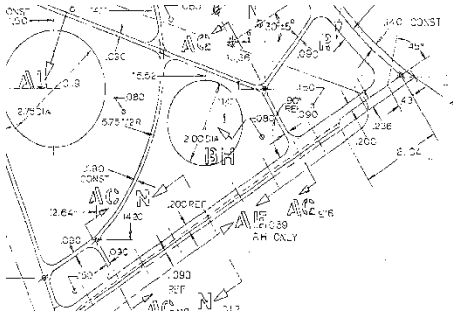
Blueprint Errors – Missing information



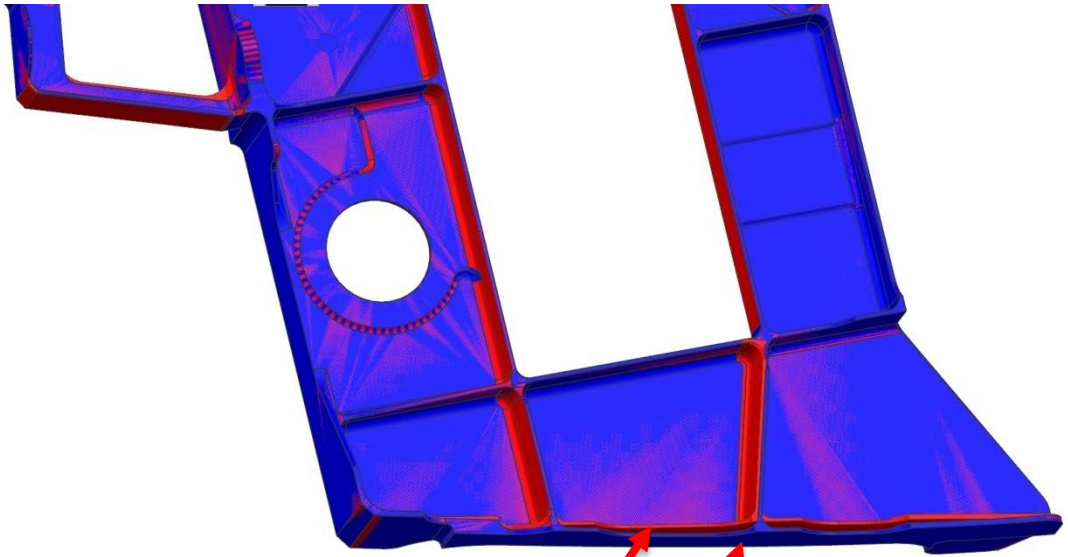
Blueprint Errors – Missing information





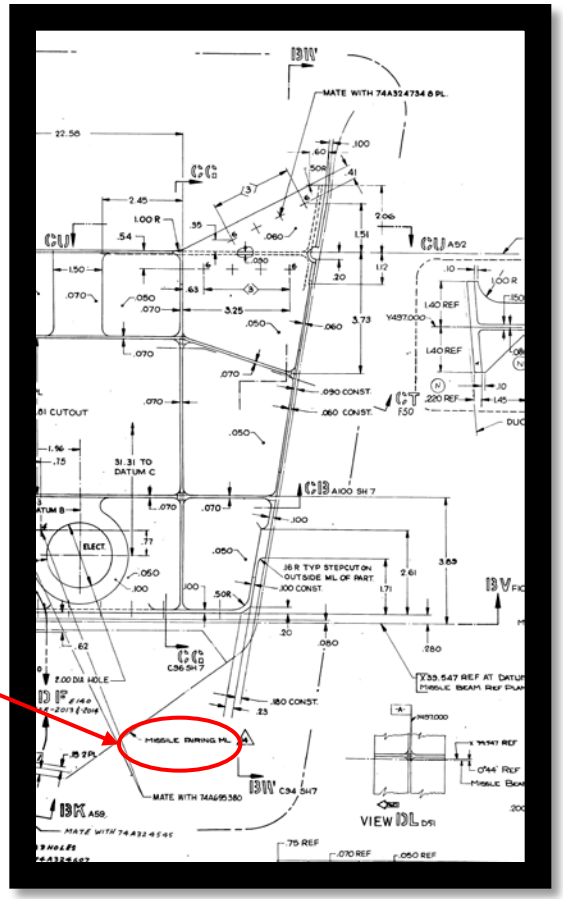


Blueprint Errors – Wrong Information



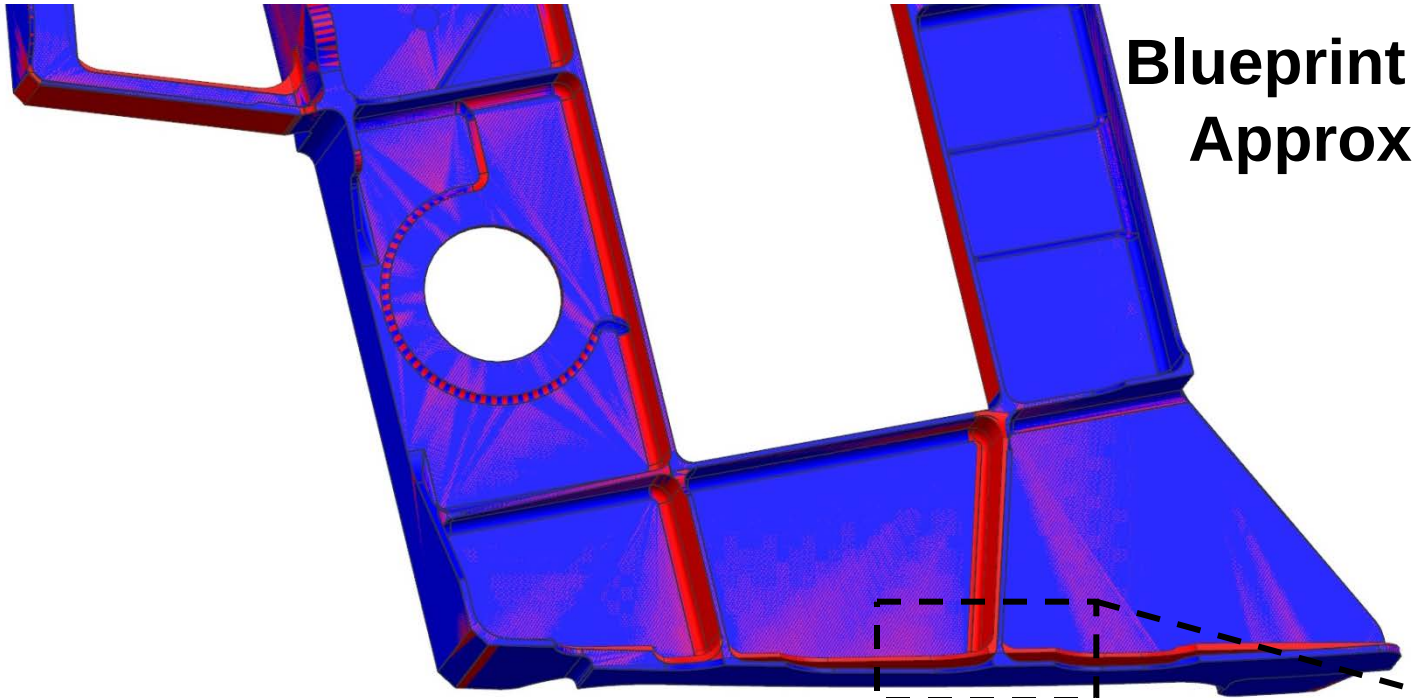
Fin Dent ML (Correct)

Missile Fairing ML



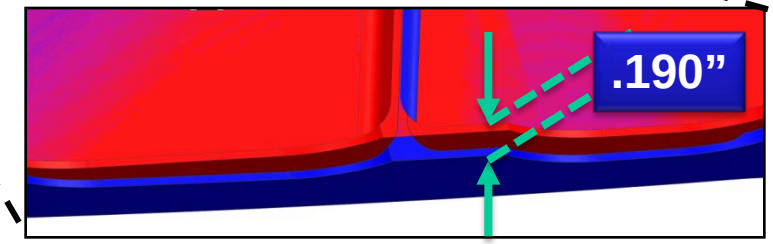
Example of incorrect call-out on a blueprint

Blueprint Errors – Wrong Information



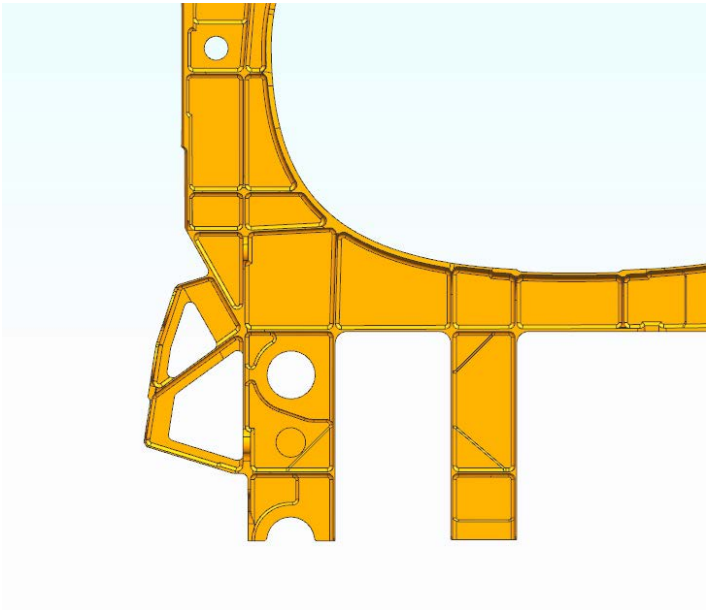
Blueprint Showed former
Approx. 0.190” lower

The change in height also affects the position of the flange

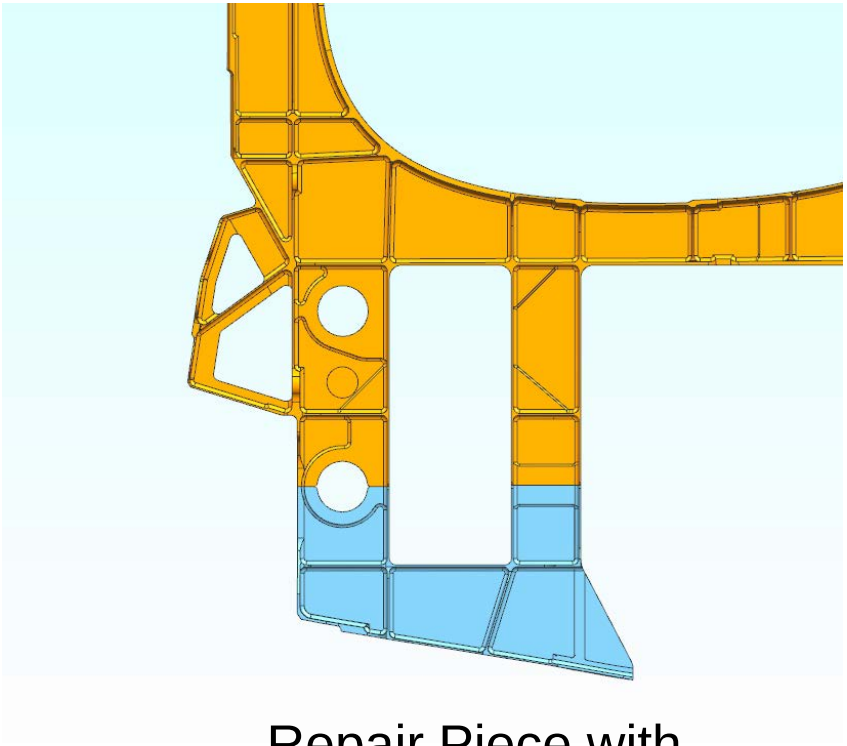


Blueprint Errors – Wrong Information

Discovered after Aircraft Fuselage already spliced together
Protrusion of Former prevented MLG Door from closing
Required Cut and Splice repair after former installation



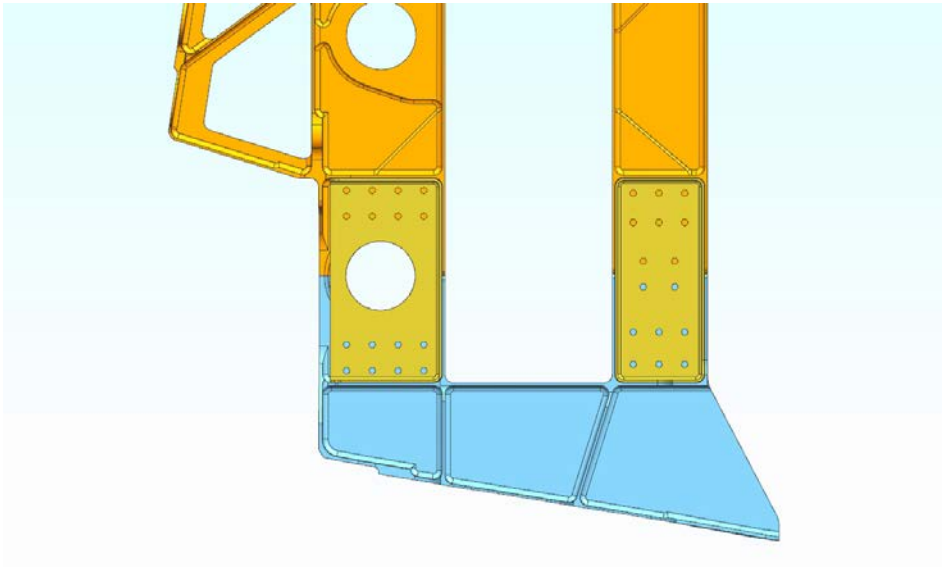
Former Cut Area

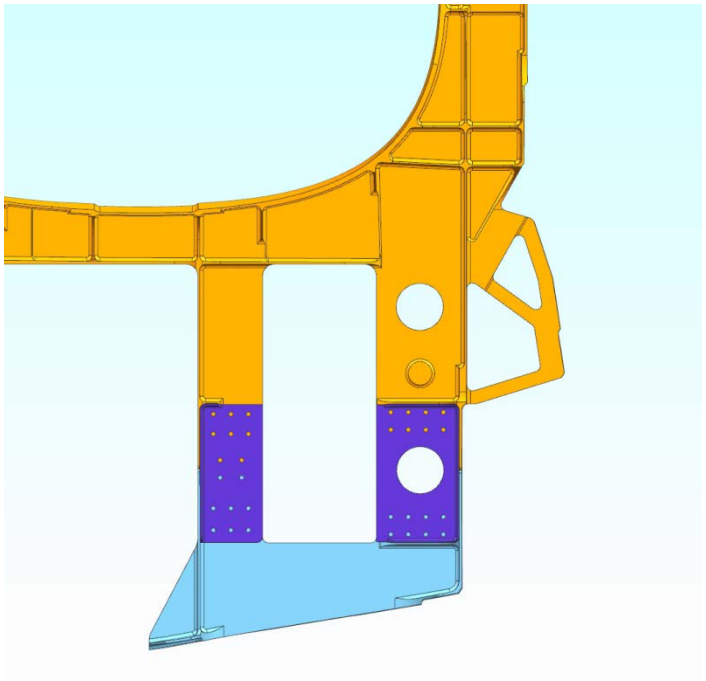


Repair Piece with
Correct Mold Line

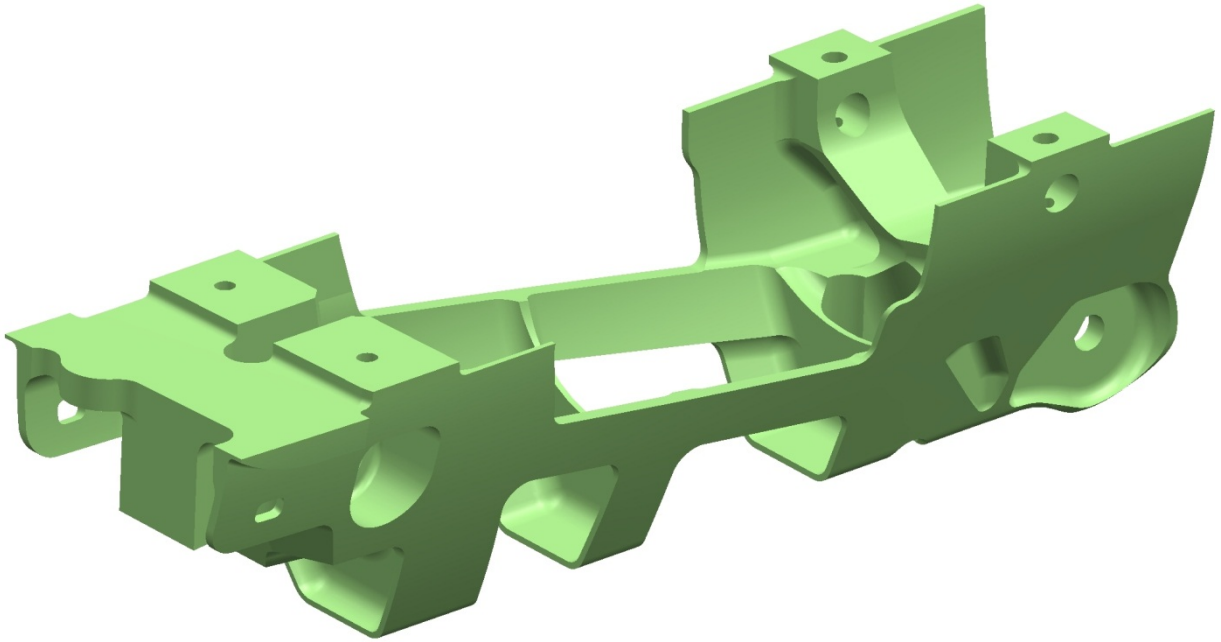
Blueprint Errors – Wrong Information

Complete Splice Repair Installation





Blueprint Errors – Conflicting information

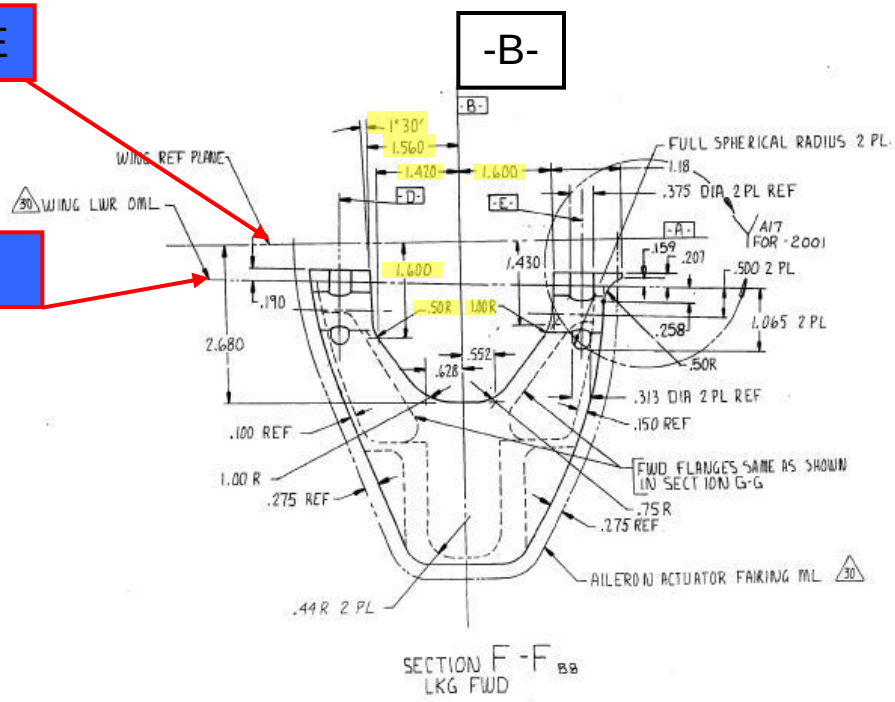


Hinge Half Assembly

Blueprint Errors – Conflicting information

WING REF PLANE

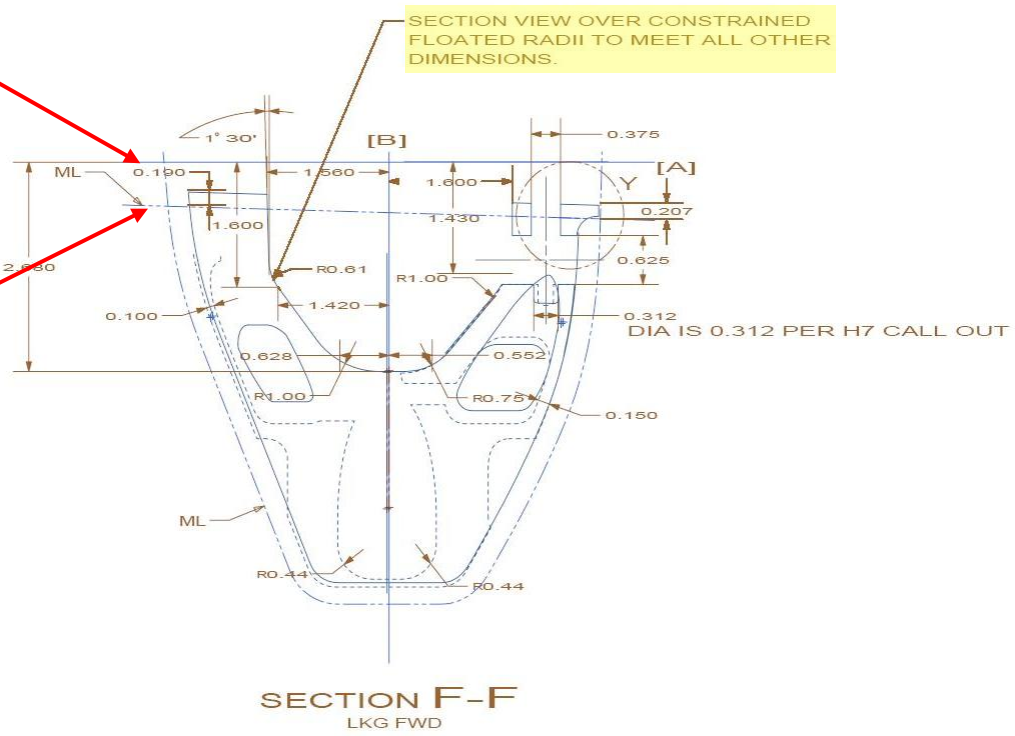
WING LWR OML



Blueprint Errors – Conflicting information

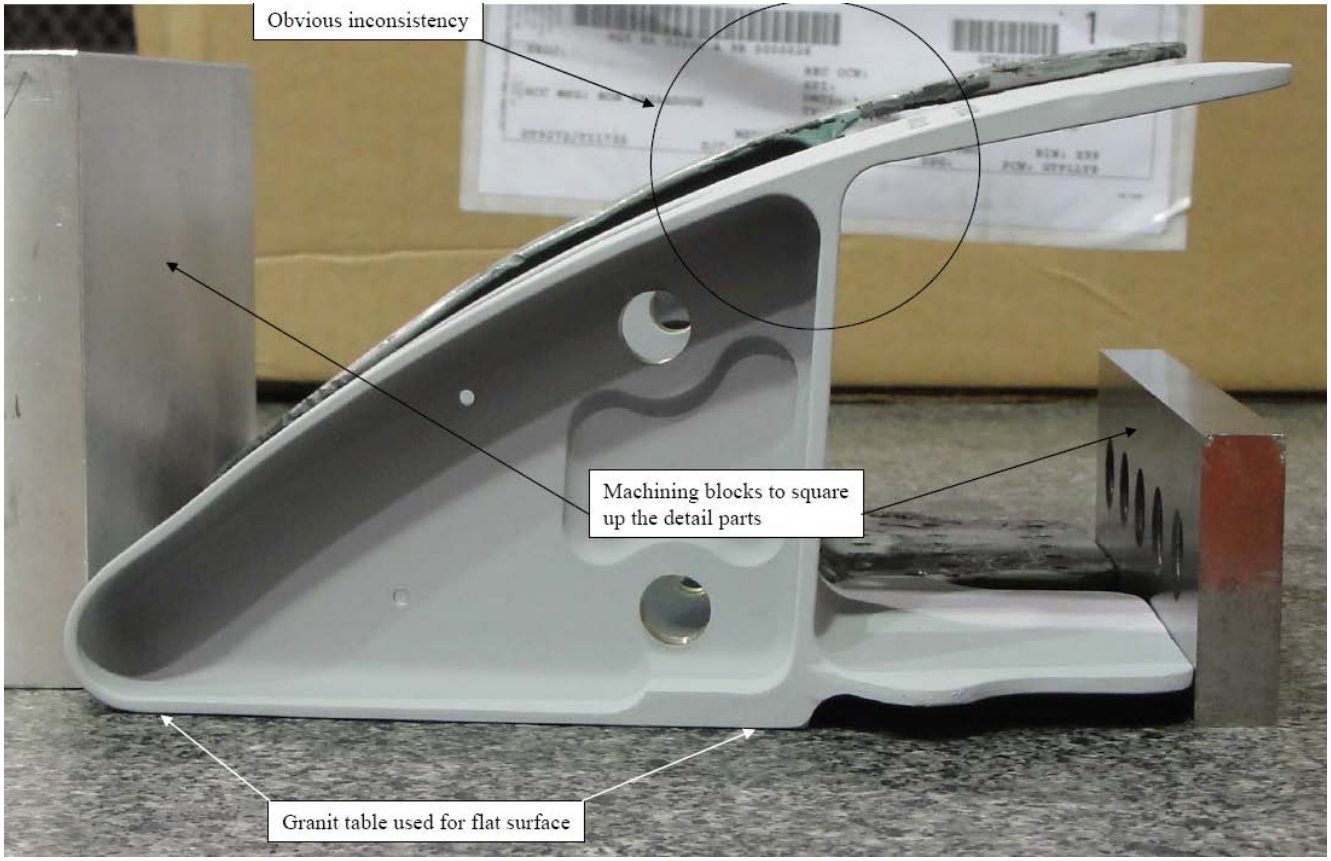
WING REF PLANE

WING LWR OML

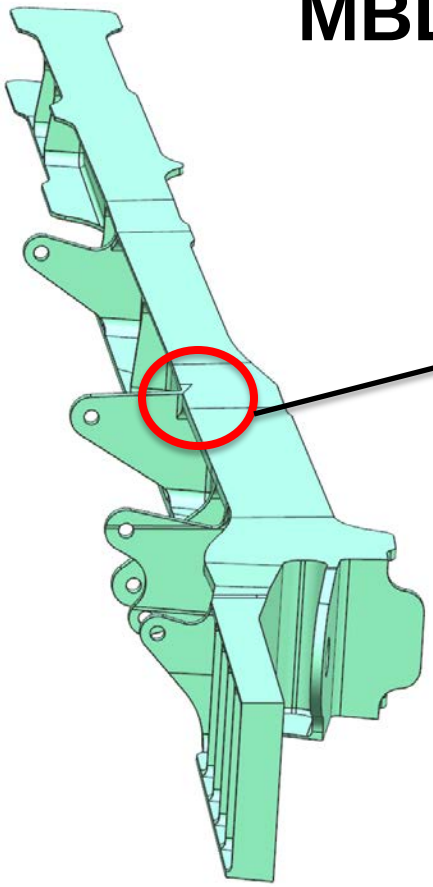


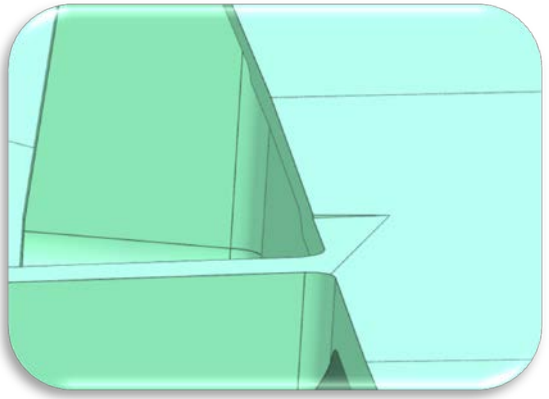
Reproduction of Section View F-F After Correction

Part Received from DLA Supply

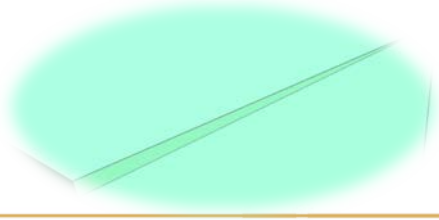


MBD Quality Issues



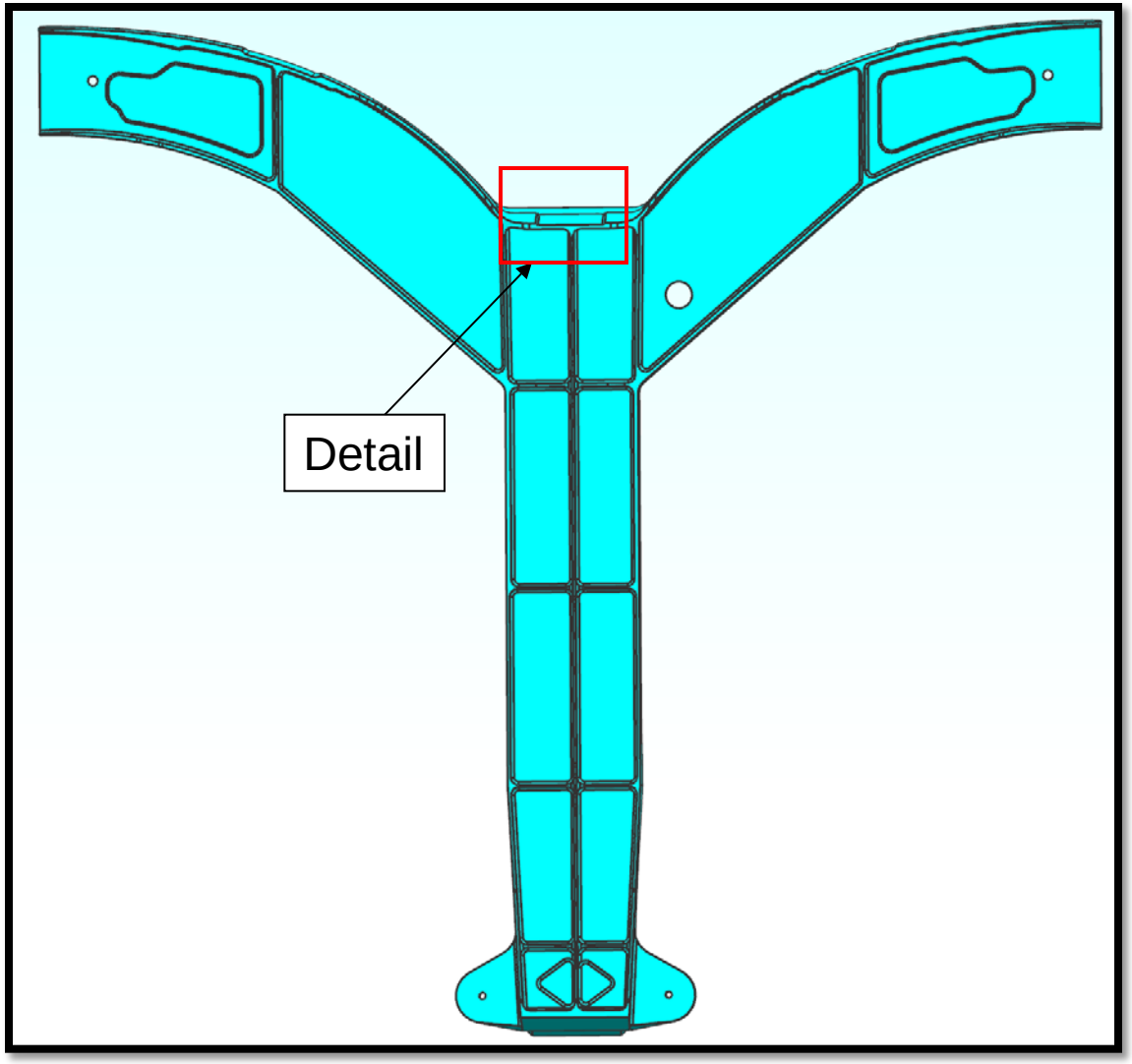


26 3D UNIGRAPHICS MODEL IS MASTER DEFINITION OF THIS PART

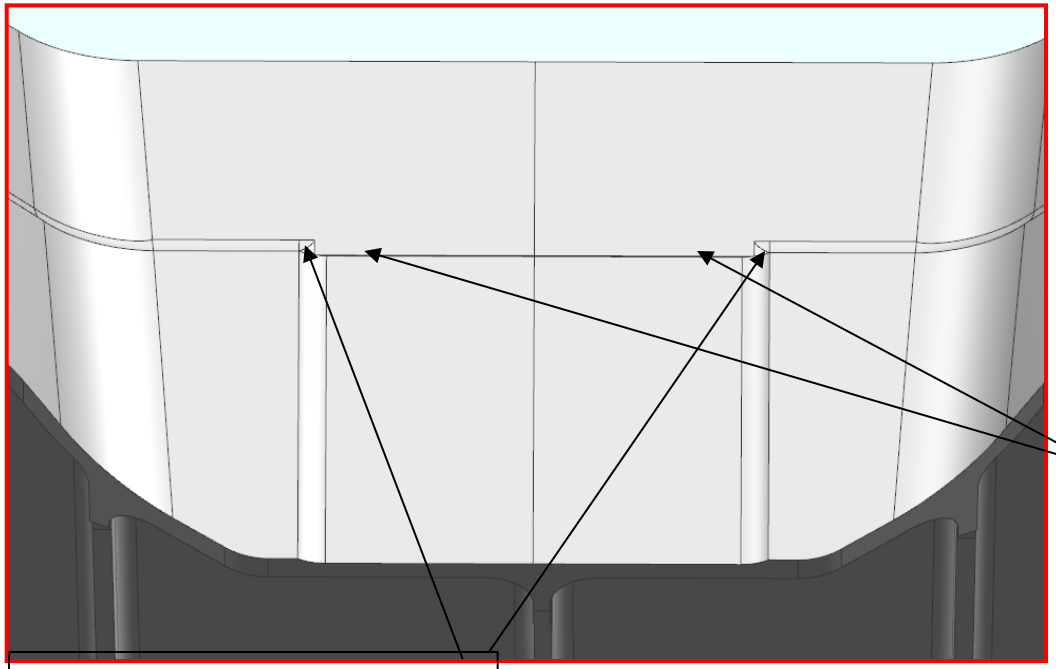


Vs.

MBD Quality Issues



MBD Quality Issues

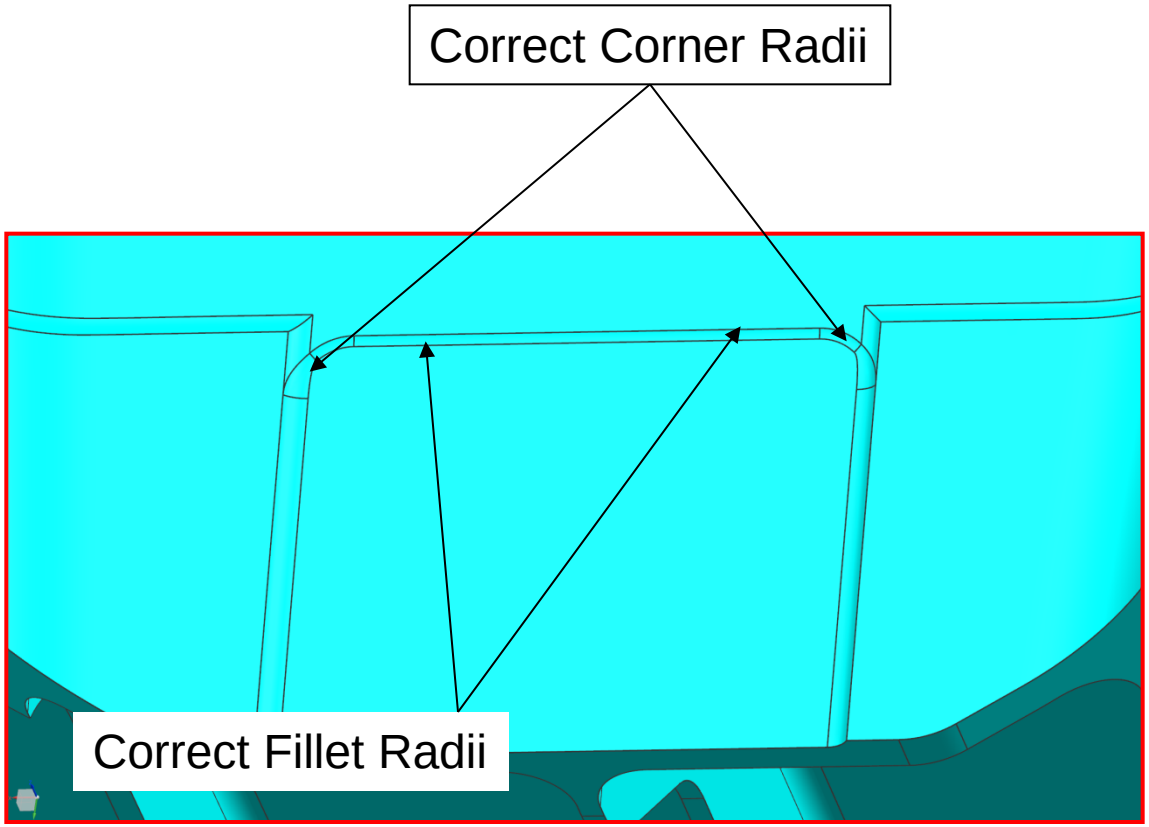


Lacking Fillet Radii

Lacking Corner Radii

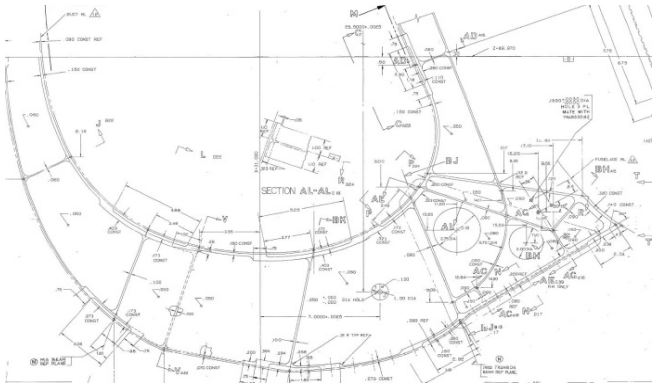
OEM MBD Detail
This cannot be Manufactured without a CNC Programmer adjusting the tool-path.

MBD Quality Issues

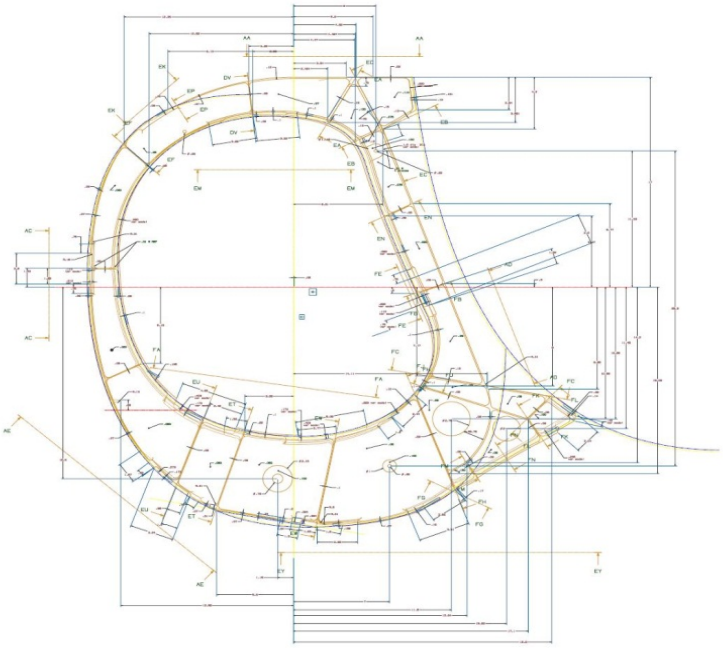


Manufacturing Model Management System (3MS)

Check 1: Ensure Model is True to Blueprint



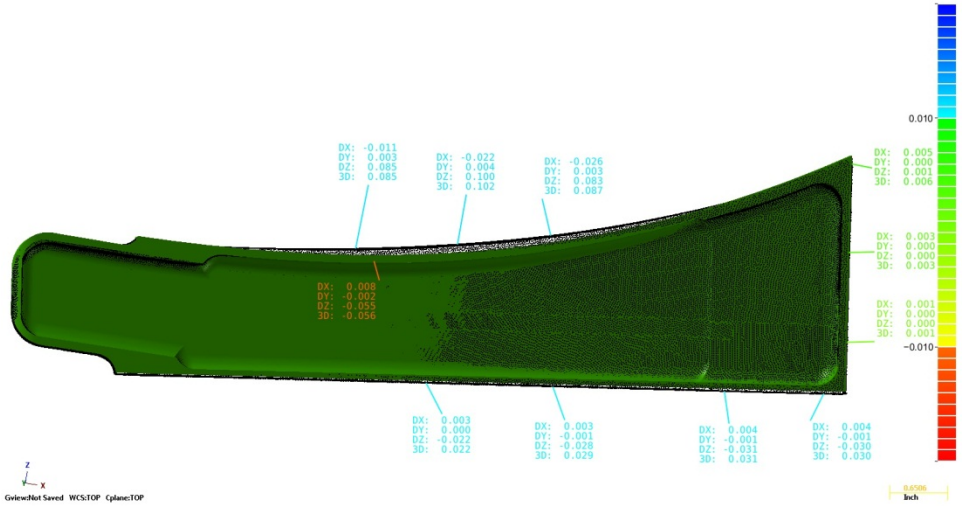
Original blueprint

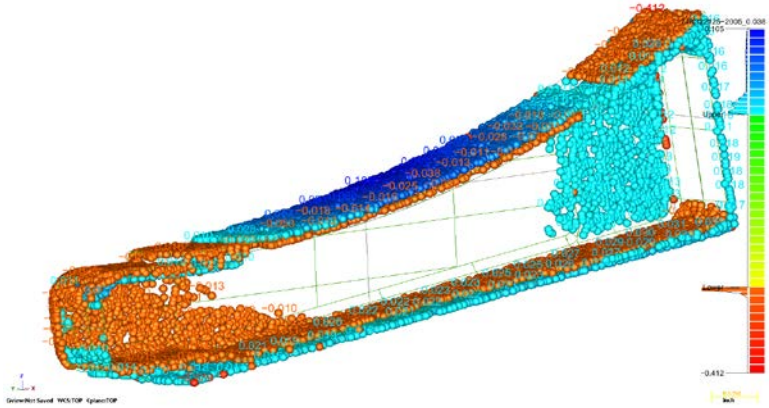


Created from Model Interrogation

Manufacturing Model Management System (3MS)

Check 2: Scan Aircraft Sample and Compare to Model

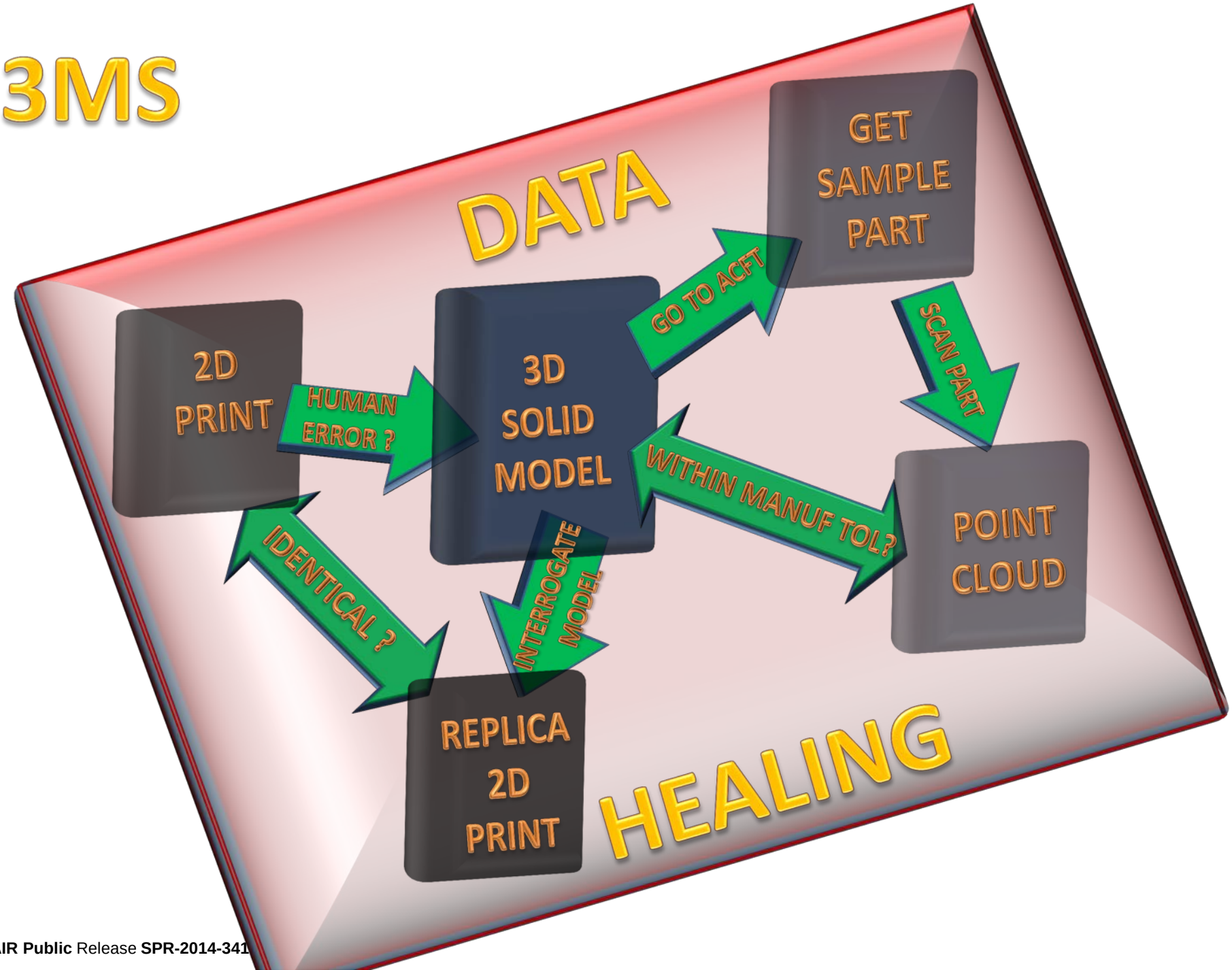




	Neg	Nom	Pos	Total	Pct
In Tolerance:	6354	70	6834	13258	41.86
Out of Tolerance:	8258		10154	18412	58.14
Failed Points:					
Total Points:	14612	70	16988	31670	100.00

	DX	DY	DZ	3D
Maximum Deviation:	0.2080	0.1840	0.3230	**0.1050**
Minimum Deviation:	-0.0900	-0.0870	-0.2790	**-0.4120**
Deviation Range:	0.2980	0.2710	0.6020	**0.5170**
Average Deviation:	0.0000	0.0000	0.0000	**0.0050**
RMS Deviation:	0.0080	0.0090	0.0240	**0.0270**
Standard Deviation:	0.0080	0.0090	0.0240	**0.0260**

3MS



NAVAIR Public Release **SPR-2014-341**

FRCSW 2D-3D Translation Control Documents

FRCSWINST 4790.4

FRCSWINST 13600.2

Questions?

ISSC Engineering Team, FRCSW Code 43353

Presented 28 April 2014 Rick Mendoza