SMARTDENT: 2019 UPGRADES, HARDWARE AND SOFTWARE

2019-09-17 A4A NDT Forum

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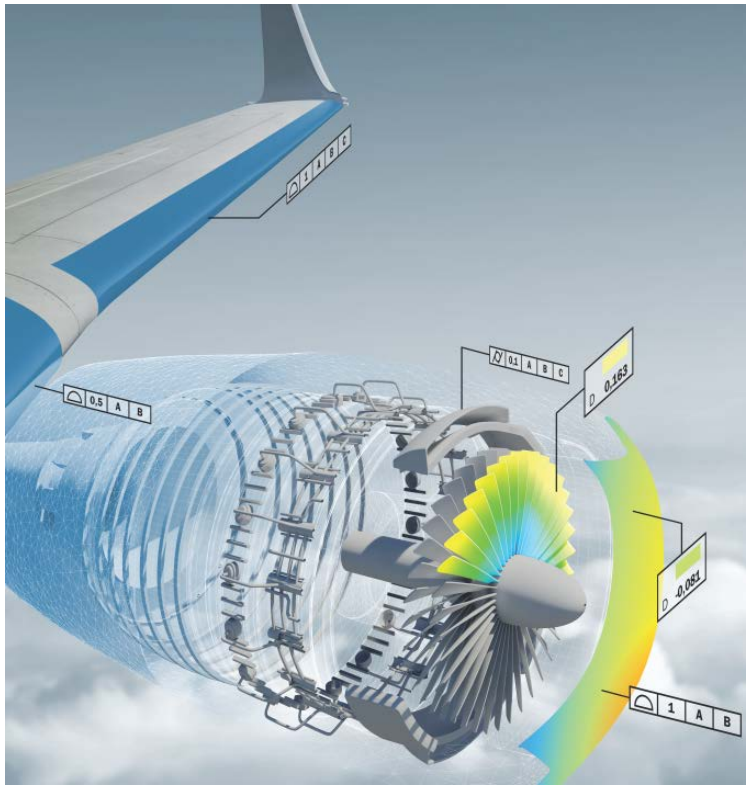
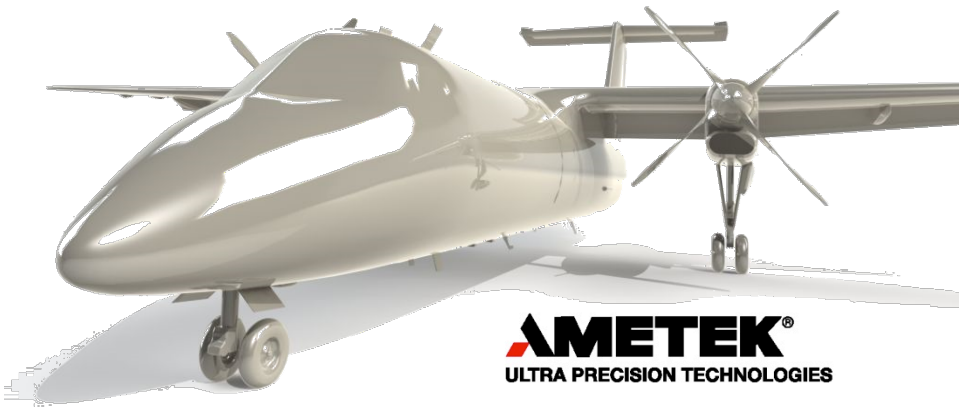
AGENDA

- Overview of Creaform's portable scanners
  - GoSCAN Spark
  - HandySCAN Black
  - Comparison to previous models
- SmartDENT
  - New features
  - Examples
- Creaform tools used by MROs/Airlines
  - Applications





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SCANNER LINEUP

CREAFORM'S PORTABLE SCANNER LINEUP

Go!SCAN3D™

SPARK

2019

307

HandySCAN3D™

BLACK

2019

BLACK|Elite

2019

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CREAFORM'S PORTABLE SCANNER LINEUP

Go!SCAN3D™

SPEED
SIMPLICITY
SCAN QUALITY

HandySCAN3D™

SPEED
METROLOGY-GRADE
VERSATILITY

* All Creaform tools compatible with all major CAD, metrology and computer graphic software through mesh import, point cloud. Also through CAD surfaces with VXmodel module.

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HOW THE GOSCAN WORKS

	Go!SCAN SPARK™
ACCURACY (1)	Up to 0.050 mm (0.0020 in)
MEASUREMENT RESOLUTION	0.100 mm (0.0039 in)
MESH RESOLUTION	0.200 mm (0.0078 in)
MEASUREMENT RATE	1,500,000 measurements/s
LIGHT SOURCE	White light (99 stripes)
POSITIONING METHODS	Geometry and/or color and/or targets

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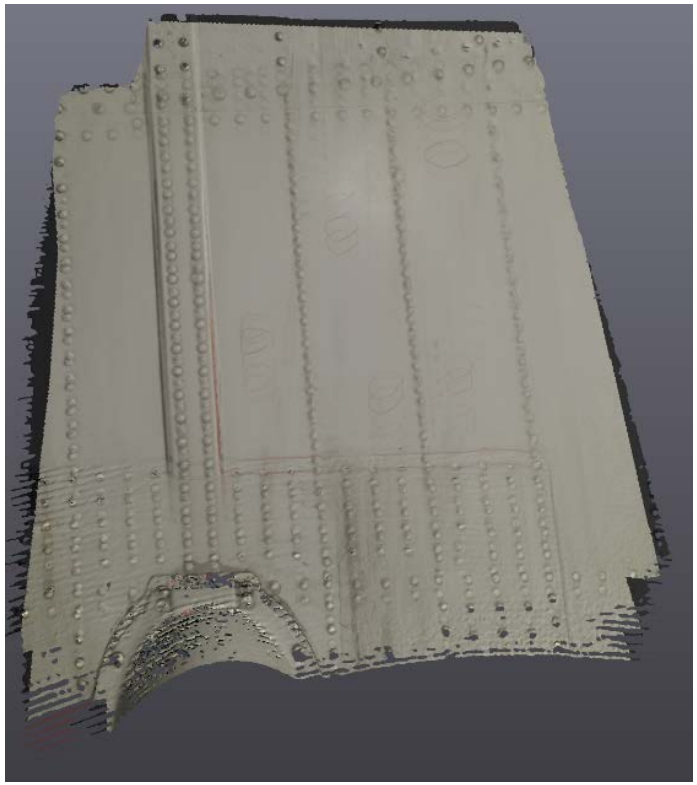
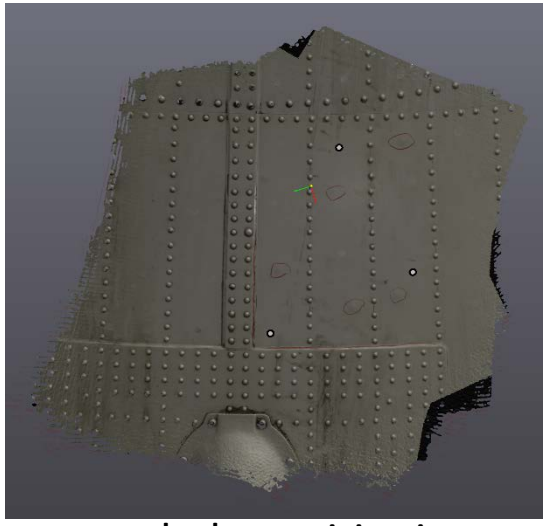
LIMITATIONS OF GOSCAN WITH SMARTDENT

- Problematic areas:
  - No geometry
  - No color
  - Symmetric patterns (rivets)
- Workaround use known references like targets



No targets, too much symmetry



3 targets to help positioning: good scan

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HOW THE HANDYSCAN WORKS

- Uses positioning targets to triangulate itself automatically at all times
  - Insures accuracy and repeatability independently of inspector and environment
- 1 min/m² to position targets
  - New low adhesive very easy to brush away/remove
- Acquired data = good data
- No limitations: sunlight, chrome parts, any color/finish

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HOW THE HANDYSCAN WORKS

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CREAFORM'S HANDYSCAN

307	BLACK	BLACK|Elite
Accuracy +	Accuracy ++	Accuracy +++
Resolution 0.100 mm	Resolution 0.025 mm	Resolution 0.025 mm
7 red laser crosses	7 blue laser crosses	11 blue laser crosses (+1)
Meas. rate 480k	Meas. rate 800k	Meas. rate 1.3M
	ISO 17025	ISO 17025

	HandySCAN 307™	HandySCAN BLACK™	HandySCAN BLACK™|Elite
ACCURACY (1)	Up to 0.040 mm (0.0016 in)	0.035 mm (0.0014 in)	0.025 mm (0.0009 in)
MEASUREMENT RESOLUTION	0.100 mm (0.0039 in)	0.025 mm (0.0009 in)	
MESH RESOLUTION	0.200 mm (0.0078 in)	0.100 mm (0.0039 in)	
MEASUREMENT RATE	480,000 measurements/s	800,000 measurements/s	1,300,000 measurements/s
LIGHT SOURCE	7 red laser crosses	7 blue laser crosses	11 blue laser crosses (+ 1 extra line)
LASER CLASS	2M (eye safe)		

(1) HandySCAN BLACK and HandySCAN BLACK|Elite (ISO 17025 accredited): Based on VDI/VDE 2634 part 3 standard. Probing error performance is assessed with diameter measurements on traceable sphere artefacts.
HandySCAN 307: Typical value for diameter measurement on a calibrated sphere artefact.

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ISO 17025

- Based on VDI/VDE 2634 part 3 standard
- Tools accuracy compared to artefacts traceable to metrology laboratories (NIST, NRC)
- Accuracy must include 100% of data (even better than 2 sigma = 95%)

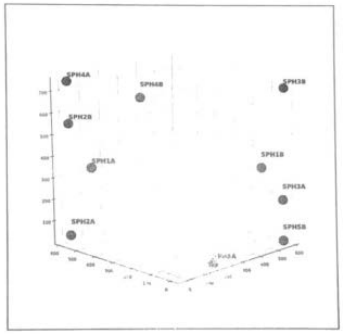
Probing Size Error

Summary

Specification	Limits +/-	Status	Max. Deviation (Result)
Accuracy	0.0250	Passed	0.0077

Uncertainty ($k = 2$) : 0.0040
Decision rule based on simple acceptance.

Positions in volume



Isometric view

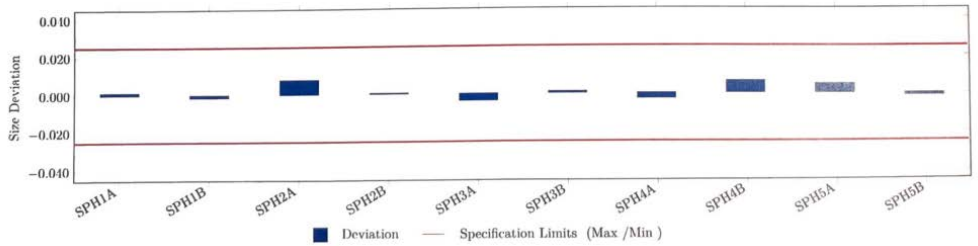
Probing Size Error

Detailed Results

Position	Size Deviation	Diameter (Nominal)	Diameter (Measured)	Form (Range of deviation)[a]	Form (Sigma)[a]
SPH1A	0.0013	38.1184	38.1197	0.0324	0.0055
SPH1B	-0.0014	38.1127	38.1113	0.0372	0.0057
SPH2A	0.0077	38.1138	38.1215	0.0362	0.0058
SPH2B	0.0004	38.1151	38.1155	0.0361	0.0057
SPH3A	-0.0037	38.1194	38.1157	0.0338	0.0059
SPH3B	0.0010	38.1165	38.1175	0.0357	0.0058
SPH4A	-0.0028	38.1172	38.1144	0.0368	0.0058
SPH4B	0.0063	38.1161	38.1224	0.0446	0.0060
SPH5A	0.0046	38.1141	38.1187	0.0388	0.0060
SPH5B	-0.0012	38.1171	38.1159	0.0355	0.0058

Average Deviation	0.0012	
Max. dev. (Result)	0.0077	Passed
Limits +/-	0.0250	

Graph



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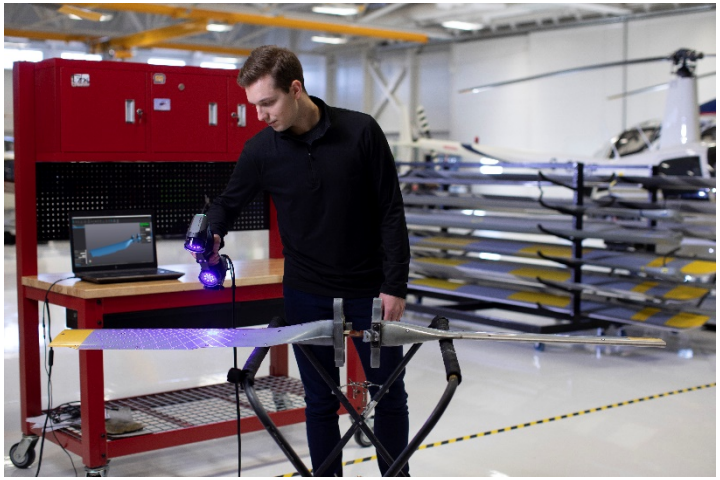
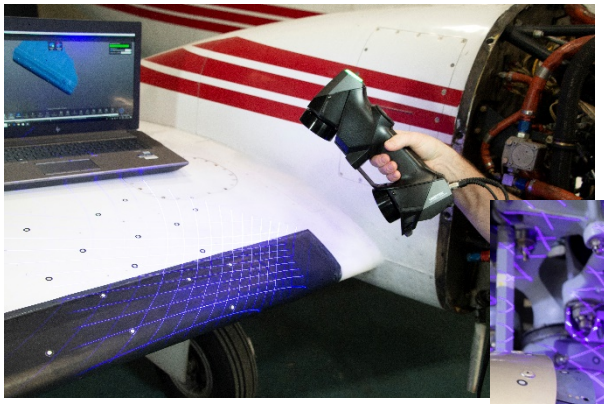
IMPROVEMENT OF HANDYSCAN 2019

- Fast scan for any surfaces (shiny as well)
- Chrome finish/mirror capable
- Very light adhesive targets (light and high still available + magnet)
- Measurement resolution improved (more details)
- Laser can adapt to scan multiple color/reflectivity on the same pass
- 50 ft long cables





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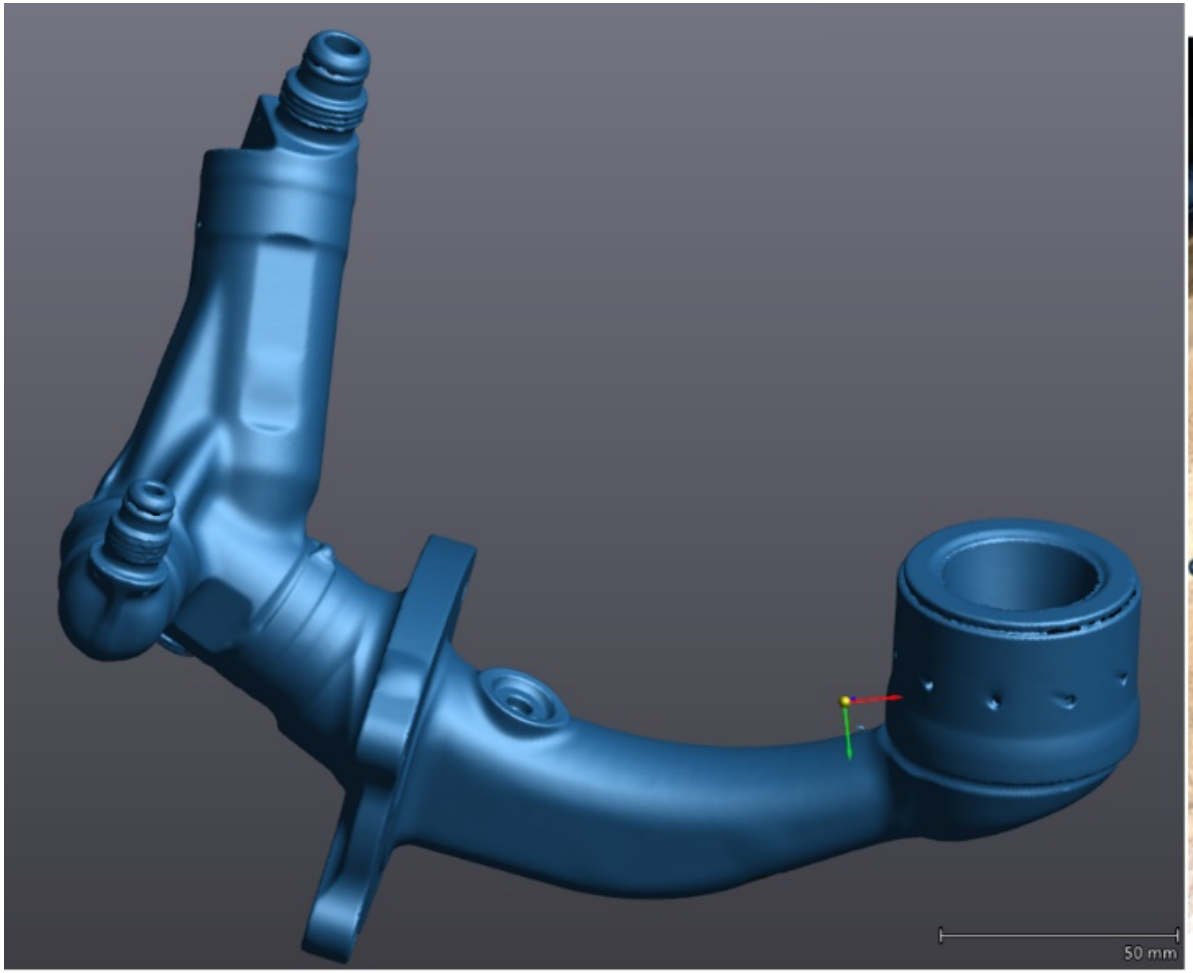

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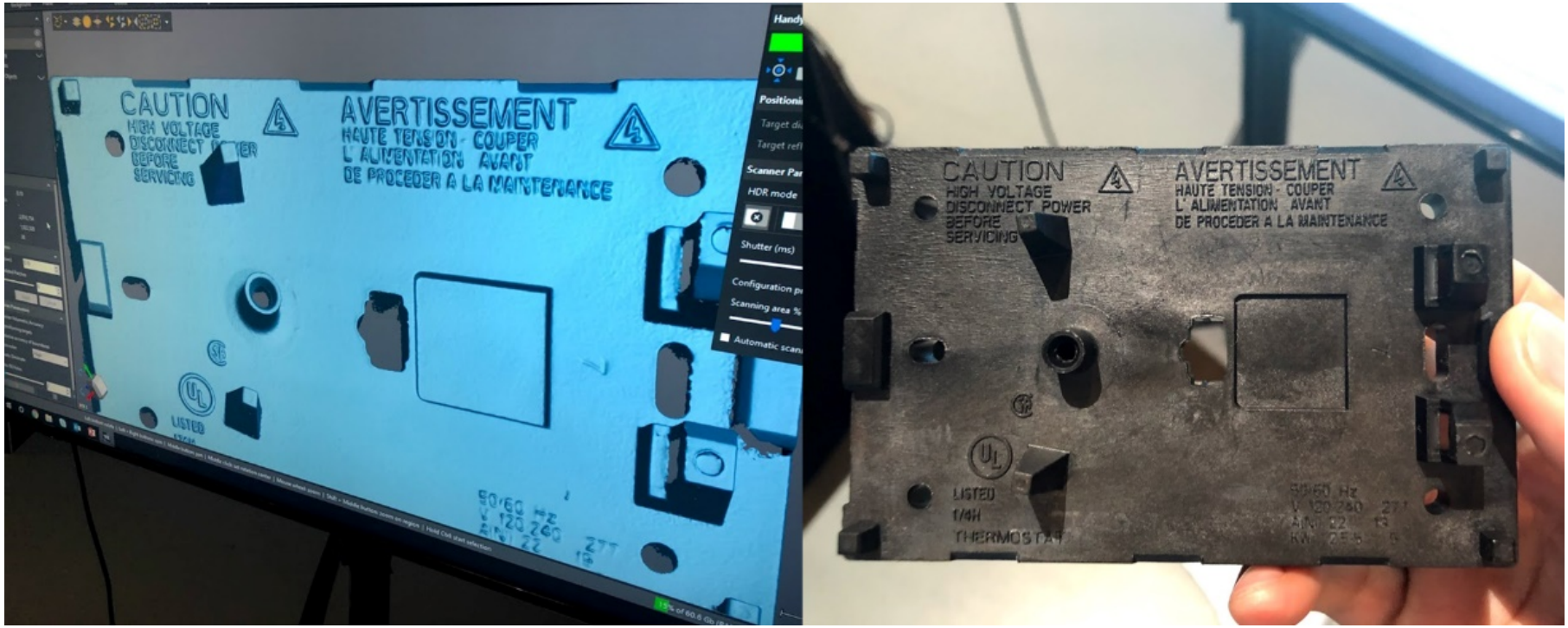

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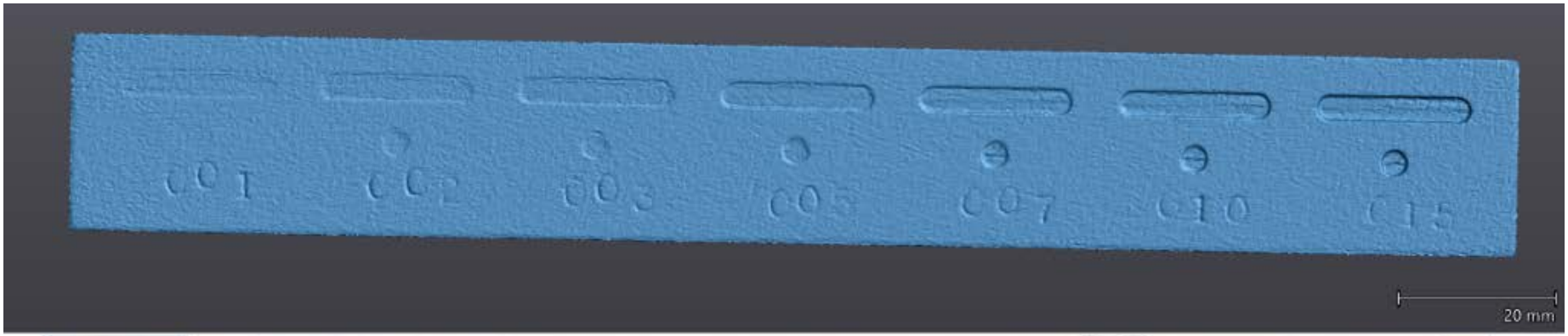

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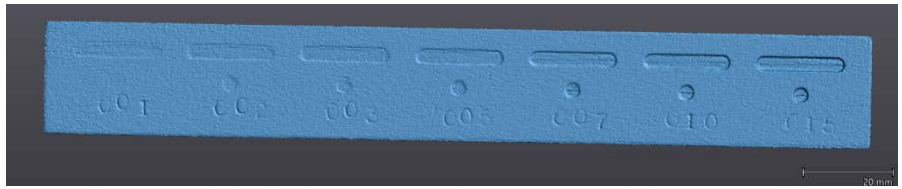

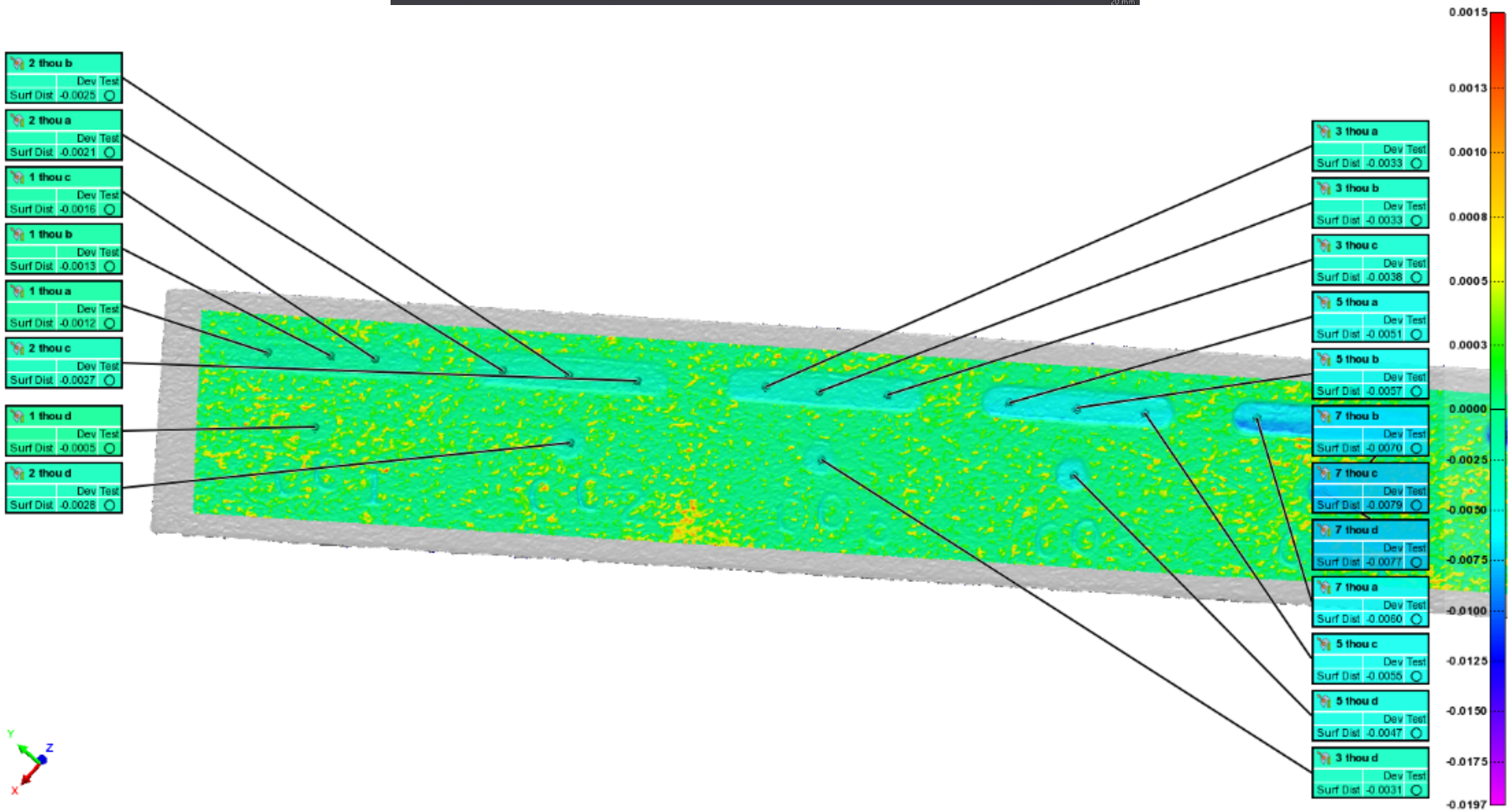

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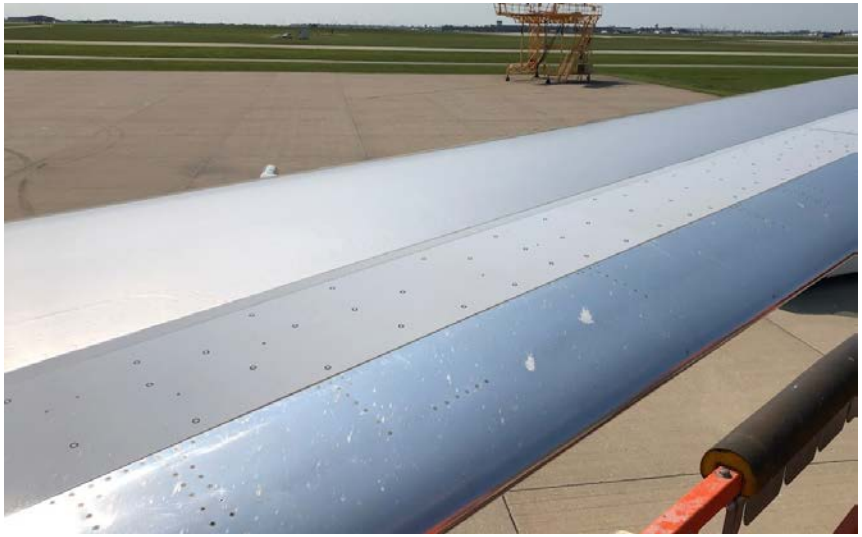

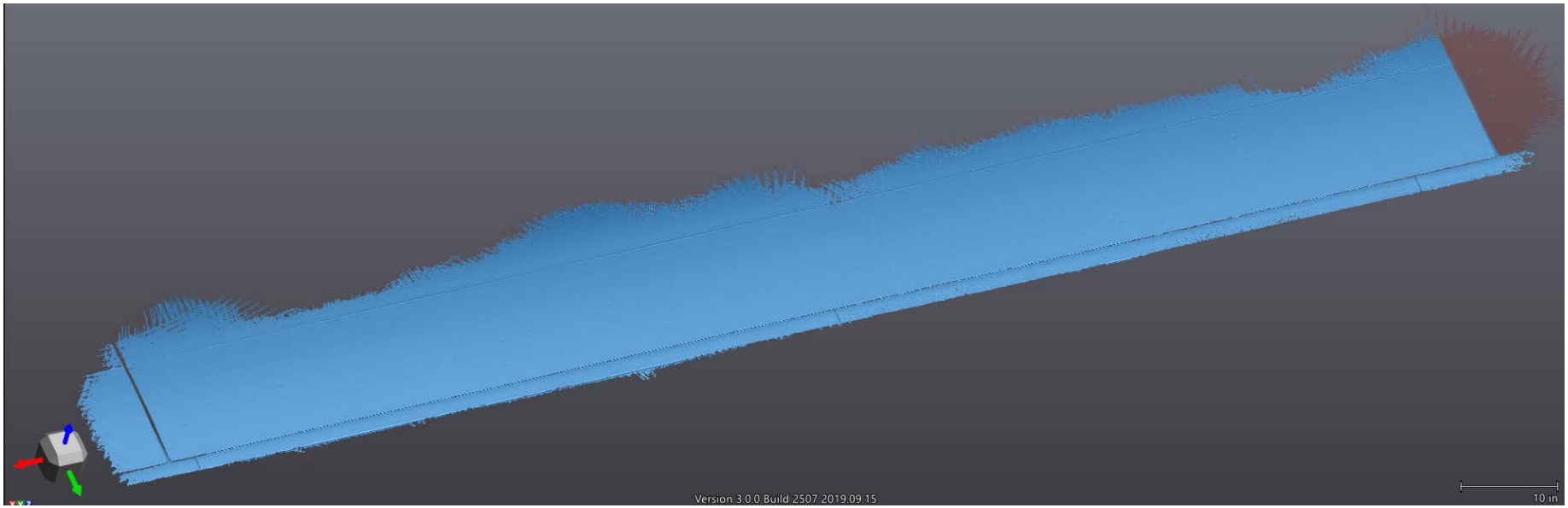

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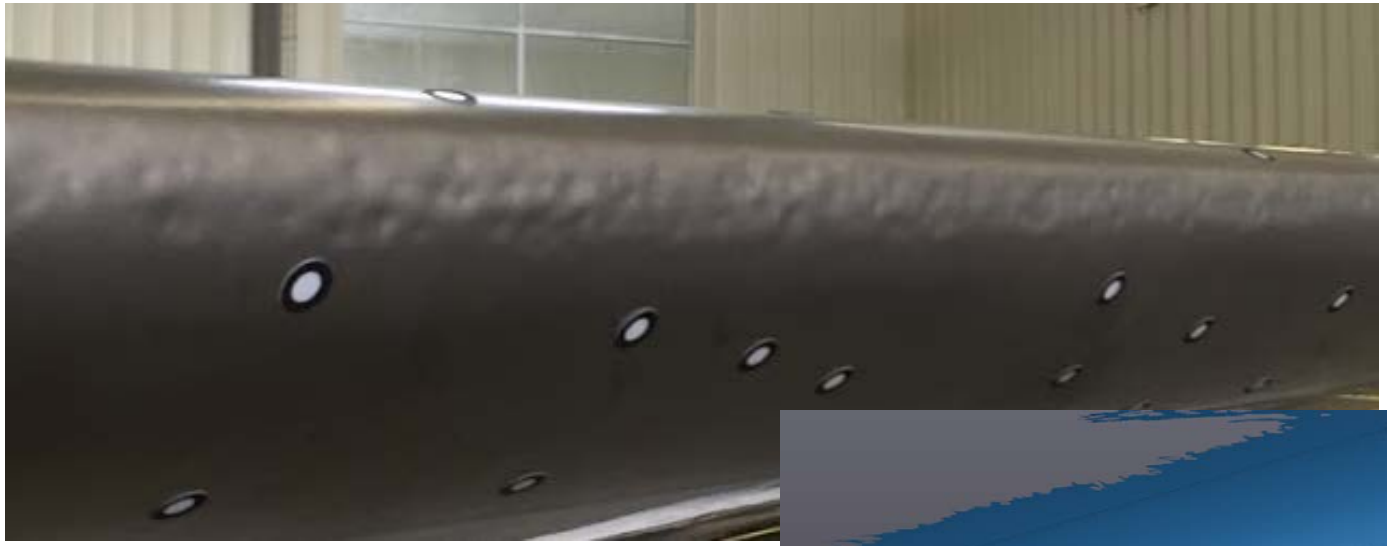

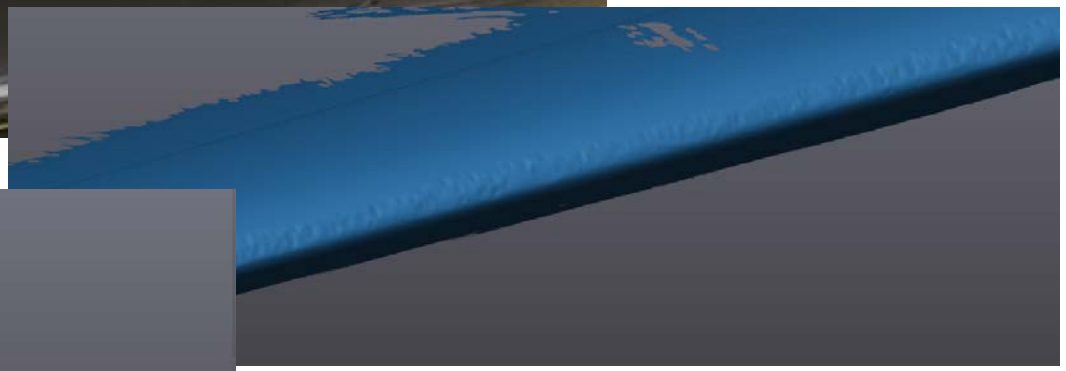

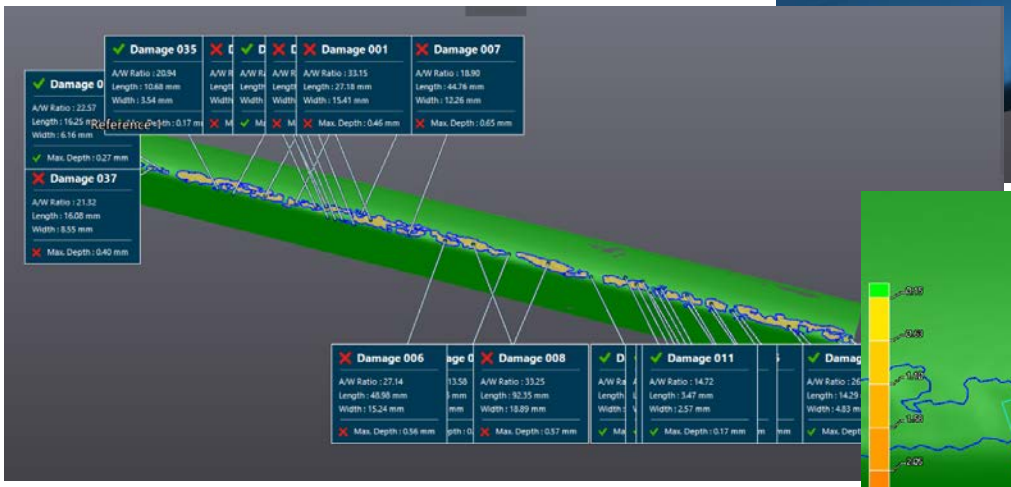

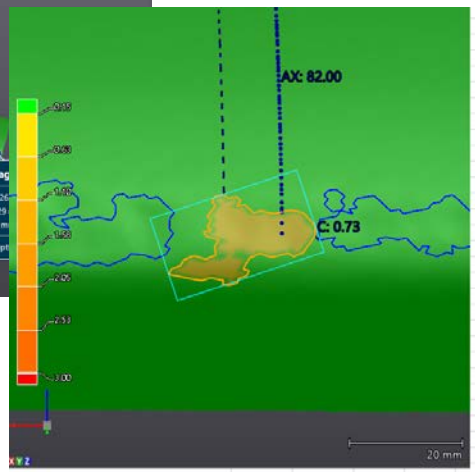

				0.16	0.16					
				0.24	0.29	0.28	0.22	0.19	0.23	0.21	0.16	
				0.27	0.34	0.39	0.33	0.31	0.37	0.33	0.32	
				0.24	0.33	0.42	0.35	0.39	0.46	0.42	0.36	0.18
				0.16	0.20	0.19	0.17	0.23	0.30	0.28	0.22	
	0.15	0.17	0.17	0.19	0.18	0.16						
0.15	0.15	0.19	0.16	0.17	0.18	0.16						

Name	Value	Unit
A/W Ratio	33.152	
AX: Deepest point to Reference 1	81.996	mm
BX: Distance to Reference 1	76.670	mm
Deepest point depth	0.465	mm
Length	27.177	mm
Width	15.413	mm

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SMARTDENT UPDATES

SMARTDENT UPDATES

- Measure positive/negative deformation
  - Possibility to excluded areas
- Multi-shape, double curvature analysis
- Aimed to facilitate onsite scanning
  - Simplified workflow
  - Aircraft scan location
- Software flexibility

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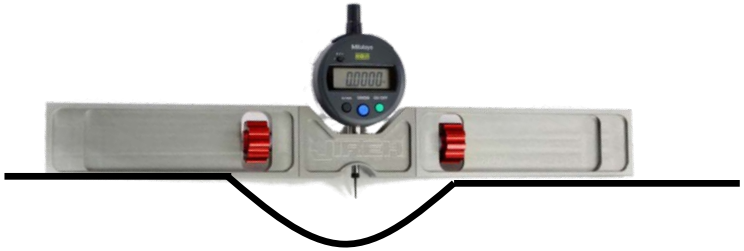
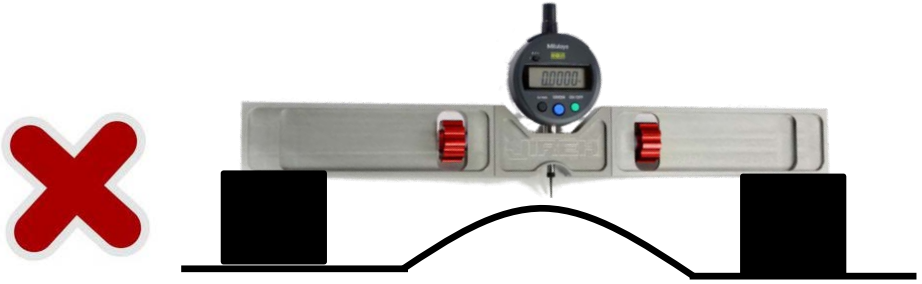
MEASURE POSITIVE/NEGATIVE DEFORMATION

- Virtual pit gage allows accurate measurements
- Even more reliable than using block under pit gage



Negative deformation



Positive deformation

Positive deformation flipped

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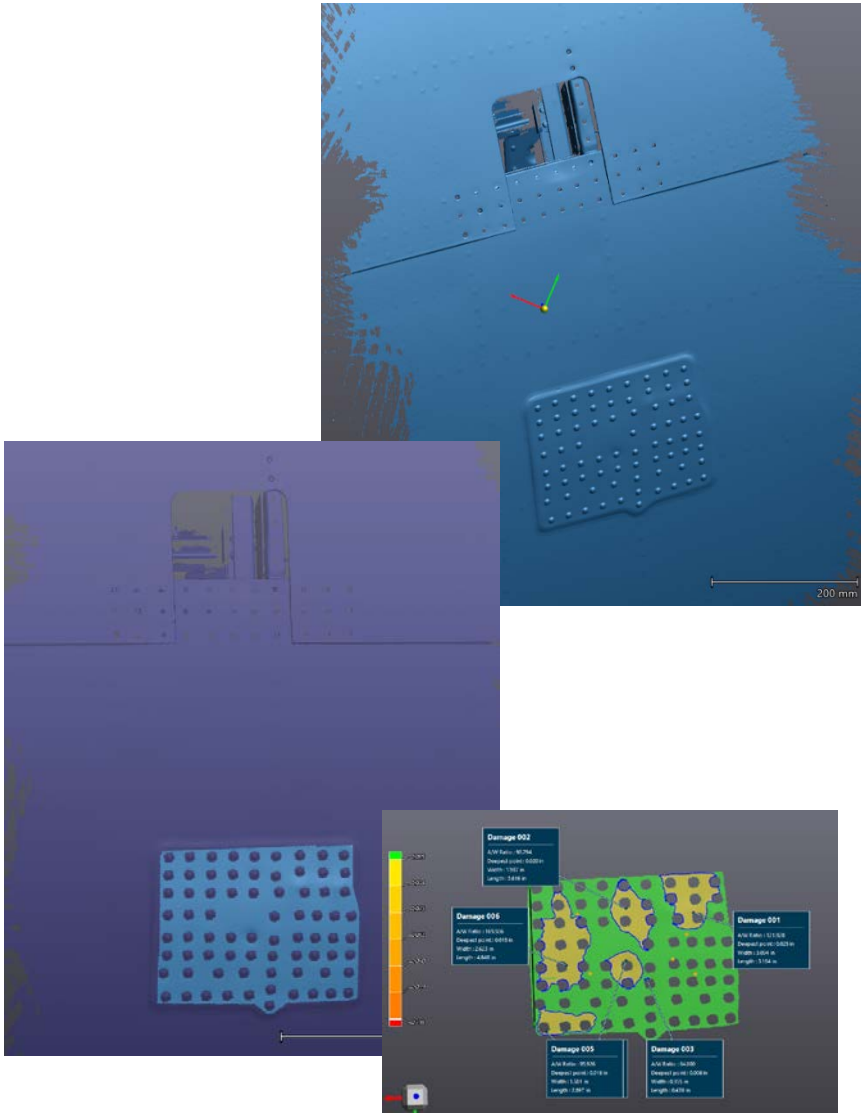
EXCLUDE AREAS

- Keep all scan data
- Remove surface from analysis
- Perform measurements difficult/impossible manually



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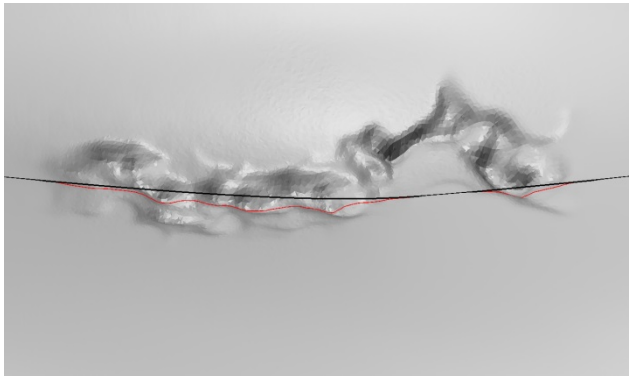
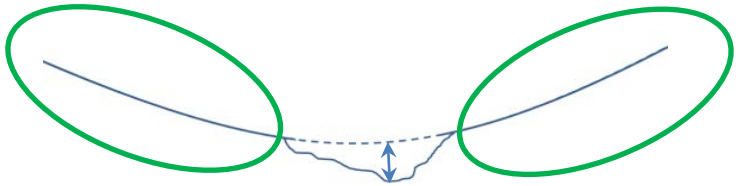
MULTI-SHAPE

- When pit gage can’t be used
  - Double curvature
  - Dent in concave area





- Provides total flexibility

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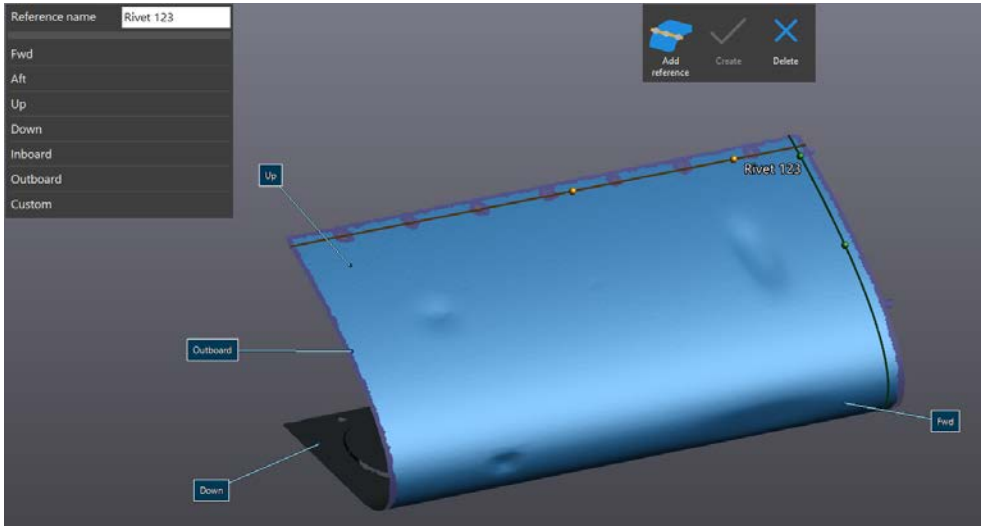
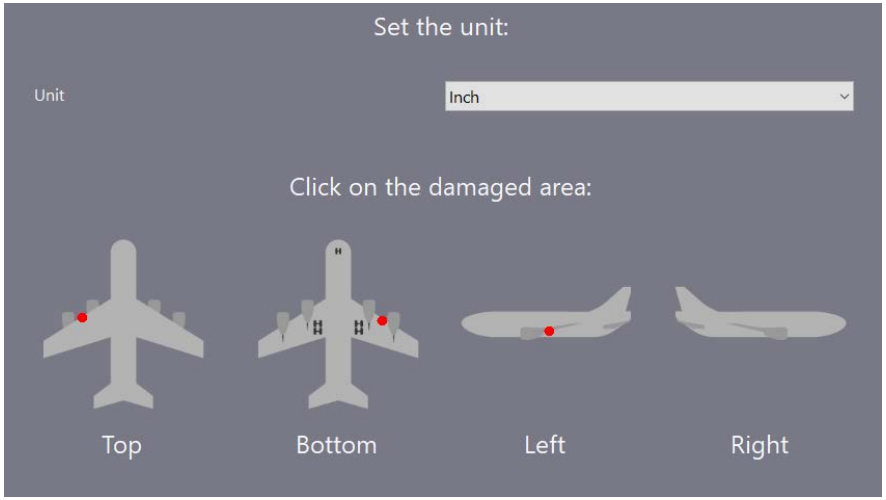
IMPROVED WORKFLOW

- Quick to add information on positioning
- Orientation of the scanned area





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SOFTWARE FLEXIBILITY

- Software license:
  - Physical USB dongle
  - Network seats
- SmartDENT can now import mesh files
- SmartDENT listed 9900$
- SmartDENT now part of the **Creaform software Aerospace Package** which includes reverse engineering and inspection software for less than 15k$

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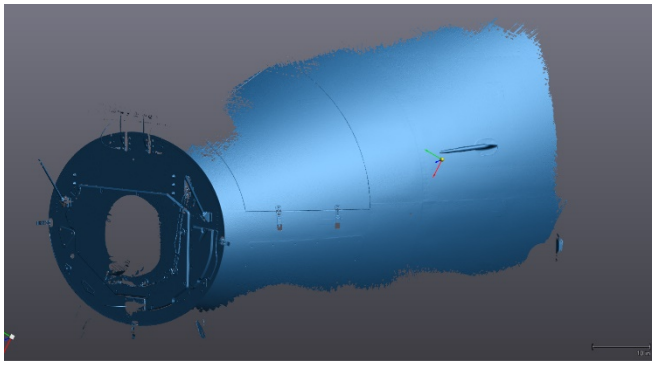
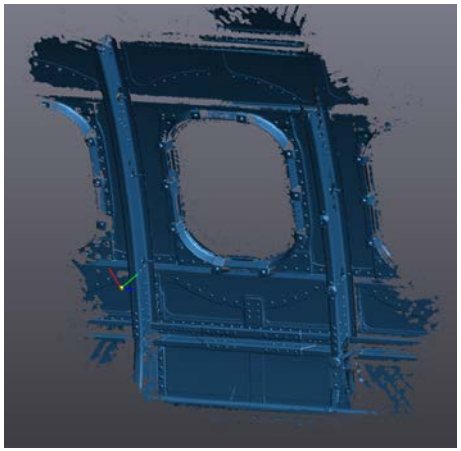
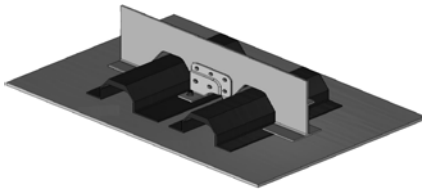
CONCLUSION:
3D SCANNER USAGE

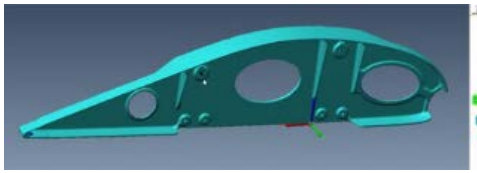
HOW CREAFORM SCANNERS ARE USED

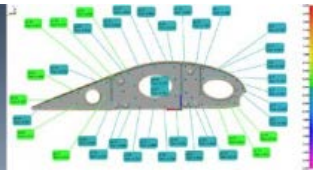
- Primarily acquired for dent mapping
- While not measuring dents:
  - Reverse engineering/prototyping
  - Quality control
  - Repairs
  - Tailored reinforcements
  - RVSM, skin waviness
  - Damage documentation
  - …











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QUESTIONS?

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