

# Event #1: 8tree & Alaska Airlines Airframe Damage Inspection

## 8tree and Alaska Airlines Airframe Damage Inspection

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2 team members required.

Within the allocated 15 minutes, complete tasks in order:

- 1) Evaluate dent as per Task #1 Manual (Dent Evaluation using Traditional Method)
- 2) Repeat dent evaluation as per Task #2 Manual (Dent Evaluation using dentCHECK)

**Bonus:** If there is time remaining after the above two tasks are completed, participants may choose to evaluate additional dents

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# Task #1 Manual: Dent Evaluation using Traditional Methods

# Provided Tools

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- 1) Depth Gauge
- 2) Six Inch Ruler
- 3) Marker
- 4) Flashlight
- 5) Calculator (Not Shown)
- 6) Calibration Block (Not Shown)

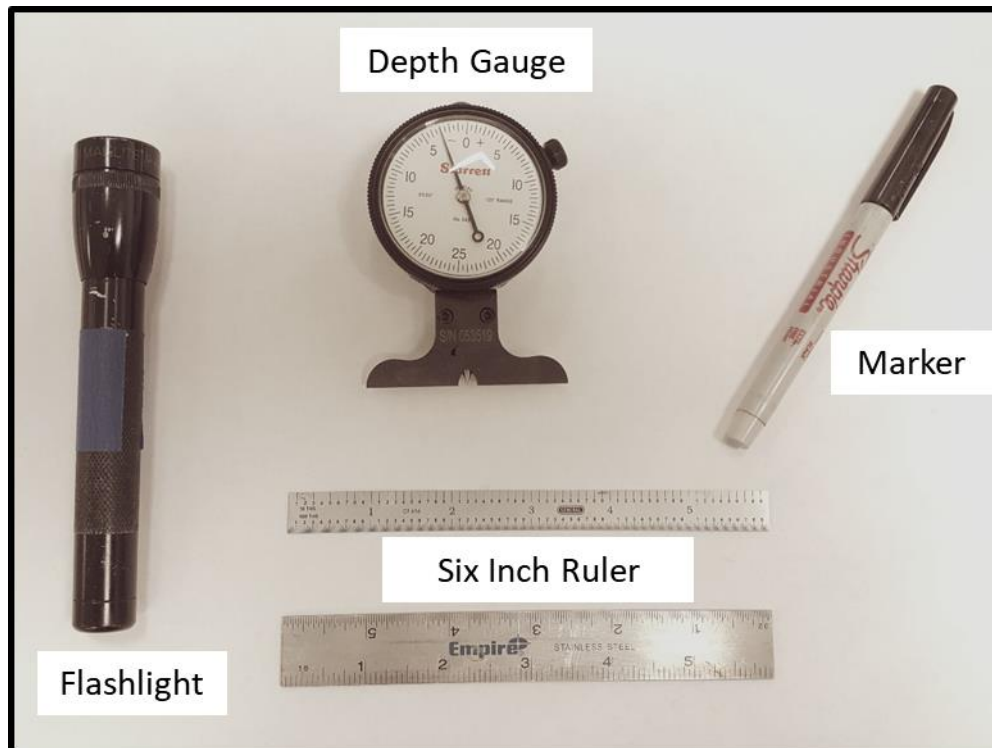


Figure 1

# Task Process

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## Step 1: Determine Edge of Dent

- Place the 6" ruler with its edge perpendicular to the plane of the panel skin / along the direction of zero curvature. (Figure 2). Mark two dots – one on the start point of the dent; and the other on the end point of the dent. (Figure 3)
- Move the ruler up or down along the vertical plane in small increments (~0.25"). At each position, repeat the marking of the two start and end points, until the entire dent is encircled.
- After marking the periphery of the dent, connect the dots to obtain the complete outline of the dent edge. (Figure 5)

## Step 2: Determine Length of Dent (B)

- Using the ruler and marker, draw a straight line down the longest cross-section of the dent, determined by its edge. (Figure 5). This is the length of the dent.
- Measure the length (B = Length of dent). (Figure 5)
- Record measurement (in inches) in the provided Task Card. (2 decimal points; e.g. 1-3/16 inch = 1.19")

## Step 3: Determine Depth of Dent (Y)

- Zero out the depth gauge with the provided Calibration Block
- Place the depth gauge perpendicular to the plane of the panel skin / along the direction of zero curvature. (Figure 4)
- Determine the deepest point of the dent along the length drawn in Step 2. To do this, place the tip of the depth gauge on the length of the dent. Move the depth gauge along the length of the dent until the deepest point is identified.

- Record depth measurement (in inches) on the Task Card, and mark that point (Y) with a marker. (3 decimal points)

#### **Step 4: Determine Width of Dent (A)**

- From the marked deepest point of the dent, draw a line 90 degrees perpendicular to the length of the dent.
- This line should start and end on the edge of the dent. (Figure 5). This is the width of the dent (A = Width of dent)
- Measure the width (A)
- Record measurement (in inches) on the Task Card (2 decimal points; e.g. 1-3/16 inch = 1.19")

#### **Step 5: Determine Critical Ratio of Dent (A/Y)**

- Using the provided calculator, calculate the critical ratio of Width divided by Depth (A/Y).
- Record the calculated critical ratio (A/Y) on the Task Card (Whole number; no decimal points)

#### **Step 6: Determine if Dent is within Allowable Limits**

- An excerpt similar to Figure 6 will be provided during the competition. Based on the prescribed A/Y Allowable Limit, recommend whether or not the dent is allowable / non-allowable.
- Record recommendation (Allowable / Non-Allowable) in the Task Card
- Note: The prescribed A/Y Allowable Limit during the competition might not be  $A/Y = 10$

# Figure Guides

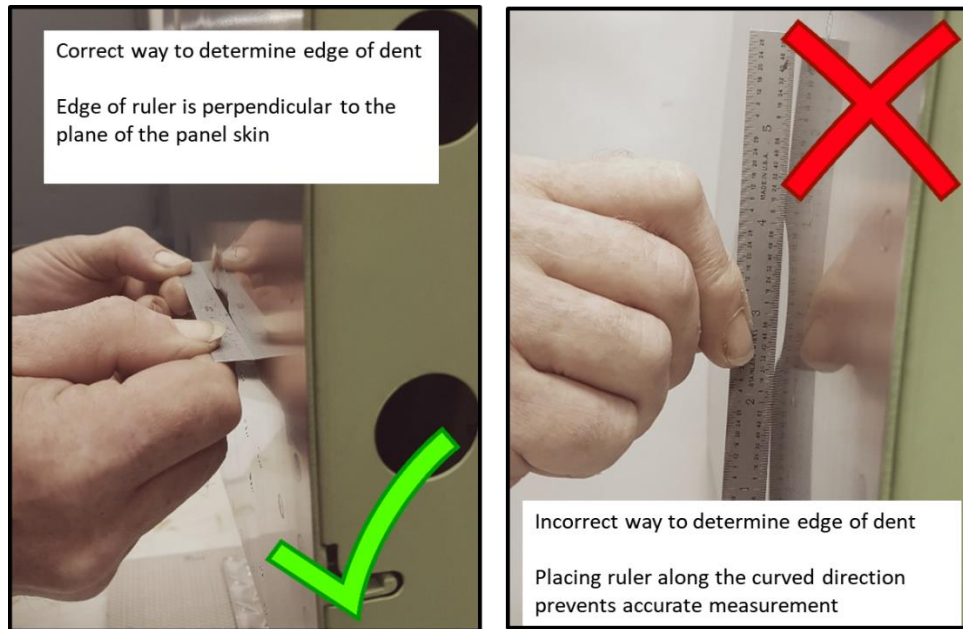


Figure 2

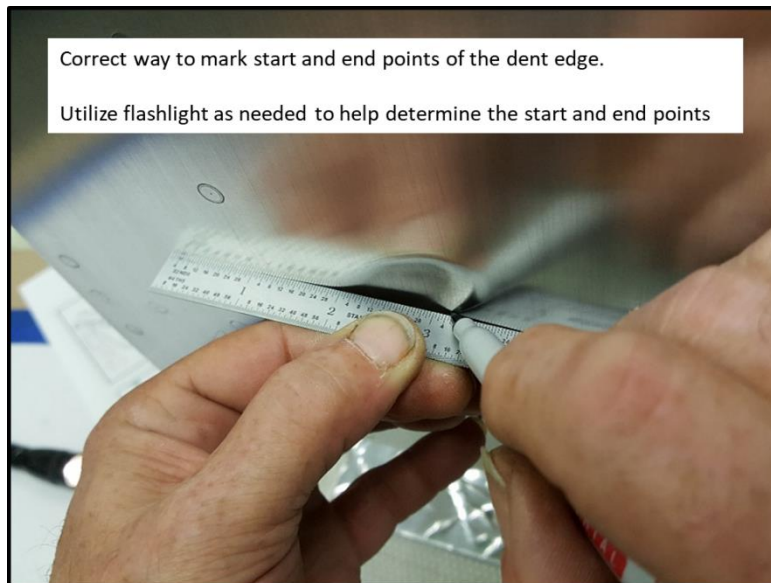


Figure 3

# Figure Guides (Continued)

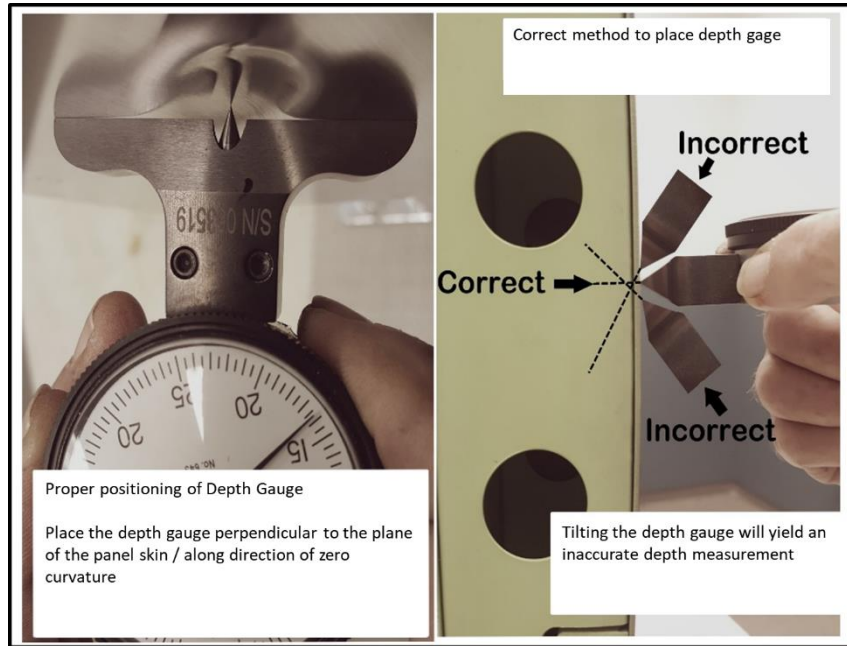


Figure 4

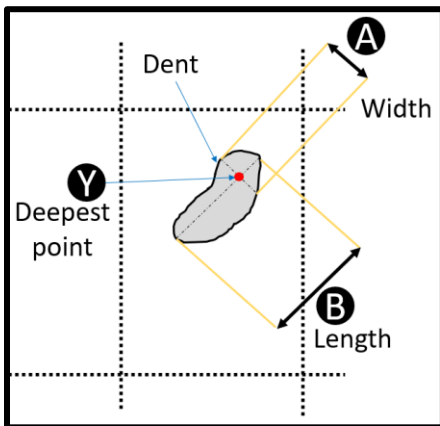


Figure 5

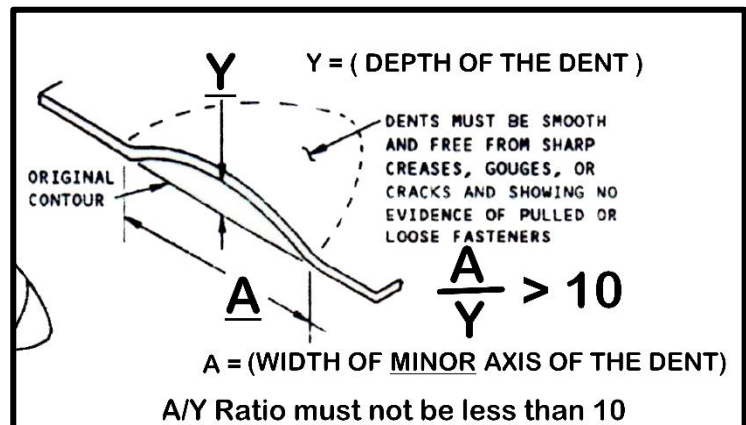


Figure 6

# Task Card Template

Task Card										
Completed By										
Inspection Method	<input type="checkbox"/> Traditional Method	<input type="checkbox"/> dentCHECK								
Defect ID	<input type="checkbox"/> Dent #1	<input type="checkbox"/> Dent #3								
	<input type="checkbox"/> Dent #2	<input type="checkbox"/> Dent #4								
Defect Size	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%; padding: 2px;">Depth (Y) <i>3 decimal points in inch</i></td> <td style="width: 30%;"></td> </tr> <tr> <td style="padding: 2px;">Width (A) <i>2 decimal points in inch</i></td> <td></td> </tr> <tr> <td style="padding: 2px;">Length (B) <i>2 decimal points in inch</i></td> <td></td> </tr> <tr> <td style="padding: 2px;">Critical Ratio (A/Y) <i>0 decimal points</i></td> <td></td> </tr> </table>		Depth (Y) <i>3 decimal points in inch</i>		Width (A) <i>2 decimal points in inch</i>		Length (B) <i>2 decimal points in inch</i>		Critical Ratio (A/Y) <i>0 decimal points</i>	
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Length (B) <i>2 decimal points in inch</i>										
Critical Ratio (A/Y) <i>0 decimal points</i>										
Allowable?	<input type="checkbox"/> Allowable	<input type="checkbox"/> Non-Allowable								

# Example Completed Task Card

Task Card										
Completed By	<i>Jared Brady</i>									
Inspection Method	<input checked="" type="checkbox"/> Traditional Method	<input type="checkbox"/> dentCHECK								
Defect ID	<input checked="" type="checkbox"/> Dent #1	<input type="checkbox"/> Dent #3								
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Allowable?	<input checked="" type="checkbox"/> Allowable	<input type="checkbox"/> Non-Allowable								



# Task #2 Manual: Dent Evaluation using dentCHECK



# Provided Tools

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- 1) dentCHECK Inspection Tool
- 2) QR Codes
- 3) Compact Remote Control

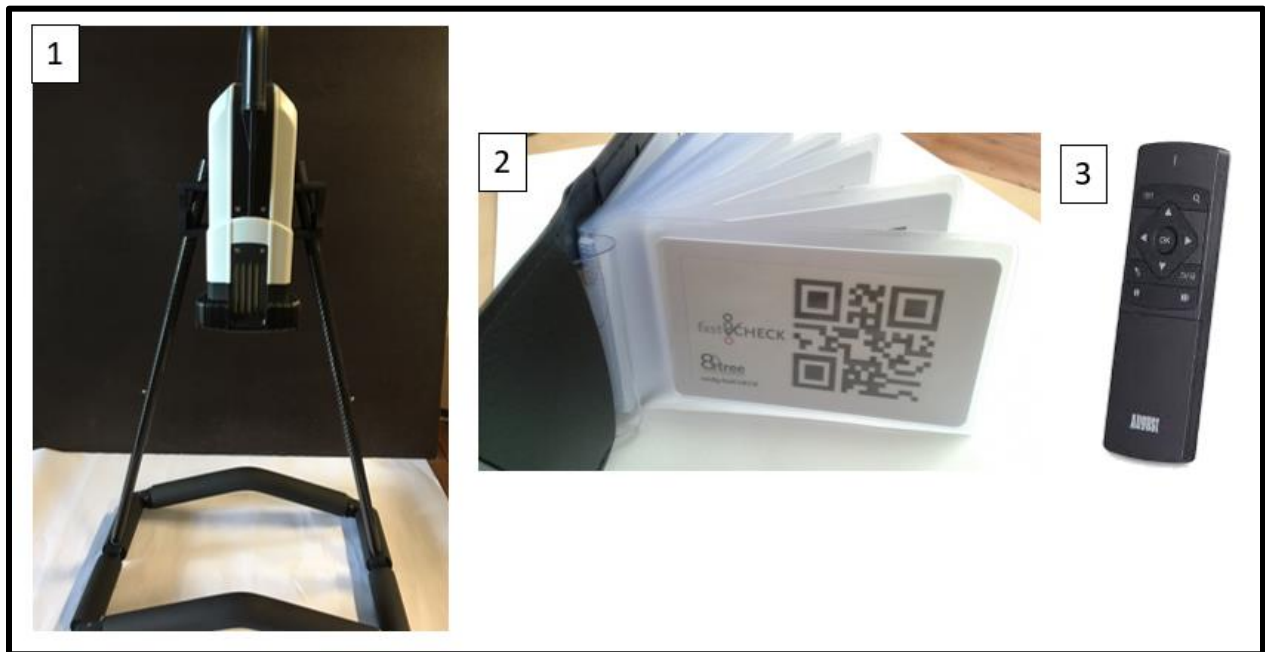


Figure 7

# Task Process

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## Step 1: Load Aircraft Zone using QR Code

- Place the dentCHECK tool in the upright position. (Figure 7)
- Press the “Search” key on the Compact Remote Control. (Figure 8)
- Place the provided QR code that denotes Aircraft Zone A, within the white box projected by dentCHECK. (Figure 9)
- The correct tolerance for Aircraft Zone A is now automatically loaded into the dentCHECK tool

## Step 2: Take a Scan using dentCHECK

- Position the dentCHECK tool by leaning the corner(s) of the positioning frame on the dented panel. (Figure 10)
- Take a scan by pressing the button on the trigger handle. (Figure 11)
- After taking a scan, pay attention to the following:
  - o While the blue lights are flickering on the panel, the user must hold dentCHECK stable (~200 milliseconds)
  - o Approximately 2 seconds after the blue flickering light, the dent measurements will be projected on the surface of the dented panel skin
  - o Ensure that the dent is measured correctly. A “Save successful” message should appear at the top of the results image. The results image will be mostly green, with the dent highlighted in a different color with an accompanying annotation box (Figure 12)

### **Step 3: Record measurement results on the Task Card**

- With the help of a partner, record the dent measurements – Depth (Y), Width (A), Length (B), and Critical Ratio (A/Y) on the Task Card.
- In addition to the measurement results, dentCHECK automatically determines if the dent is within Allowable Limits. A green annotation box denotes that the dent is within Allowable Limits; a red annotation box denotes that the dent is out of Allowable Limits. (Figure 13).
- Record recommendation (Allowable / Non-Allowable) in the Task Card

## Task #2 Manual

# Figure Guides

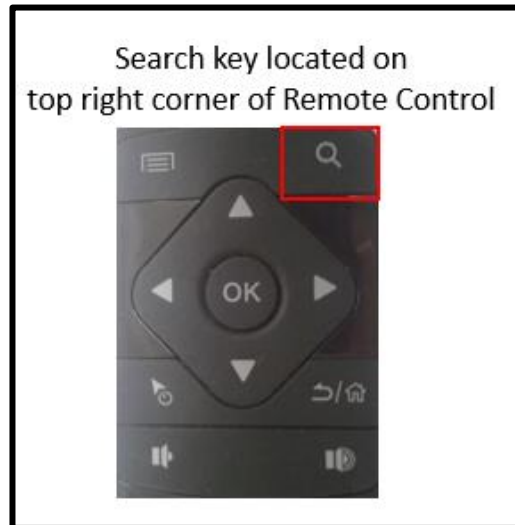


Figure 8

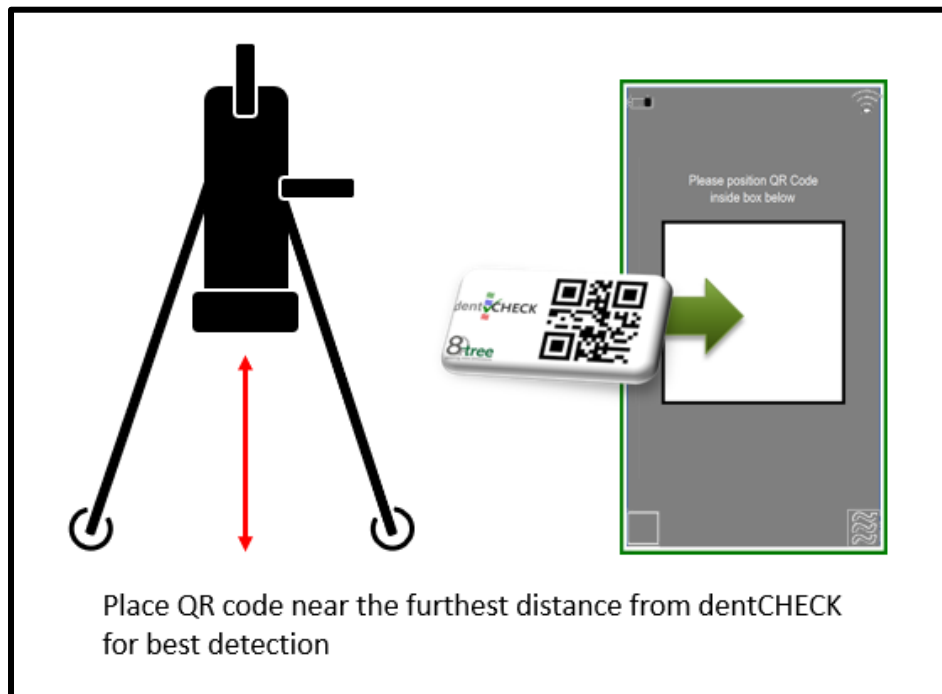


Figure 9

## Figure Guides (Continued)



Figure 10

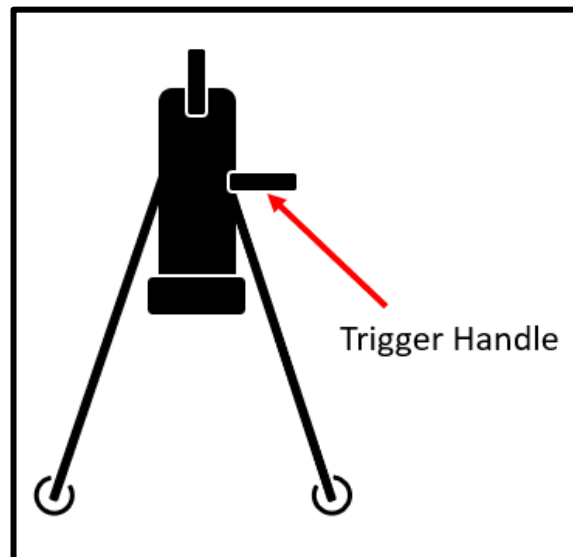


Figure 11

# Figure Guides (Continued)



Figure 12

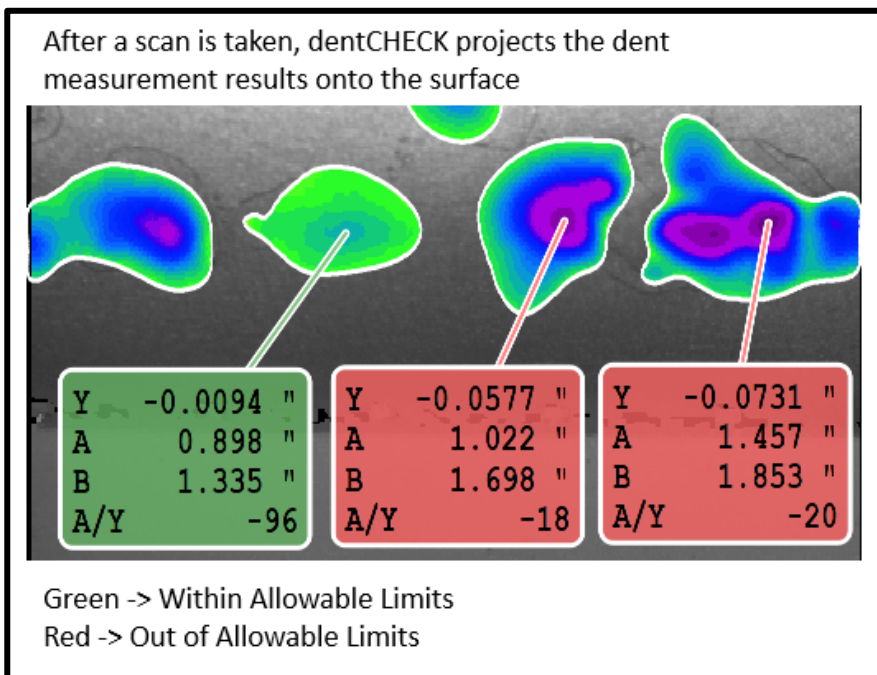


Figure 13

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