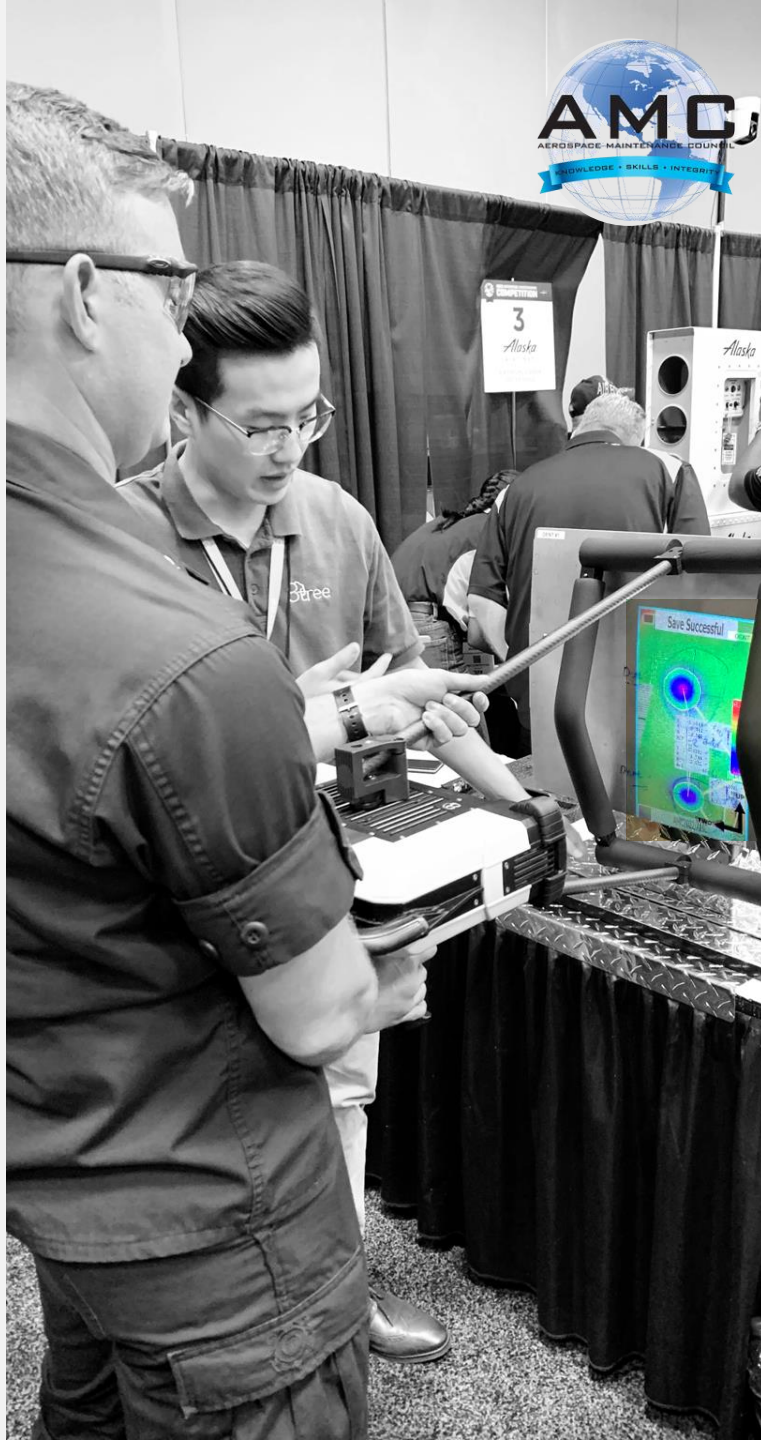
dentCHECK vs. Traditional Methods

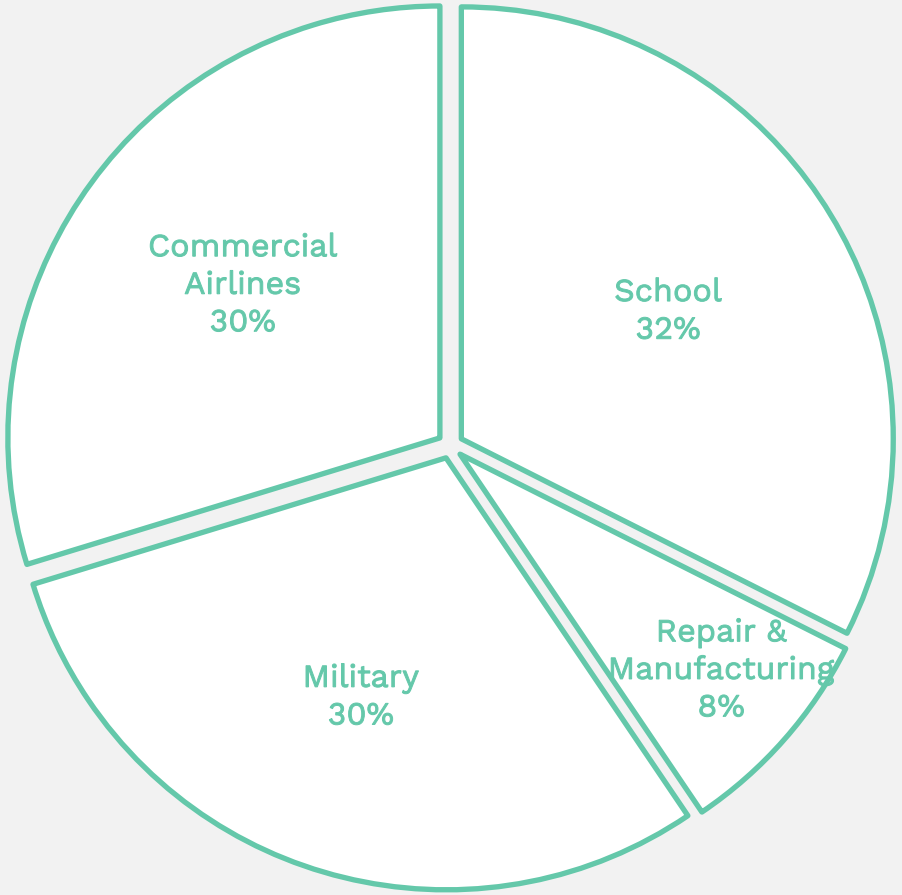
World’s most comprehensive aviation dent-mapping study



Aerospace Maintenance Competition (AMC)

- 2-day competition
- 73 teams of 5-6 members
- 27 events
  - 15-minutes task per event
  - “Airframe Damage Inspection” event, co-sponsored by 8tree and Alaska Airlines

Participant Category in 2022



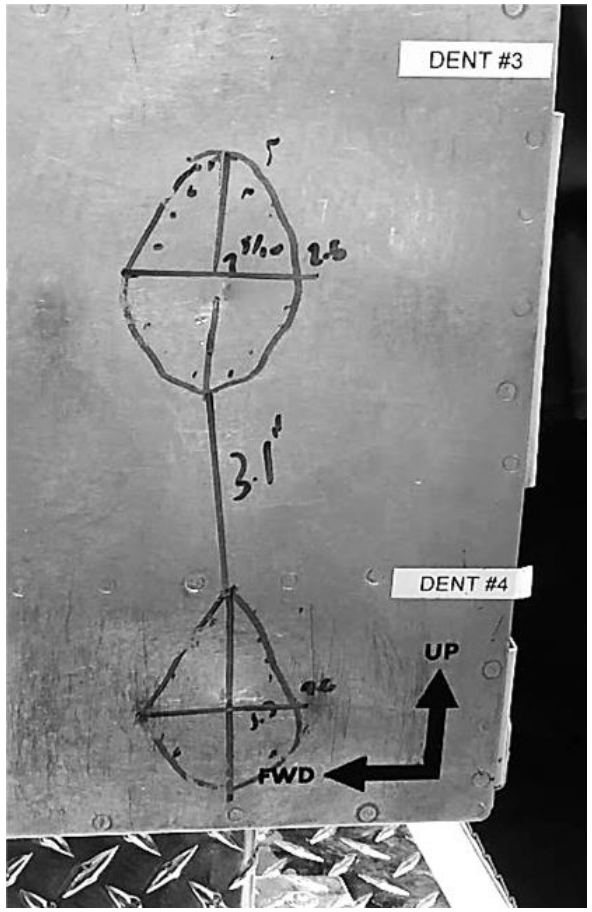
What is the task?

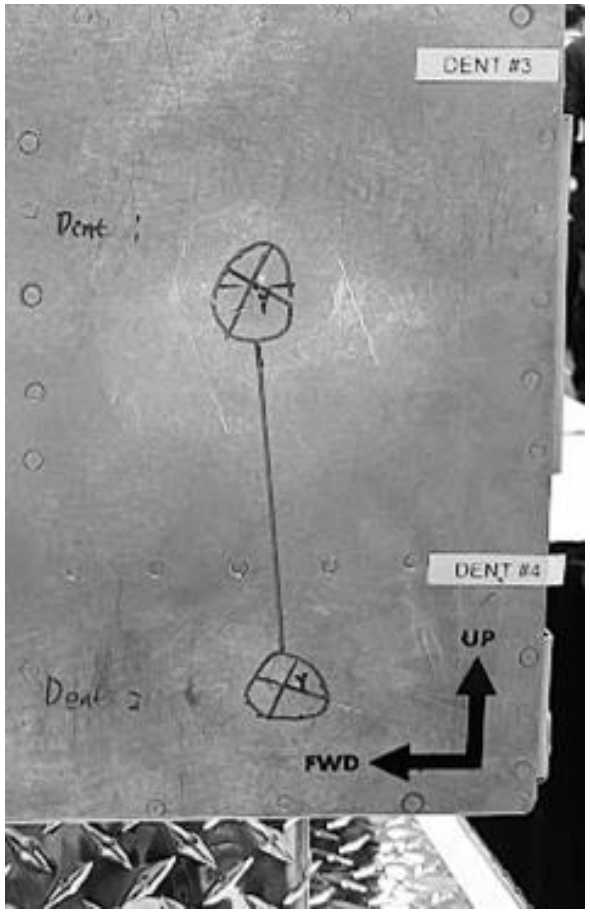
“Accurately map two dents using traditional methods and dentCHECK”

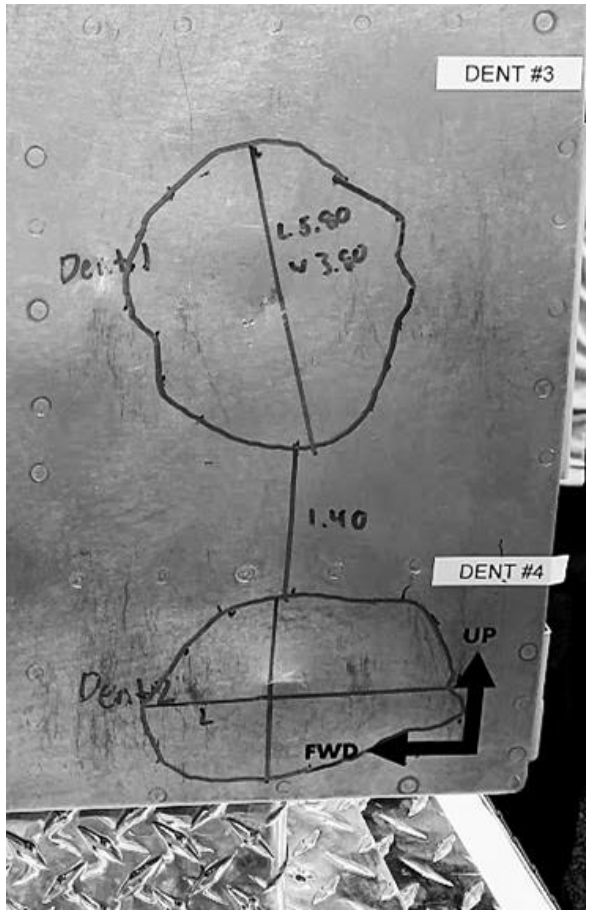
- 73 Teams / 146 Engineers
- 146 Dent Measurements
  - Depth (Y)
  - Width (A)
  - Length (B)
  - Critical Ratio (A/Y)
- 73 Inter-Dent Distance Measurements
- Measure with Traditional Tools
- Repeat Task with dentCHECK

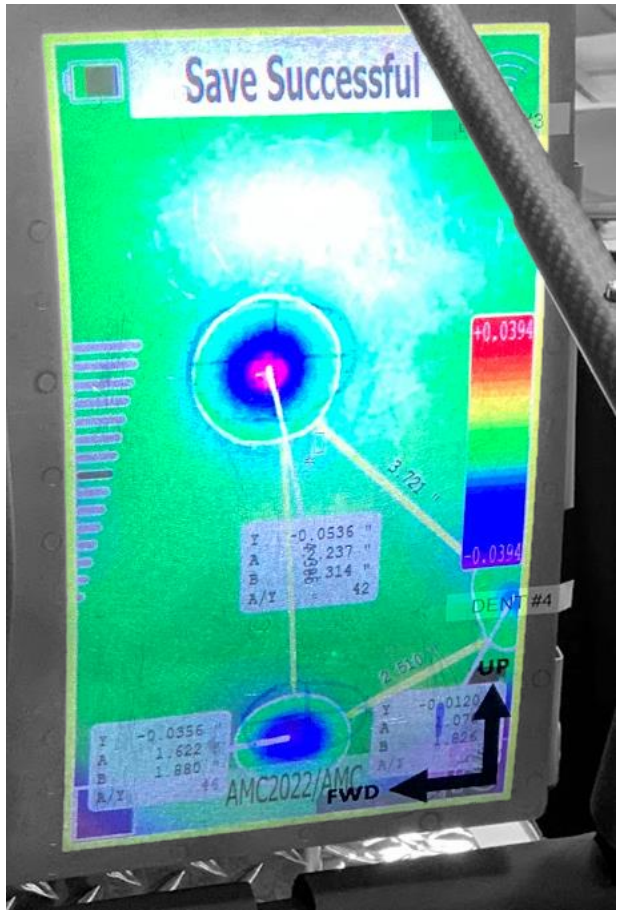
Traditional Tools: Flashlight, Marker, Depth Gauge, Straight Edge, Calculator, Pen & Paper

Traditional Method vs dentCHECK









Summary - Key Findings

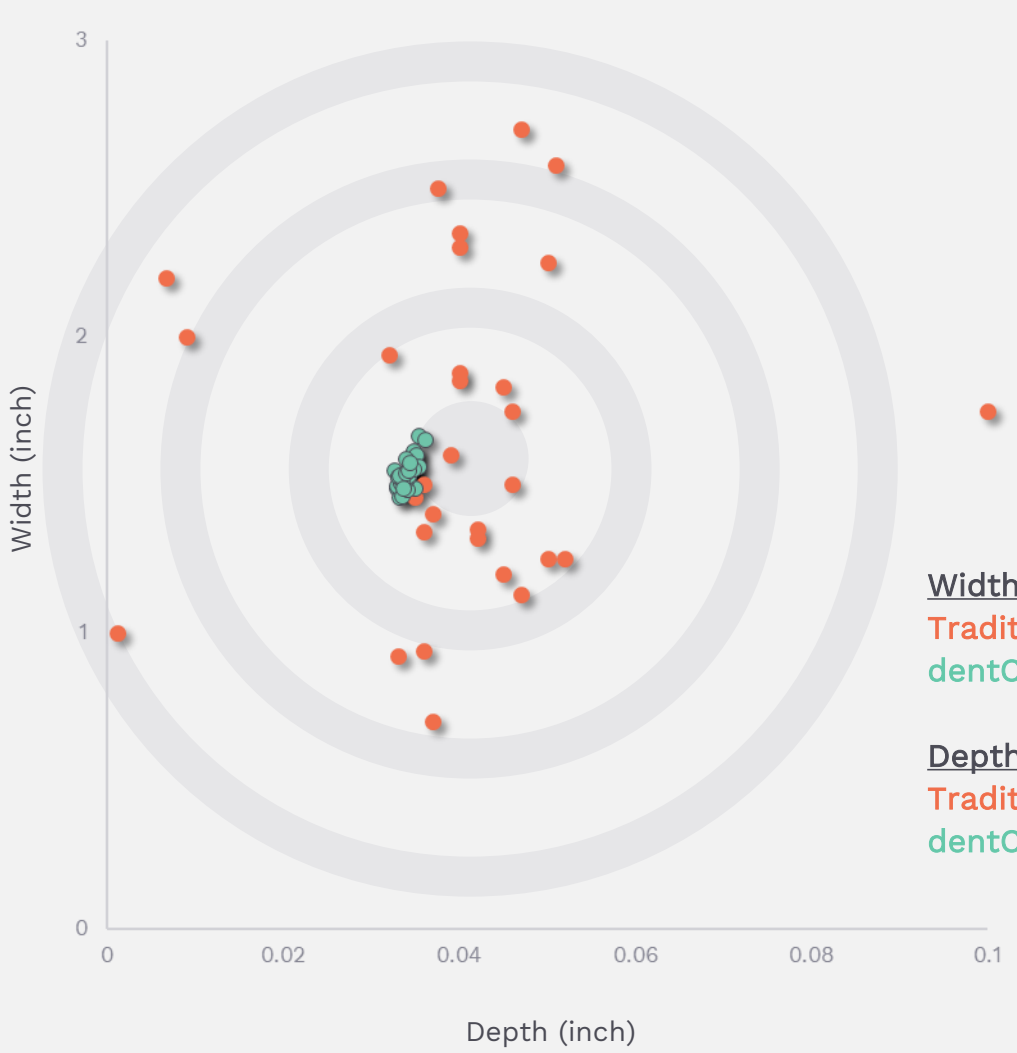
dentCHECK empowers -

- 20x more consistent depth measurement
- 13x more consistent width measurement
- 13x more consistent inter-dent distance measurement
- 48x faster inspection time
- Improved Confidence when making “Go/No-go” decisions
- Uncovered top 3 errors associated with traditional method:
    - Tool handling error
    - Incomplete measurement
    - Record keeping error

Double Digit Improvement in Precision

20x in depth measurement
13x in width measurement

Precision Chart for 1 Dent



Width Margin of Error
Traditional Method = +/- 0.602”
dentCHECK = +/- 0.048”

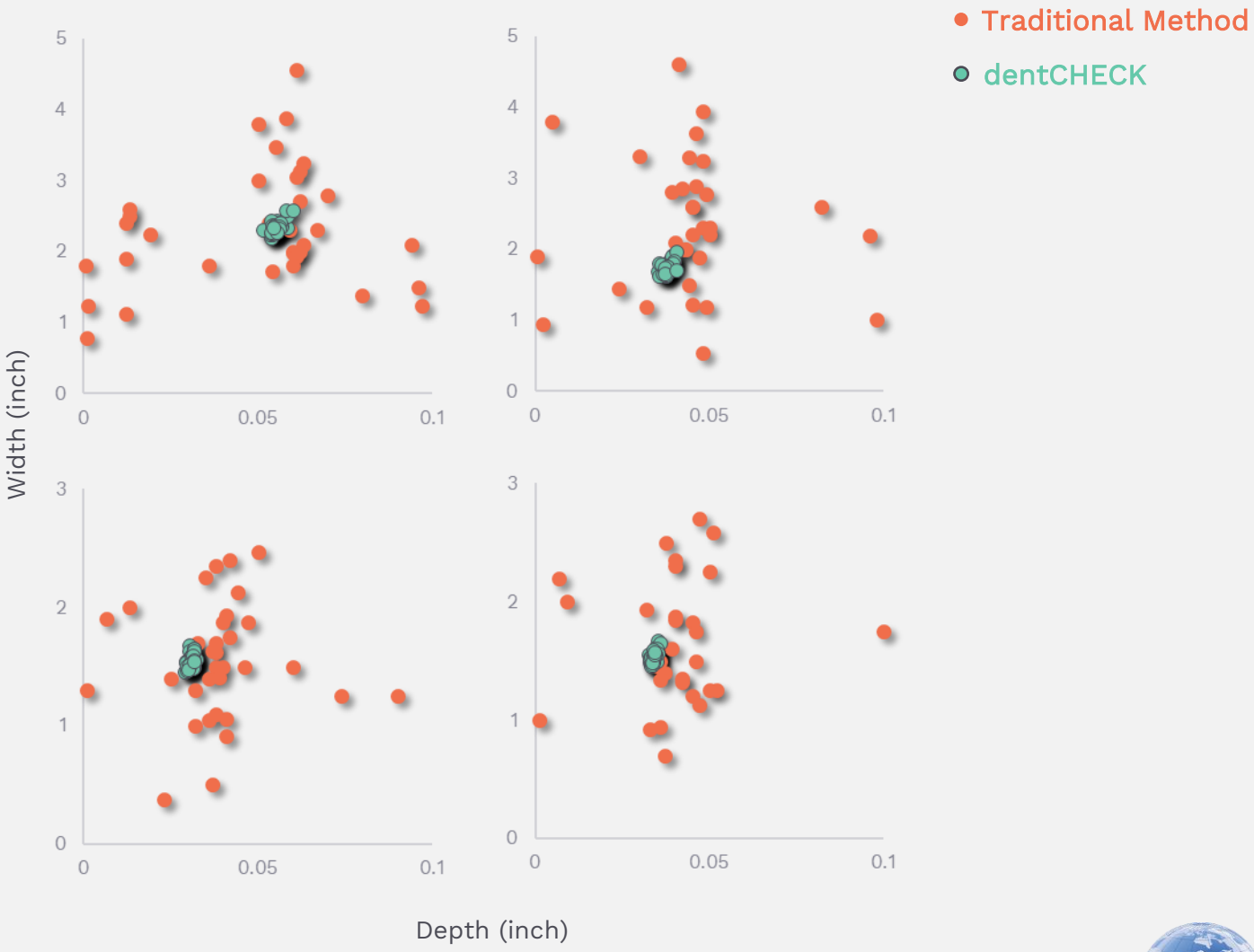
Depth Margin of Error
Traditional Method = +/- 16 thou
dentCHECK = +/- 0.8 thou

Depths > 0.100” are considered outliers and are excluded from this study
Background target used to illustrate precision. “True” width and depth is unknown

Supplement Slide

Precision Chart for all 4 dents

Precision Charts for 4 dents

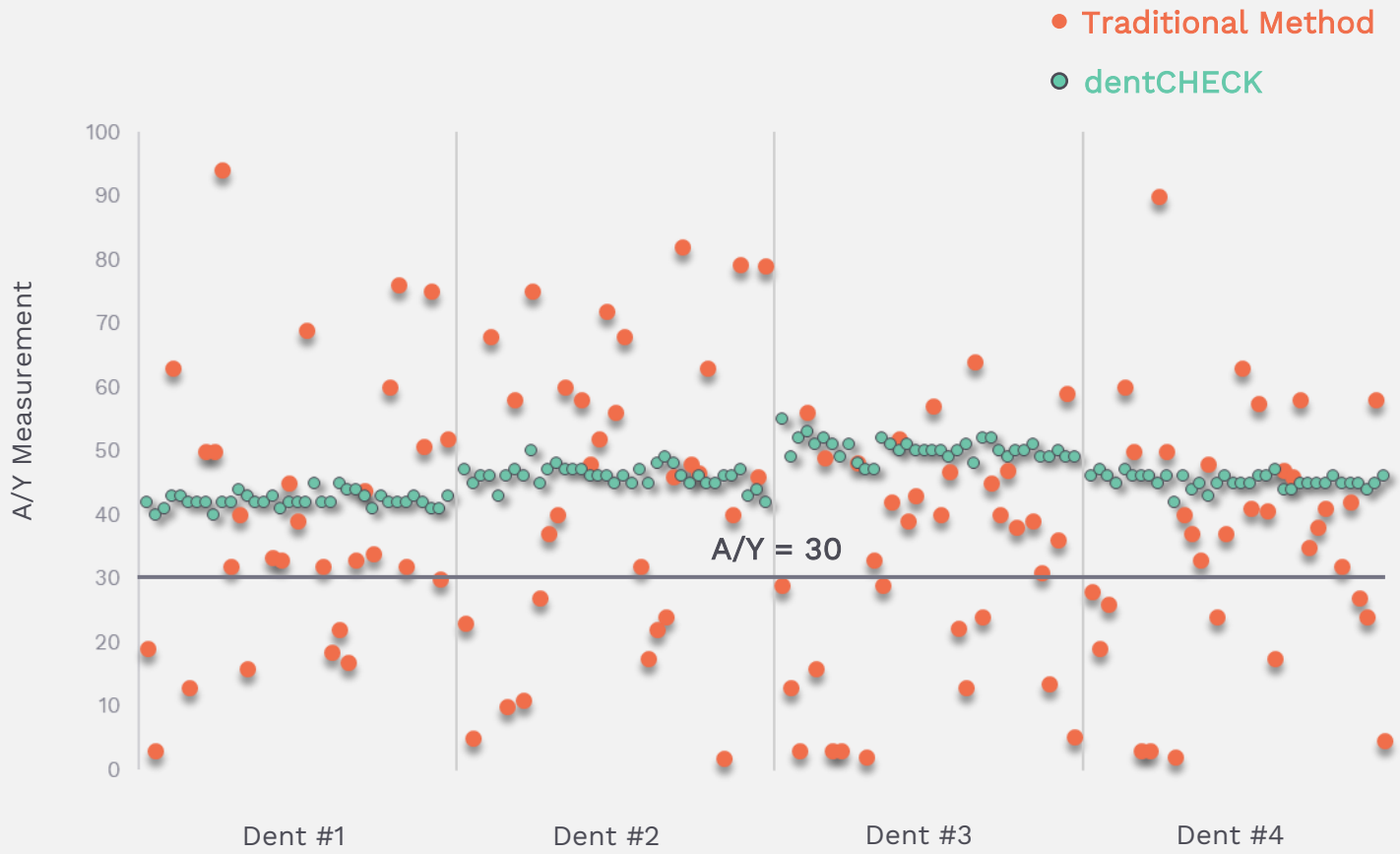


Depths > 0.100" are considered outliers and are excluded from this study

"Go/No-go" decisions with improved confidence

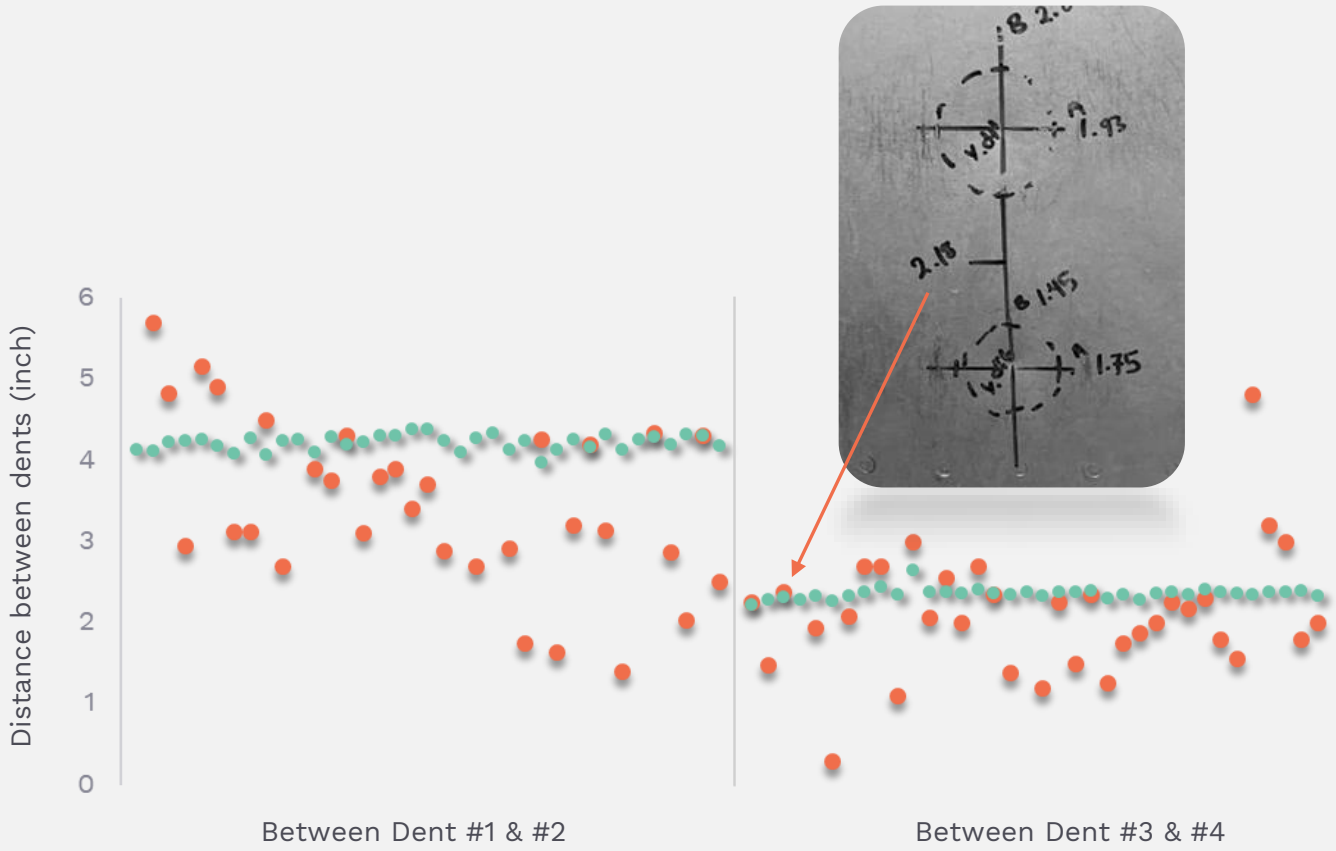
dentCHECK caught 40 erroneous manual measurements

A/Y Ratio Measurement for 4 dents



13x more consistent inter-dent distance measurement

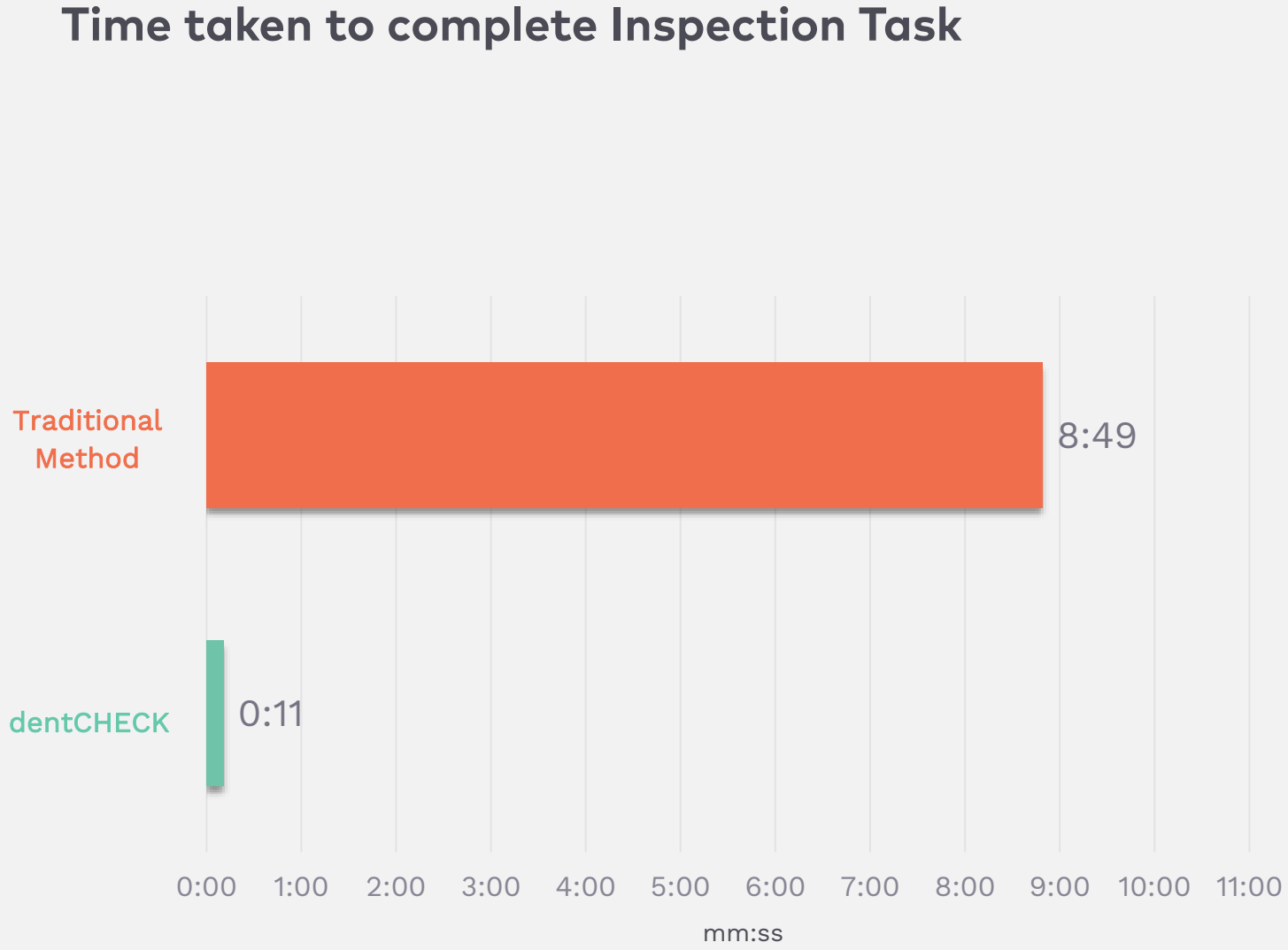
Inter-Dent Distance Measurement



Margin of Error
Traditional Method = +/- 1.225”
dentCHECK = +/- 0.094”

48x Faster Inspection Time

dentCHECK captures and measures both dents in a single scan



Top 3 Errors using Traditional Method

#1 Tool Handling Error

#2 Incomplete Measurement

Task Card

Dents Measured By: [redacted]

Dent #1 Measurements:	Depth (Y) *3 decimal points in inch*	~~.001~~.012
	Width (A) *2 decimal points in inch*	2.40
	Length (B) *2 decimal points in inch*	2.34
	Critical Ratio (A/Y) *0 decimal points*	200
Dent #2 Measurements:	Depth (Y) *3 decimal points in inch*	
	Width (A) *2 decimal points in inch*	
	Length (B) *2 decimal points in inch*	3.16
	Critical Ratio (A/Y) *0 decimal points*	

Incomplete Measurement

Distance between dents: *2 decimal points in inch*

#3 Record Keeping Error

Task Card

Dents Measured By: [redacted]

1.25 ÷ 0.074 ≠ 3

Dent #1 Measurements:	Depth (Y) *3 decimal points in inch*	.074"
	Width (A) *2 decimal points in inch*	1.25"
	Length (B) *2 decimal points in inch*	1.50"
	Critical Ratio (A/Y) *0 decimal points*	3
Dent #2 Measurements:	Depth (Y) *3 decimal points in inch*	.036"
	Width (A) *2 decimal points in inch*	.94"
	Length (B) *2 decimal points in inch*	1.44"
	Critical Ratio (A/Y) *0 decimal points*	26

Distance between dents: *2 decimal points in inch* 2.38"

Participants Testimonials

> “Did a 10-minutes job in about 30 seconds at most”

Cade Donley,
Eastern Florida State University
2022

> “dentCHECK offers a simple, fast and accurate measurement compared to traditional methods”

Arturo Amezcua
Spirit Airlines
2022

> “dentCHECK is one of the more innovative pieces of hardware that I’ve seen at the show and believe it should be a staple in every shop that works on aircraft”

Trenton Blackwood
Tulsa Tech
2019