

MRO operational efficiency-gains enabled by 'Go/No-Go' digital dent-mapping: A Case Study

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About TAP-M&E

- Leading global provider of heavy-check MRO services
- Operations in Brazil and Portugal

Rio de Janeiro

Hangar Capacity: **4 WB**
 Hangar Area: **14,500 m²**
 Total Building Area: **180,000m²**

Porto Alegre

Hangar Capacity: **1 WB, 5 NB**
 Hangar Area: **12,500 m²**
 Total Building Area: **55,000m²**



Lisbon

Hangar Capacity: **3 WB, 5 NB**
 Hangar Area: **26,380 m²**
 Total Building Area: **71,200m²**



Care² Airframe

Whether light or heavy maintenance; pre-flight, transit, or daily checks, we've got you covered.



Care² Engines

Our 40+ years' experience on military and commercial turboprops, turbofans, and APUs will propel you forward.



Care² Components

It's the details that count. We offer overhaul repair, test, and modifications of over 15,000 components.



Care² Engineering

Maintenance solutions and technical services that meet the highest standards of quality, customised to your needs.

About 8tree

- Creators of **dentCHECK**[®], the aviation industry's tool-of-choice for 'go-no/go' dent-mapping and blend-out analysis
- Certifications –
 - LNE/Airbus
 - In process at other OEMs
- Built from the ground-up for the aviation industry
- Empowers technicians, mechanics and operators to make SRM-compliant decisions instantly



The Dent-mapping Problem

The Challenge

Achieve reliable, accurate and objective

- Dent-mapping & assessment
- Corrosion Blend-out

The Ideal Solution

Real-time. Boosts inspection efficiency

Reliable & Consistently Accurate

Comprehends SRM limits

Instant Answers...not just data

Portable. Field-friendly. Zero Learning Curve

No Surface Preparation needed



Hail Damage



Damage due to ground equipment



Lightning strike

(Image Source: Boeing)

Operator Experience Today

What operators demand

Ease of use

Accuracy

Consistency

Reliability

What operators must tolerate

Difficult learning curve

Complex tools & menus

Long interpretation & reporting time

Subjectivity & Human-error

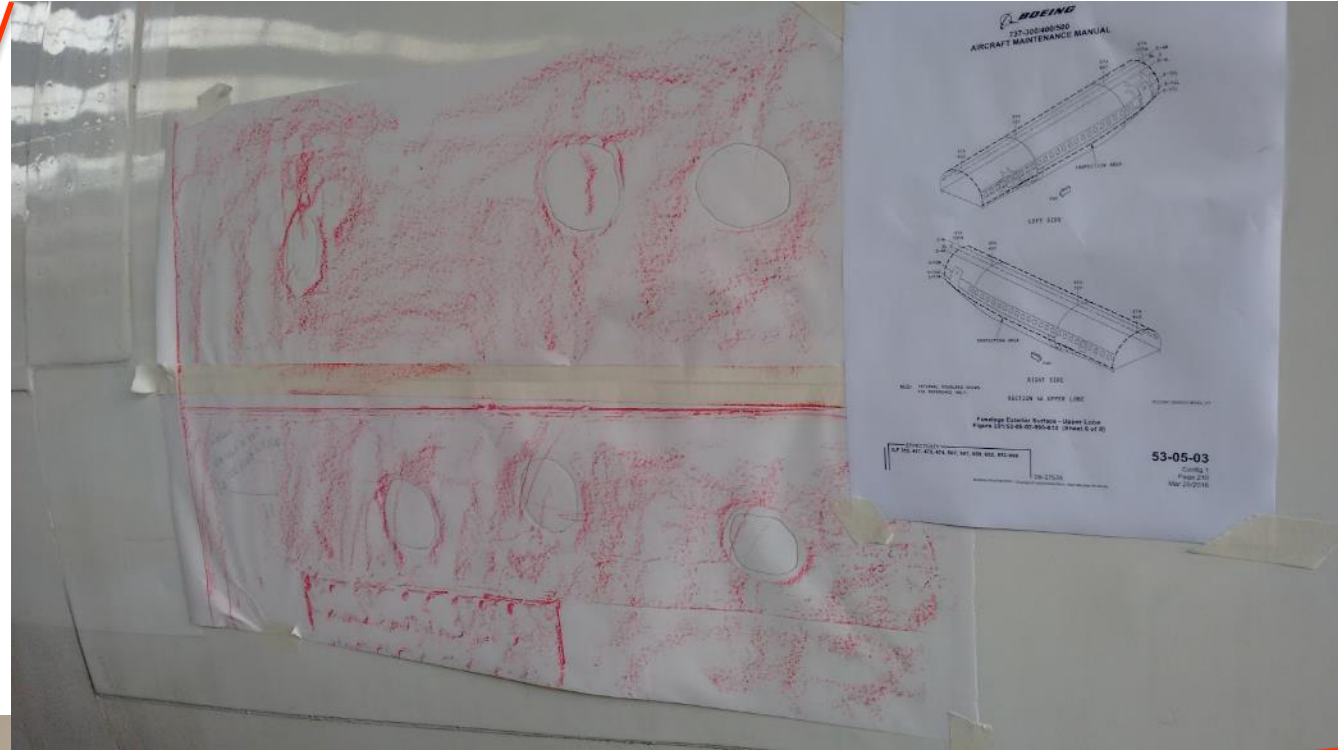


TAP-M&E : The Problem Statement

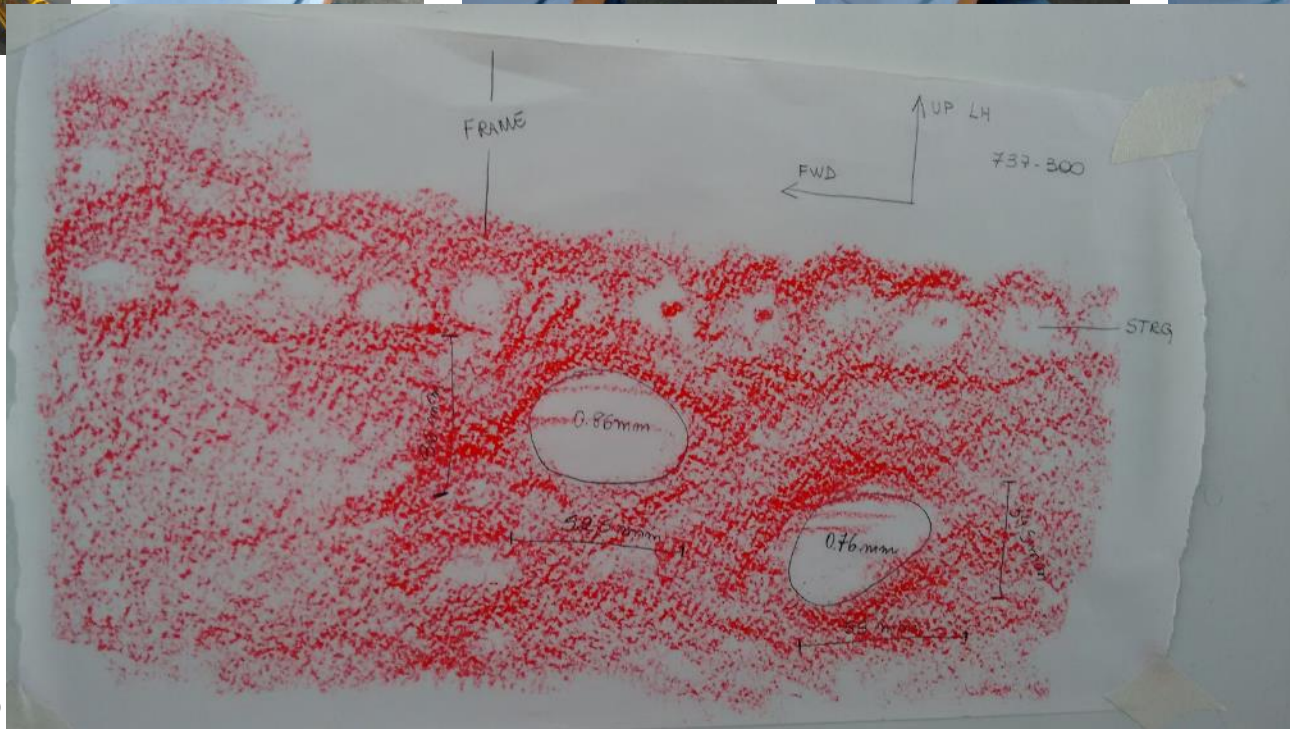
“Traditional dent-checking methods are very time consuming and frustrating”

Valter Fernandes
EVP, Operations
TAP-Maintenance & Engineering

Traditional Mapping Methods



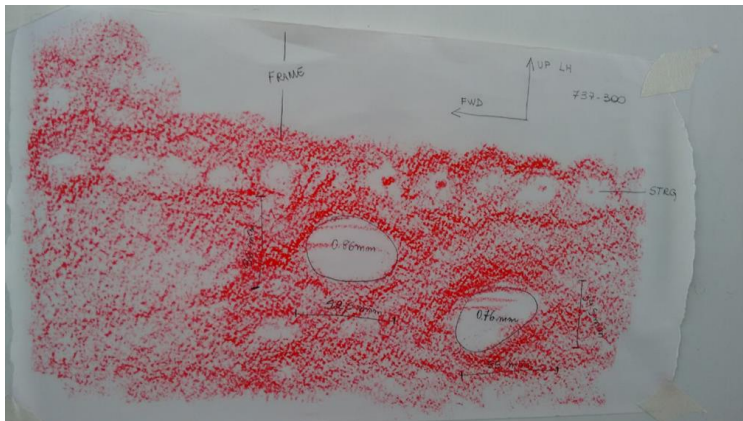
Traditional Mapping Workflow



Dent Reports: Traditional Methods

Typical industry format

- Minimal identification data
- Basic numeric measurement values
- Relies on manual entry of location information
- Text-only, unless operator attaches a photograph / manual drawing of affected area



TAP MAINTENANCE & ENGINEERING Structure Defect Report

Fleet: A330		Registry: C-XXXX	MSN: 123	Airline: BRASIL	Check: C	Flight Cycles: 1	Flight Hours: 20000	ATA: 57
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Job Number: 123
SDR Number: 123 57 28
Date: Nov 05/2016

Generating Item: Scheduled task (routine): 1586777 Job Number: _____
 Other (EO, CAR, TLB, SNAG,...) _____

Inspection Method: General Visual Detailed Visual Ultrasonic HFEC MFEC
 Rototest X-Ray Magnetic(MPI) LFEC Thermography
 Borescope Conductivity Tap Test Spot Fluid (FPI) Other: _____

Damaged Part: Fuselage Vert Stabilizer Slat Rudder Spoiler PN: _____
 Wing Aileron Flap Nacelle Elevator SN: _____
 Door Horiz Stabilizer Other: _____

Type of Damage: Crack Dent Corrosion Perforation Lightning Strike Missing
 Scratch Wear Delamination Debonding Other

Type of Corrosion: Exfoliation Intergranular Pitting Foliform N/A

Corrosion Level: 1 (Light) 2 (Medium) 3 (High) N/A

Description/Location of the Damage: DENT WAS FOUND NEAR RIB 4 STRG 10. Size of the Damage: Unit: mm

Length:	55	Width:	23
Depth:	0,85	Remaining Thick:	_____

Sketch/photo attached: Yes/Second page may be used-Requires NRC N* No

Allowable Damage: SRM Other

Repair Reference: SRM Other

(*) If Repair Category "B" or "C", FILL Specific Maint Req

Threshold FC:	Interval FC:
Threshold FH:	<input type="checkbox"/> Since New
Interval FH:	<input type="checkbox"/> Since Repair Embodiment

REPAIR CATEGORY (*): A Permanent - Unlimited B Permanent - Inspection C Temporary TBD

Specific Maint Req: _____

Method: _____

PRODUCTION (SIGNATURES)

Originator/Reported by: Date/Signature/stamp	Accomplished by (mechanic): Date/Signature/stamp	Verified by (Inspector): Date/Signature/stamp
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Implementing dentCHECK® @ TAP-M&E

- Tool introduction inside TAP (Oct 2015)
 - User training – minimal; intuitive 1-button operation

- Integrating the system inside TAP's workflow
 - First-phase = Dent-Mapping
 - *Next-phase = Corrosion Blend-out, Scratch & Gouge Blend-out*

- Acceptance by technicians – easy-to-use tool

dent✓CHECK® – Go/No-Go Digital Mapping

- Never look away – eyes always on task!



Dent Reports: dentCHECK®

- Image-based reporting format with traceable measurement values
- Measurement values extracted directly from SRM-compliant dentCHECK results

Information Rich Reporting

A / Y (or W / D)

Deepest point x-section

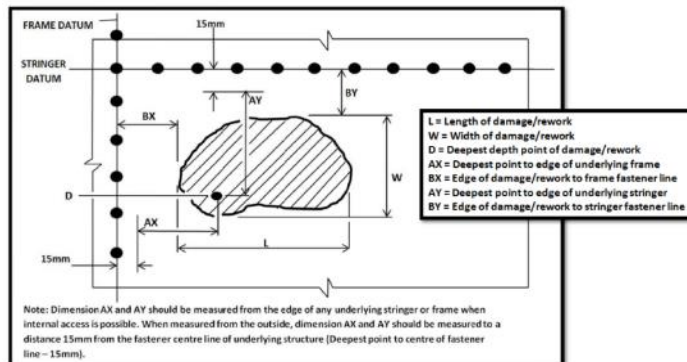
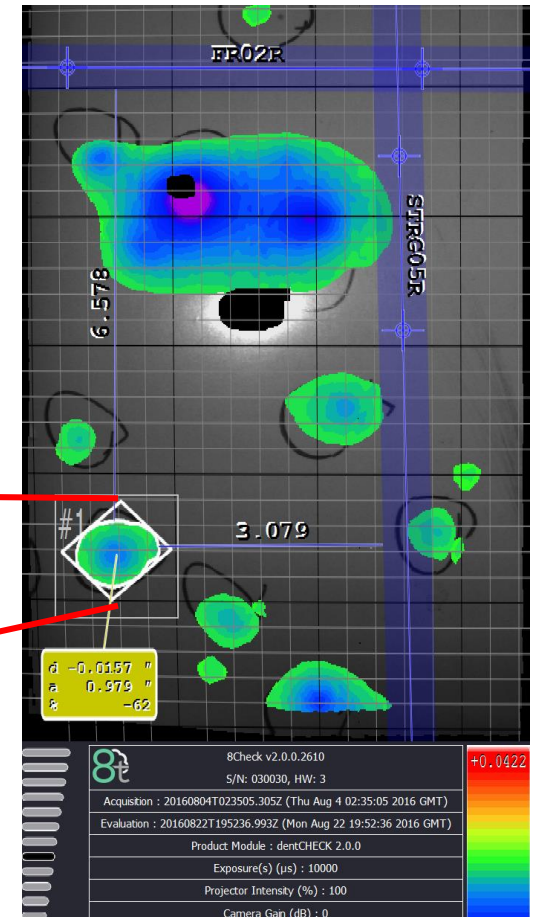
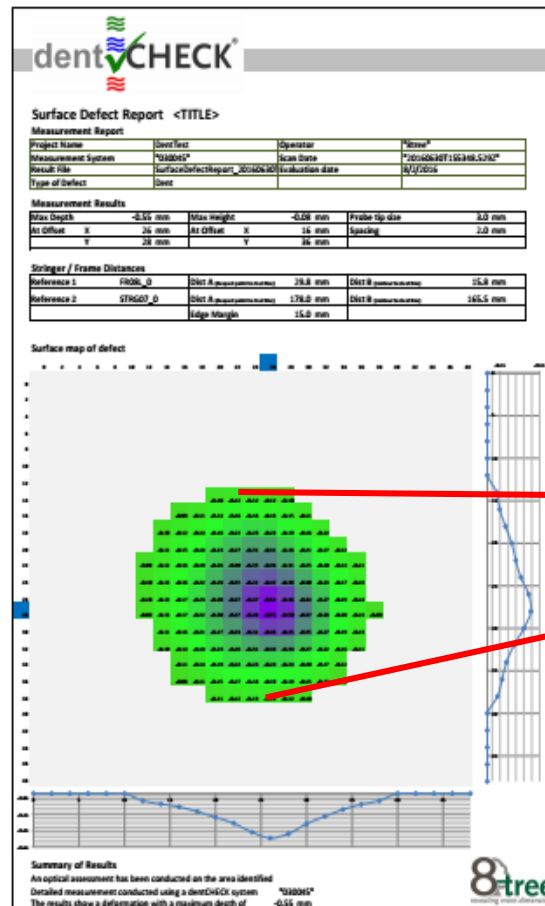
Distance to frame & stringer

Detailed log (operator ID, time-stamp, job #)

Color-coded annotation

Audit-ready digital reporting

Customizable reports



Benefits Realized : dentCHECK® @ TAP

Workflow Benefits

- Extremely rich and detailed results – visual and SRM-compliant numeric answers
- Portable and handheld design – ideal for the busy maintenance environment – no wires, no PC, no power supply
- dentCHECK Desktop Reporting Tool (DRT) – “brings the airplane into the office”
- All measurement results are digitally captured for ease of record-keeping and sharing with OEMs and Operators
- Zero-learning curve – almost no training required
- Compliant with and recognized by OEM standards – Certified by Airbus

Benefits Realized : dentCHECK® @ TAP


Time Savings & Efficiency Gains

Step	Task	Time taken (Traditional Methods)	Time taken (dentCHECK®)
1	Setup per dent	5 min	1 min
2	Operator maps a dent on aircraft*	10 min	30 seconds
3	Multiple operators repeat measurements on same dent to verify and reach consensus	10 min	30 seconds
4	Create a dent-mapping report for each dent*	10 min	1 min
	Total	35 min	3 min

dentCHECK reduces Mapping AND Reporting time by >90%

* In an SRM-compliant fashion

Benchmarking Efficiency & ROI

Man-Hours	Dent Mapping & Reporting	
	Traditional Methods	With  dentCHECK [®]
1	2 Dents	30 Dents
8 (1-workday or 1-shift)	16 Dents	240 Dents

dentCHECK saves 14 days of time and labor with every day of use

Return on Investment (ROI) period ~2 months

“dentCHECK isn’t simply an enhancement to our dent-mapping processes...

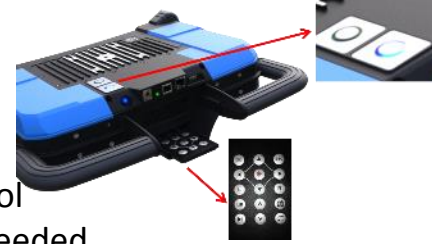
...it’s a huge leap in efficiency!”

Valter Fernandes

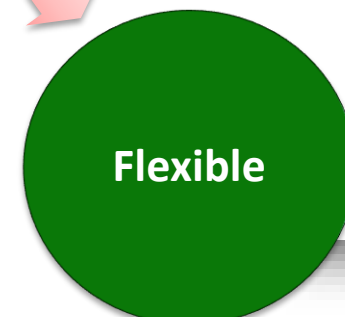
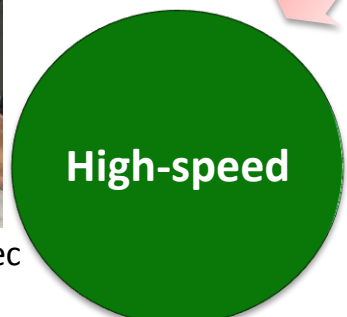
EVP, Operations

TAP-Maintenance & Engineering

dentCHECK®: Benefits to Airlines/MROs



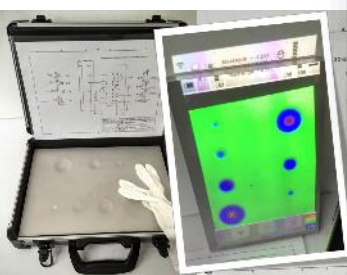
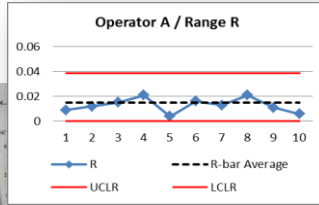
Zero Learning Curve
1-button operation
Tablet/smartphone control
No surface preparation needed



Lightweight
No cables or monitor
No external CPU



QR code Configuration
www.tap-mro.com
www.8-tree.com



Traceable to National Standards



Actionable Results <2 sec
Efficiency boost >10x
Real-time feedback

Operator Experience with dent



What operators want = What operators get

Ease of Use

Accuracy

Consistency & Objectivity

Quick out-of-box experience

Simple to operate & understand

Instant Analysis = fast decisions!

*“Don't bend to technology.
Bend technology to your needs”*

- Jason Pontin
MIT Technology Review

Thank you

Questions?

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