



# A New Approach to Accidental Damage on Aircraft Metallic Structure

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**AIRBUS**



## Introduction - Accidental Damage



## Rationale for a new approach



## AIRBUS experience



## The new approach



## Conclusions

# What is accidental damage?

Impact by ground & cargo handling equipment

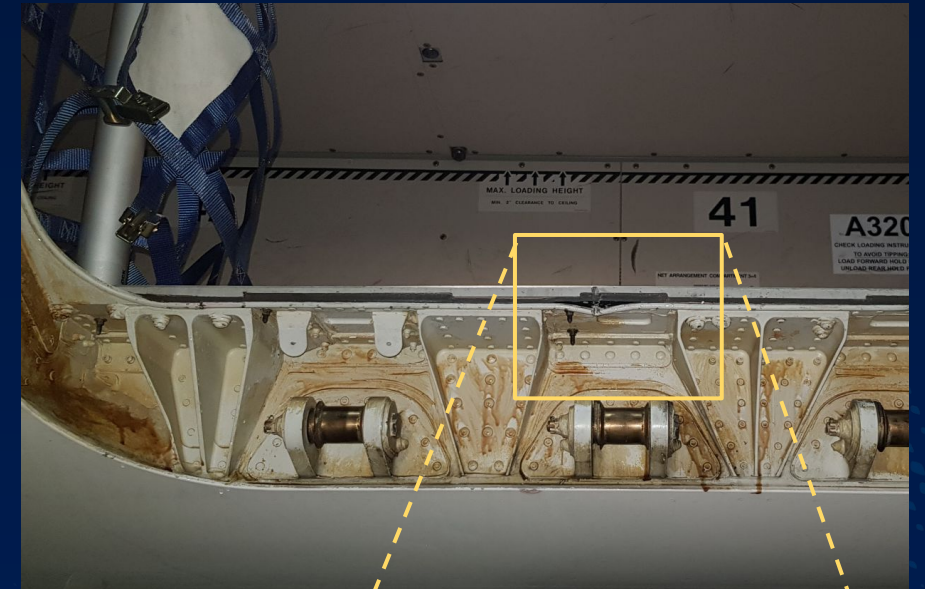
Impact by foreign objects (tools, vehicles)

Runways debris

Hail strikes

Human error

...



... in production, operation and maintenance

# Rationale for a new approach

Approach previously applied

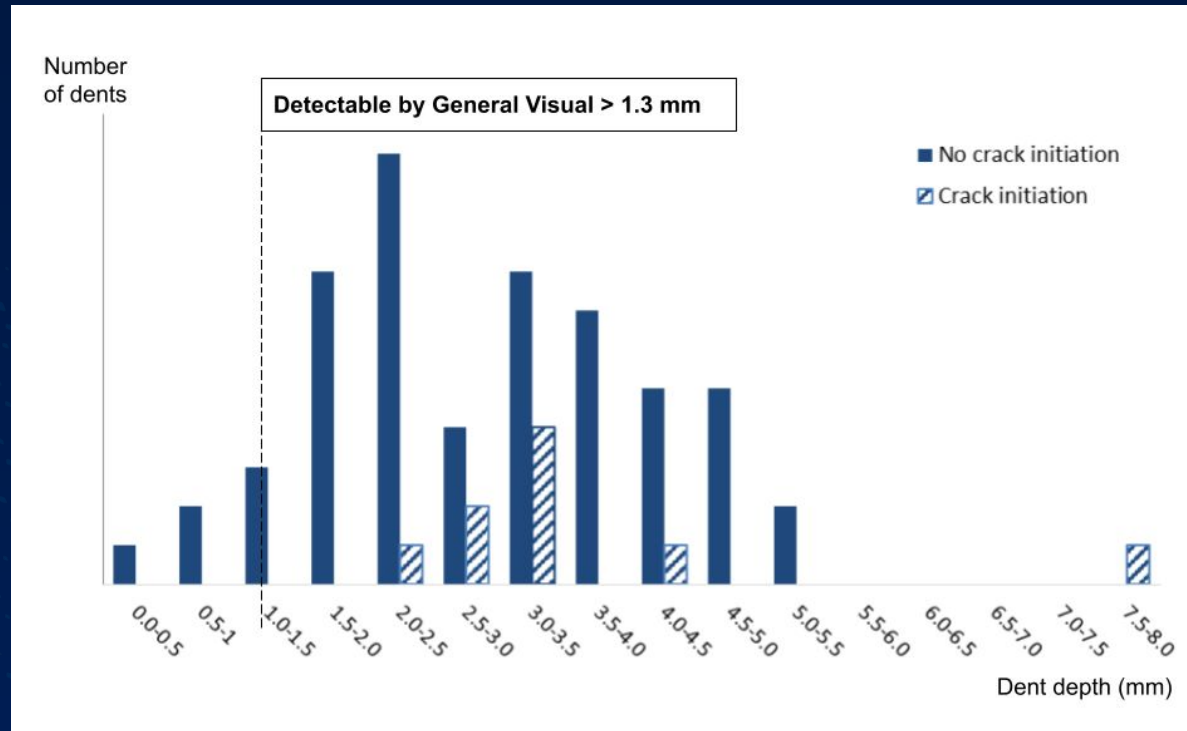


Time to define a more effective, more realistic approach  
Take credit of 50 years of test & service experience



# AIRBUS test experience

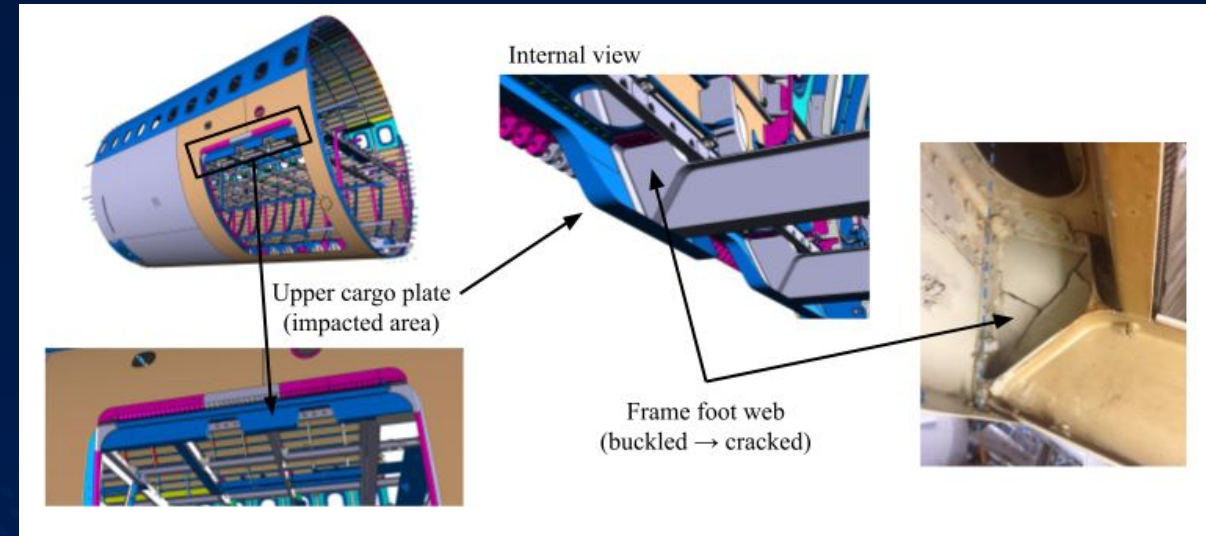
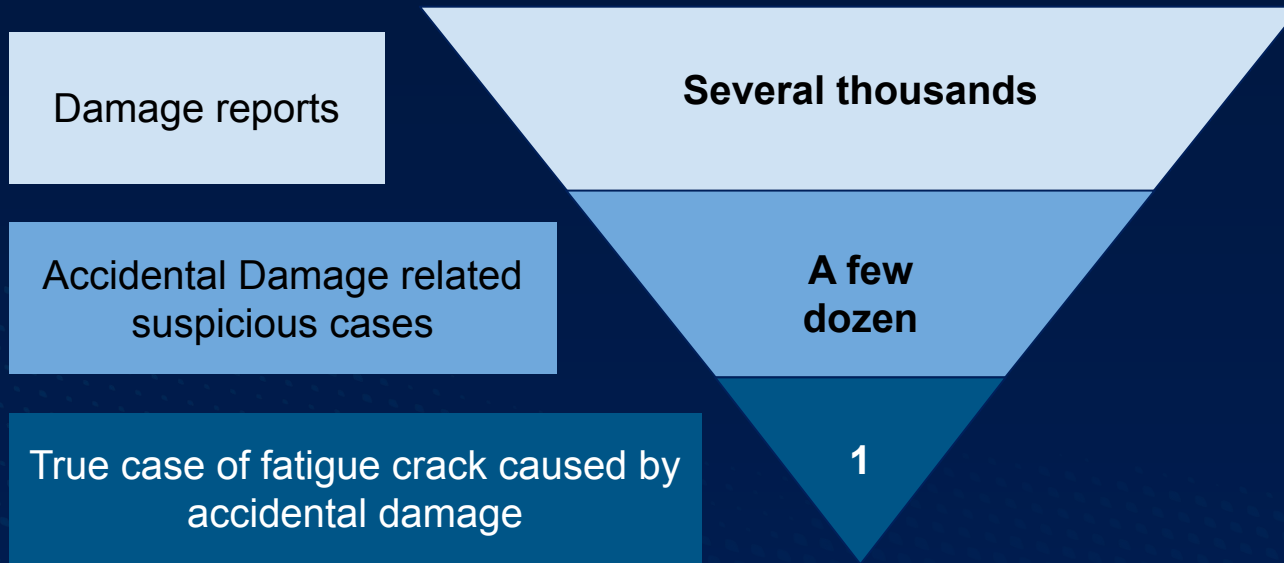
- More than 100 dents applied and tested on AIRBUS Full-Scale Fatigue specimens



- No crack initiation from dents with a depth lower than 2.3 mm
- Dents deeper than 1.3 mm can be detected with a General Visual Inspection

# AIRBUS service experience

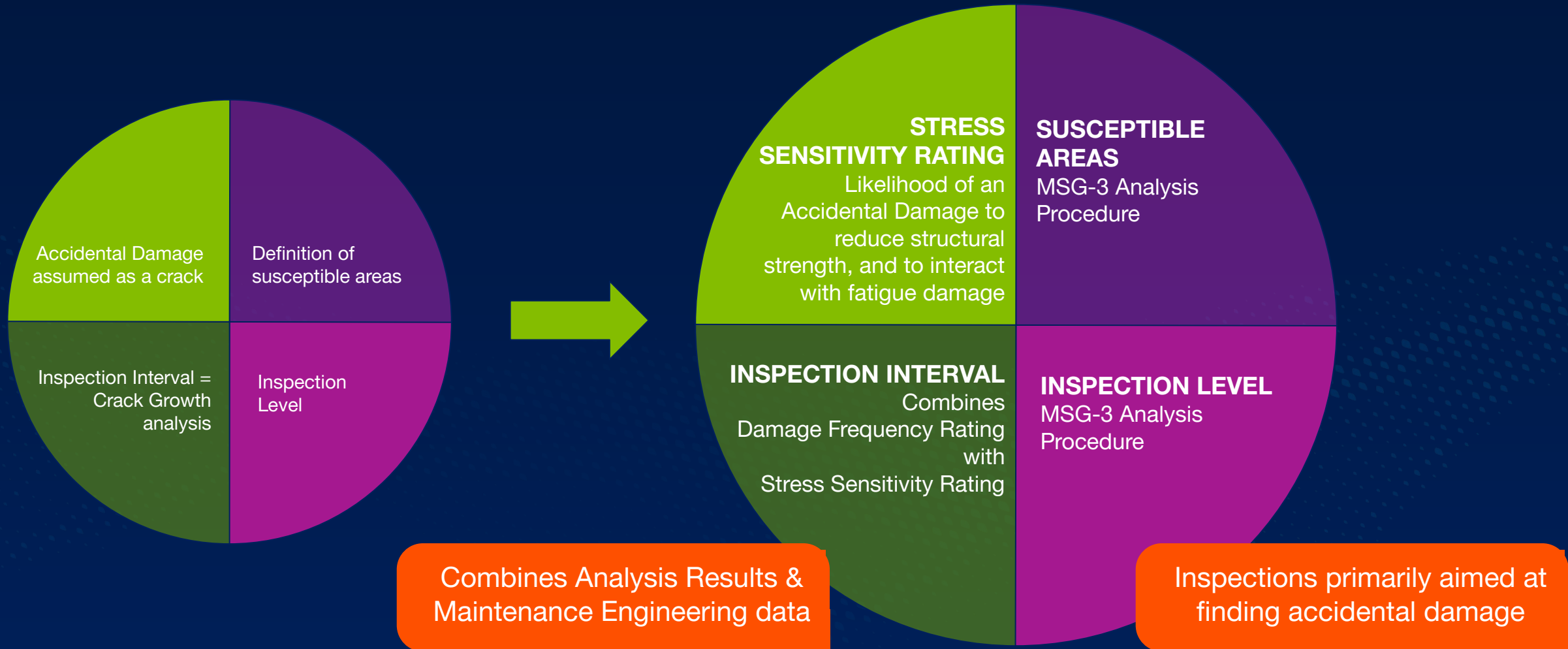
- Several thousands of damage reports from AIRBUS databases reviewed



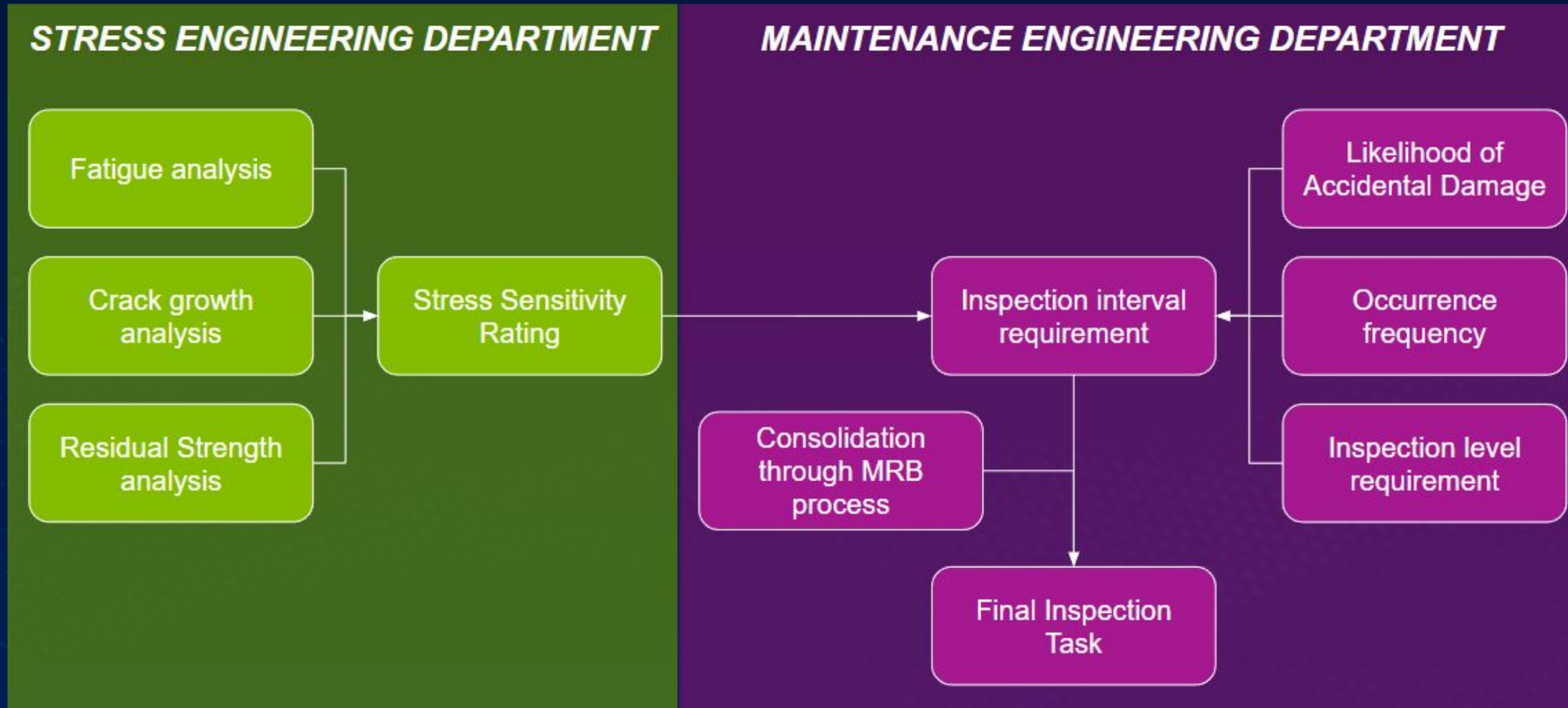
- Accidental damage was found well before significant interaction with fatigue damage

Fatigue crack initiated from accidental damage before this accidental damage is found → UNLIKELY

# Overview of the new approach



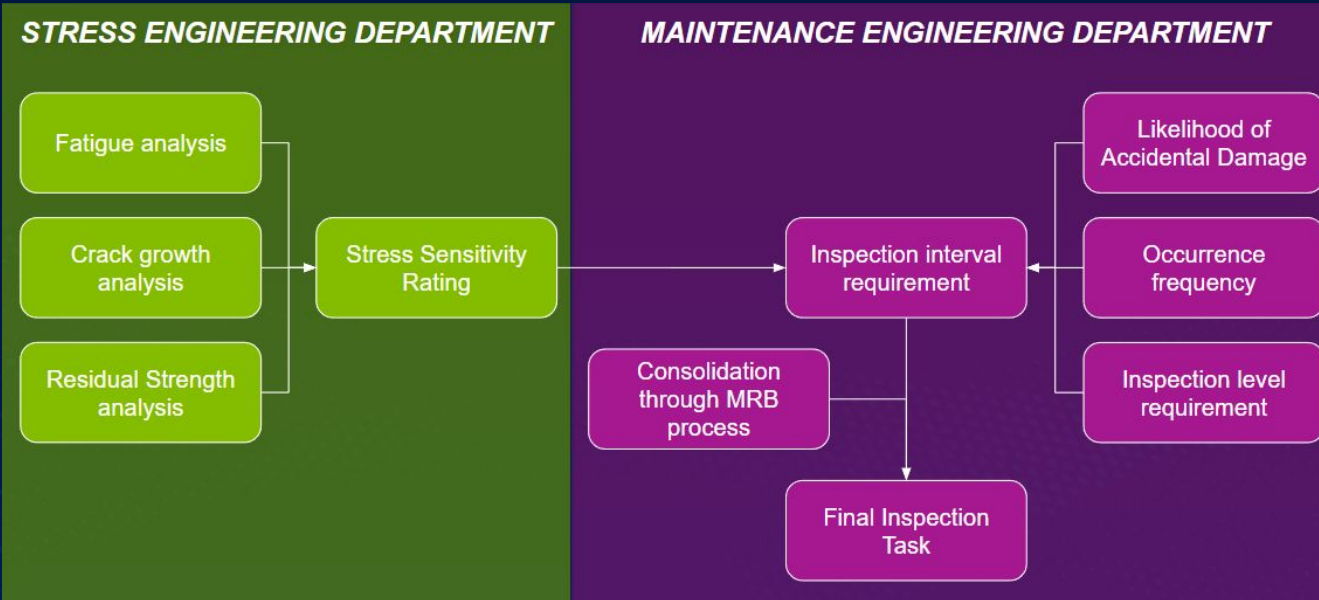
# Details of the new approach



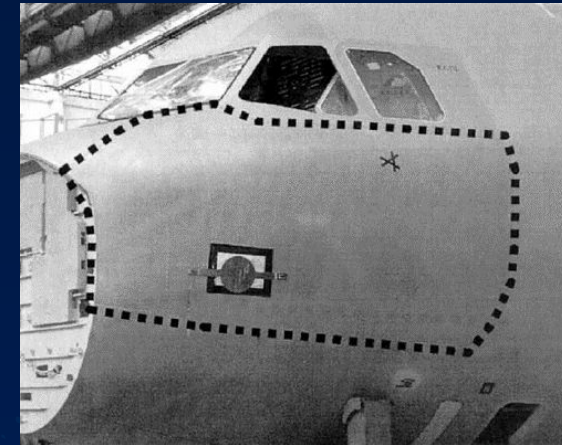
A **stress and maintenance** engineering **collaborative** approach ...



# Details of the new approach



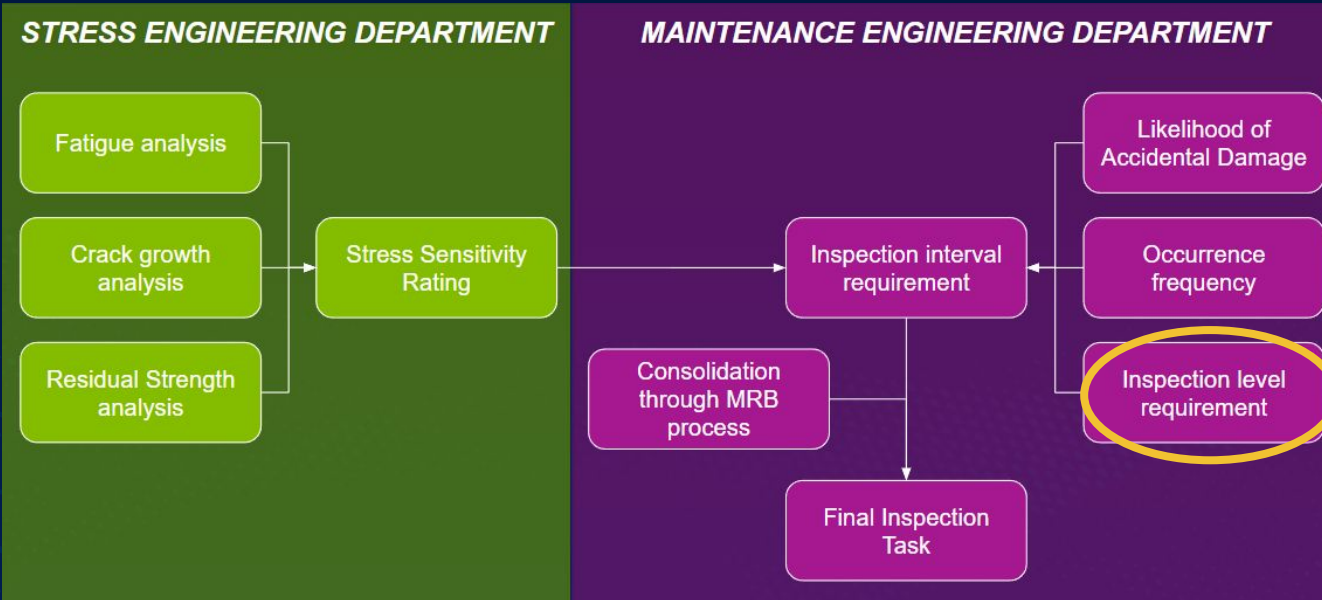
Application example: A320 Fuselage side panel below cockpit window



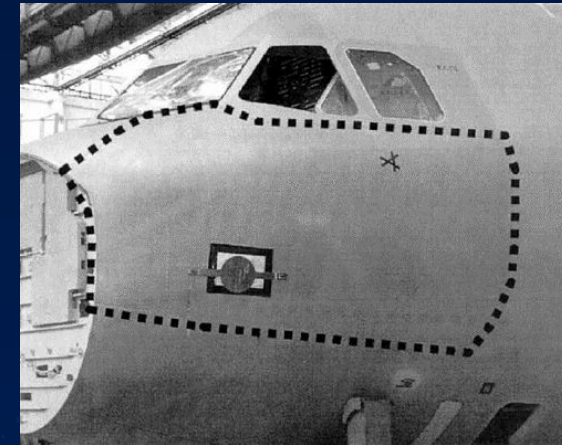
... based on a **rating system**

		ACCIDENTAL DAMAGE RATING	
		1	2
STRESS SENSITIVITY	0 - Very Low	No task required	12 YE
	1 - Low	12 YE	6 YE
	2 - Medium	6 YE	3 YE
	3 - High	3 YE	Specific justification

# Details of the new approach



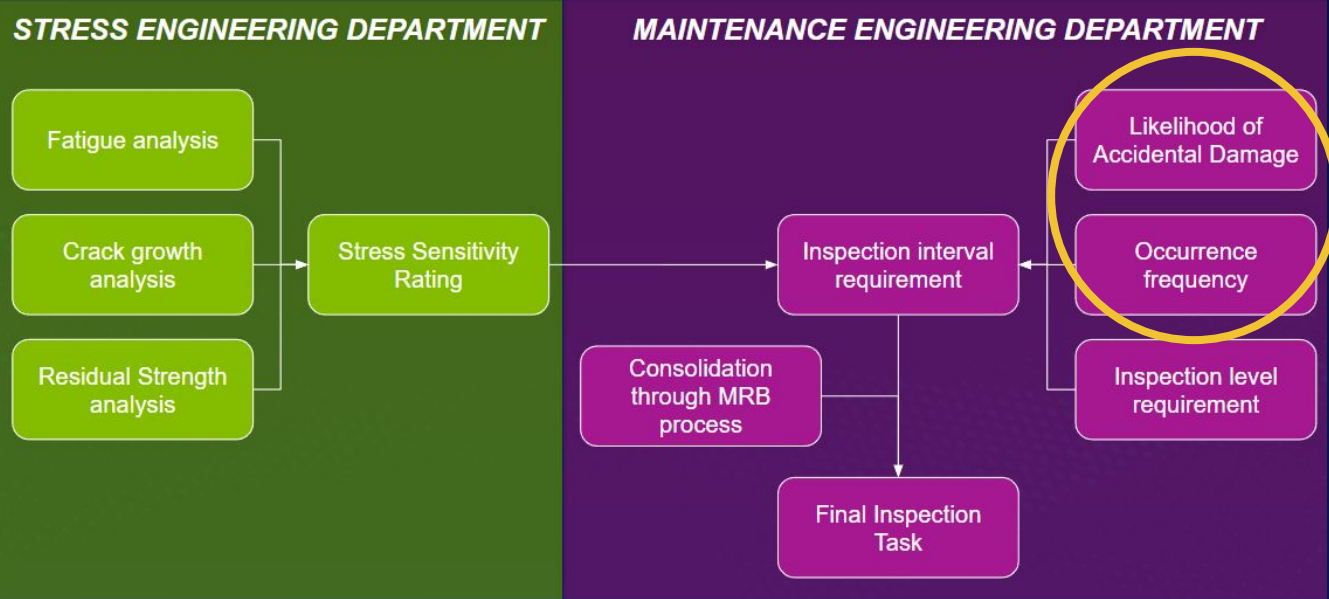
Application example: A320 Fuselage side panel below cockpit window



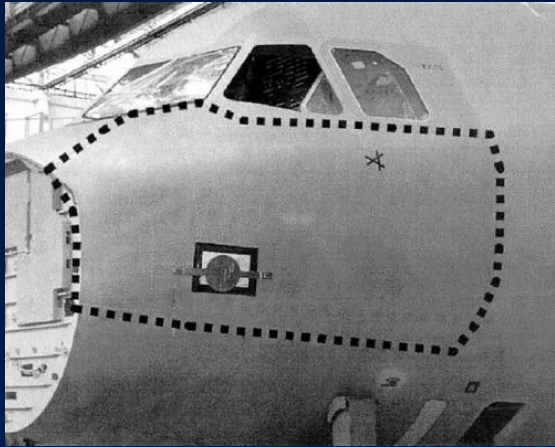
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General Visual Inspection

# Details of the new approach



Application example: A320 Fuselage side panel below cockpit window



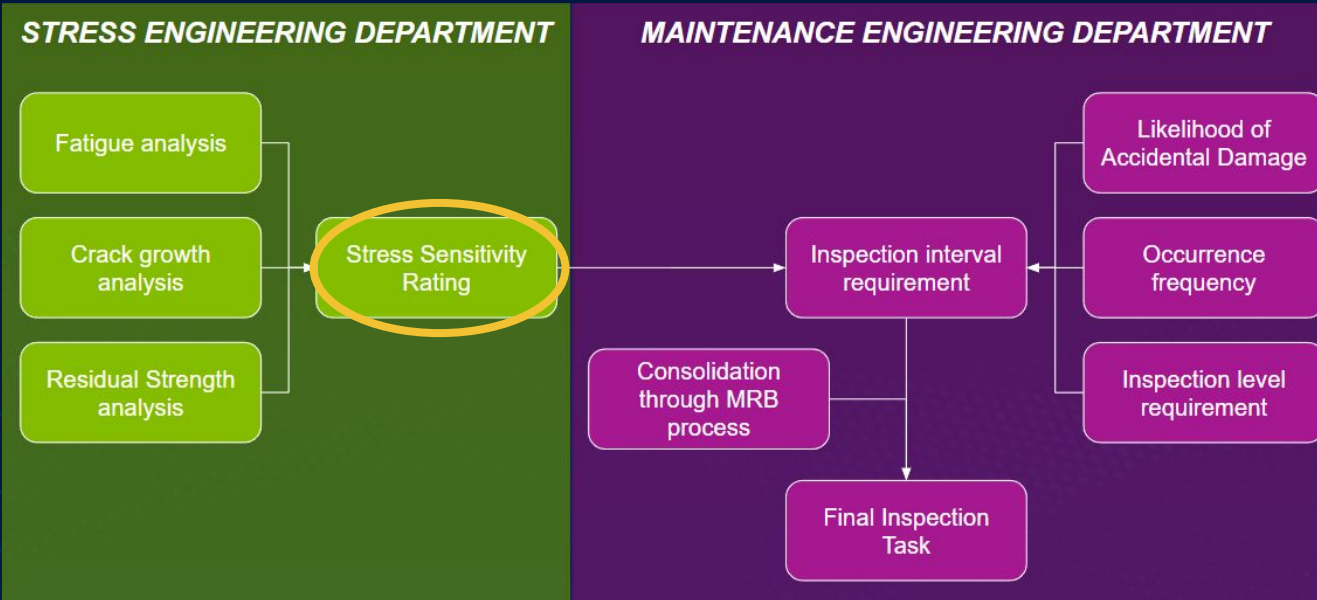
Threat assessment

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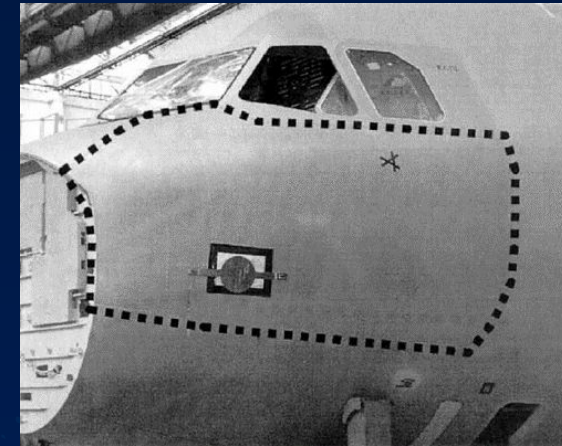
General Visual Inspection



# Details of the new approach



Application example: A320 Fuselage side panel below cockpit window



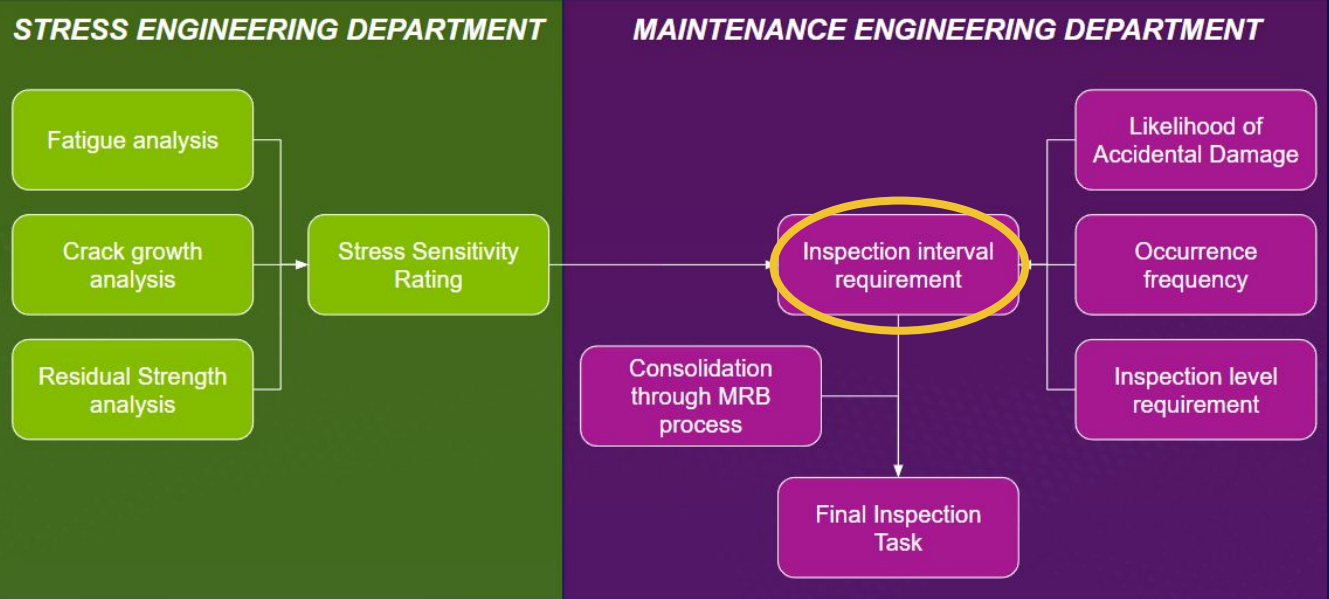
**Qualitative** assessment of Fatigue & Damage Tolerance behaviour

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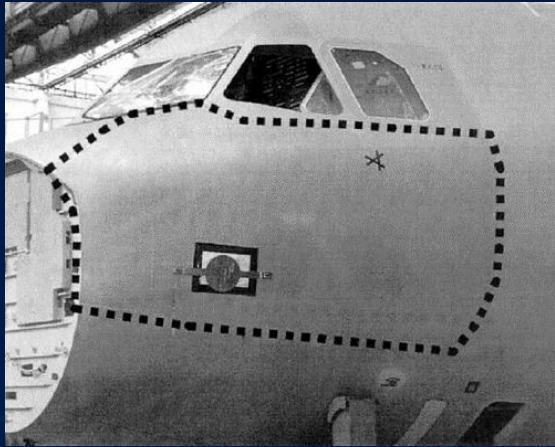
General Visual Inspection



# Details of the new approach



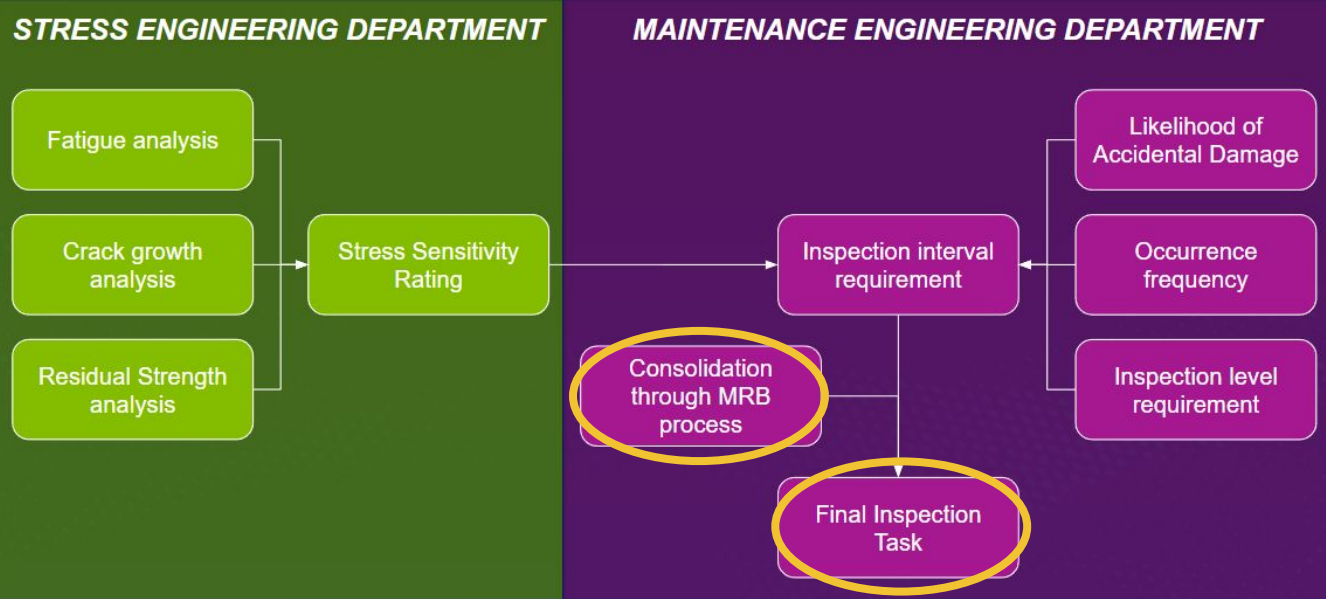
Application example: A320 Fuselage side panel below cockpit window



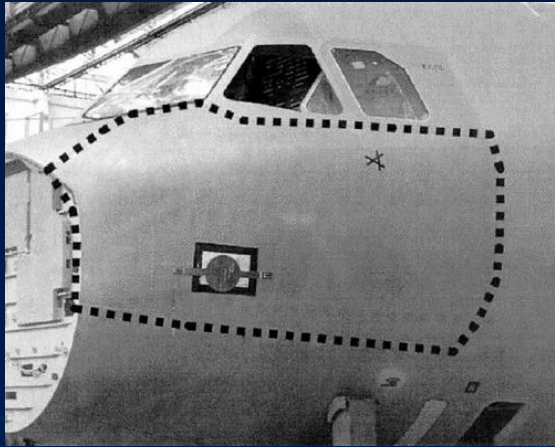
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Application example: A320 Fuselage side panel below cockpit window



Existing zonal task (interval 48 months) adequately covers the area

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General Visual Inspection

# Conclusions on the new approach



## Based on collective experience

From operators, maintenance & repair organisations, AIRBUS maintenance & stress Engineers



## Interaction with fatigue damage is unlikely

As shown by 50 years experience of test and service data



## More realistic

In line with the physics



## Inspection Program effectiveness improved

Avoids duplication of tasks. Recognised as a huge improvement by the Operators.

# Thank you

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