RotoTest Inspection Improvements.

Airbus Customer Services
Structure Engineering Support

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RotoTest Inspection Improvements

RotoTest Improvement's

(NTM 51-10-01).

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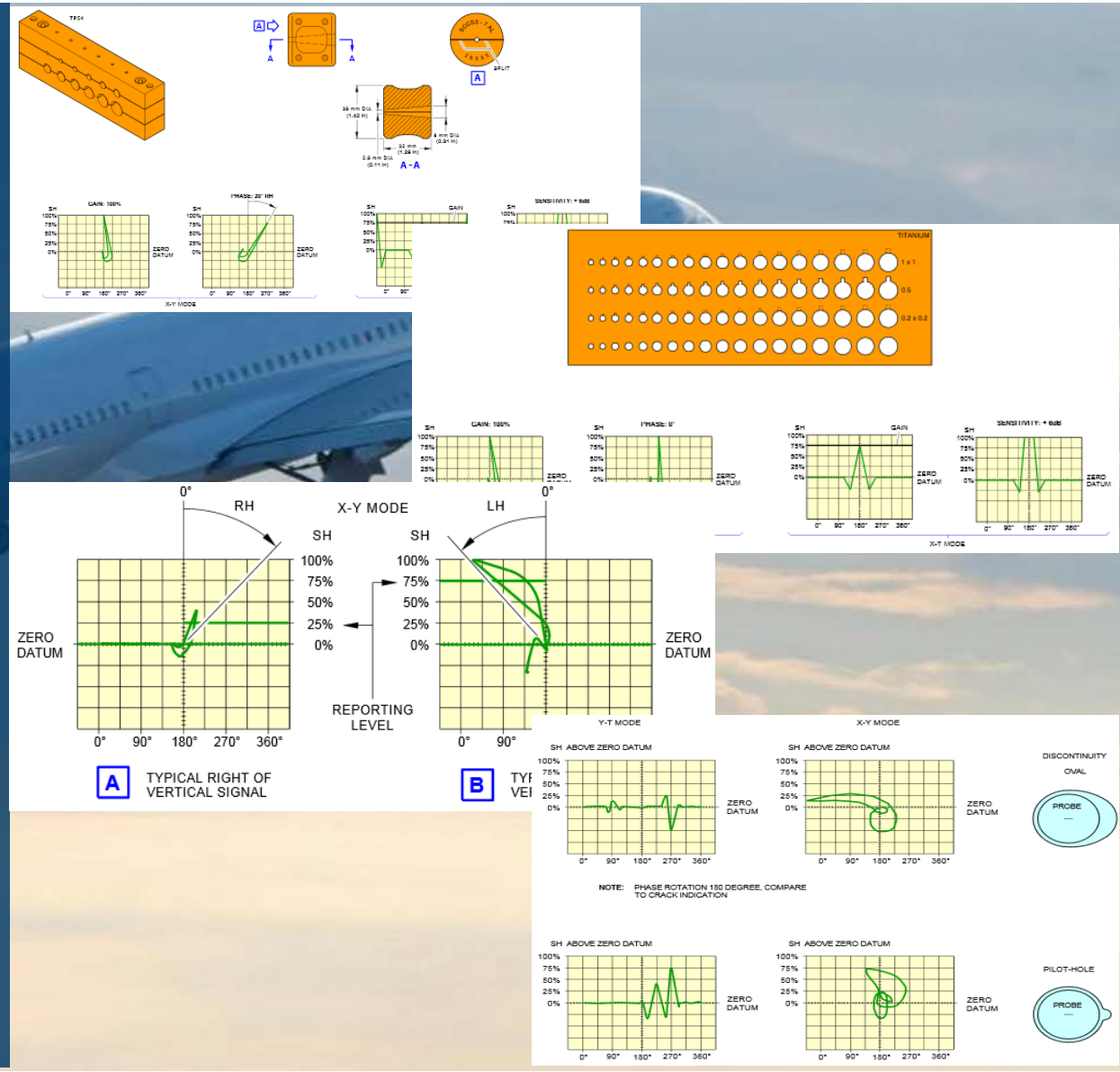
RotoTest Inspection Improvements – Mono-Frequency

Rototest NTM 51-10-01

Existing procedures (A & B) have been revised to give clearer examples (photo's) of typical indications

Added a new procedure (C) for after repair/re-work



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RotoTest Inspection Improvements – Mono-Frequency

RotoTest Improvement's

(NTM 51-10-01

Procedure A)

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NTM 51-10-01 / ANDT 51-96-29, Procedure A & Procedure B, update:

- General review of the Text & Illustrations, (eg Rename X-T as Y-t),
- Add conductivity ranges for typical materials to be inspected,
- Re-arrange Calibration Blocks, Materials and specifications (Steel 15-5PH, AlLi Alloys and Tiβ added),
- Clarify the Add or Remove 6dB after Calibration,
- Add inspection frequencuies between 500KHz and 2MHz, (eg for Steel 1~2Mhz)
- Add rotor RPM adjustment to between 1000 & 3000 RPM, (eg lower rpm to optimize signal for large diameter's),
- Clarify typical indications, with Figures and photographs:
  - Cracks,
  - Scratches
  - Cold Worked Holes,
  - Burrs,
  - Corrosion, including complementary borescope inspection,
  - Mechanical Damage,
  - Effect of Shims & different Material in the stack.

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Calibration clarification when using the different Calibration Blocks:

Instrument Adjustment	Step	SPLIT PARALLEL and SPLIT CONICAL CALIBRATION BLOCKS	HOLE PLATE CALIBRATION BLOCKS	CALIBRATION BLOCK SET
Phase Angle Calibration (X-Y Mode)	Set the instrument gain to obtain a signal above the zero datum at	100% SH	100% SH	100% SH
	Adjust the phase angle to position the signal	20 degree right from the vertical	0 degree on the vertical	10 degree right from the vertical
	Use the slot level	N/A	0,5 mm (0.020 in) (through slot)	0,5 mm (0.020 in) (corner 45°)
Sensitivity Final Setting (Y-t Mode)	Set the instrument gain to obtain a signal above the zero datum at	75% SH	75% SH	75% SH
	Modify the instrument gain	Add 6 dB	Add 6 dB	**Remove** 6 dB
	The noise level must be less than	15% SH for hole diameter ≤ 4,5 mm (0.177 in): 10% SH for hole diameter > 4,5 mm (0.177 in):		

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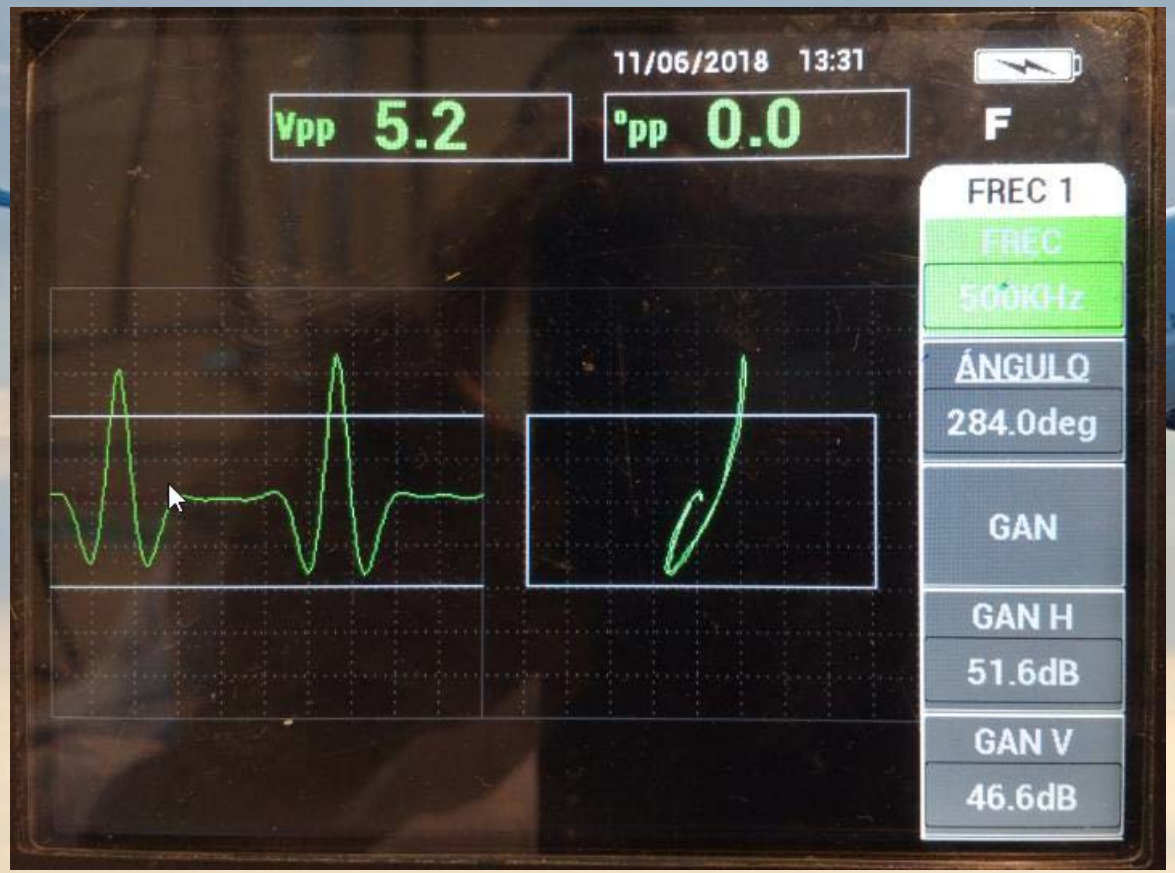
Sensitivity adjustment – Using a Split Conical Calibration Block
(after phase angle adjustment):



75% Screen Height,

+ 6dB

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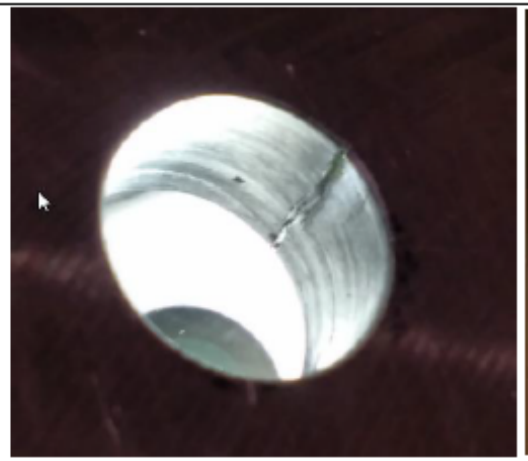
Clarification of interpretation, for scratches):

Scratches **Damage width:** Scratch < Nick < Ding	Long, narrow superficial mark done with a sharp or pointed object. All indications to the left of vertical and do not exceed 40-50% SH. Perform visual inspection for confirmation.	   X-Y view  X-Y view with +10dB

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Clarification of interpretation, this time for changes in stack materials AL to Steel:

Change of material 1	Steel – Al Adjustment in Al Passing from Al to Steel, signal in X-Y increases in amplitude and its angle rotates clockwise NOTE: cracks in steel will feature an indication left to the vertical.	 Typical signal in steel after adjustment in Al  Steel with no crack Steel with crack

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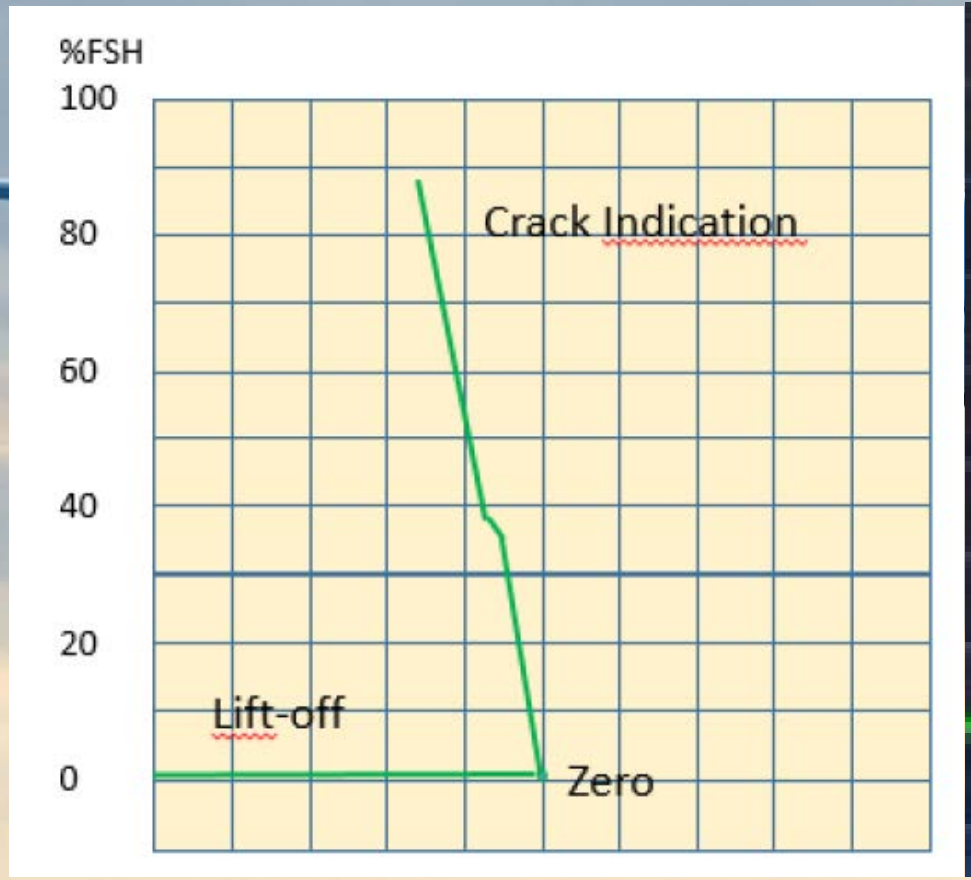
(NTM 51-10-01
Procedure B)

RotoTest Inspection Improvements – Mono-Frequency

Clarification of crack signal for Manual RotoTest:



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(NTM 51-10-01

Procedure C)

(After Re-work)

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This new Procedure C, is basically the same as Procedure A:

The important differences are in the acceptance criteria, since we already know we had a defect!

All indications at the same orientation of the marked crack prior to rework with maximized amplitudes clearly above noise level must be considered as cracks.

Sensitivity Final Setting (Y-t Mode)	Set the instrument gain to obtain a signal above the zero datum at	75% SH	75% SH	75% SH
	Modify the instrument gain	Add 6 dB	Add 6 dB	**Remove** 6 dB
	The noise level must be less than	15% SH for hole diameter ≤ 4,5 mm (0.177 in): 10% SH for hole diameter > 4,5 mm (0.177 in):		

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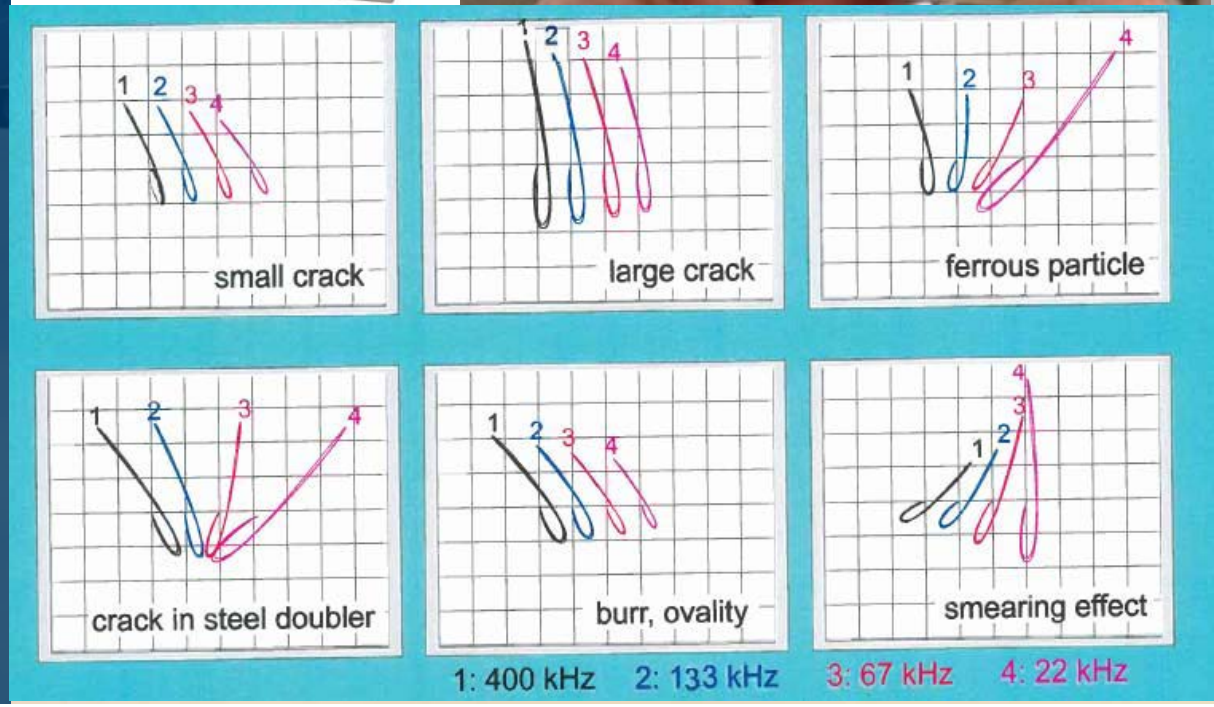
RotoTest NTM 51-10-01:

Multi-Frequency RotoTest.



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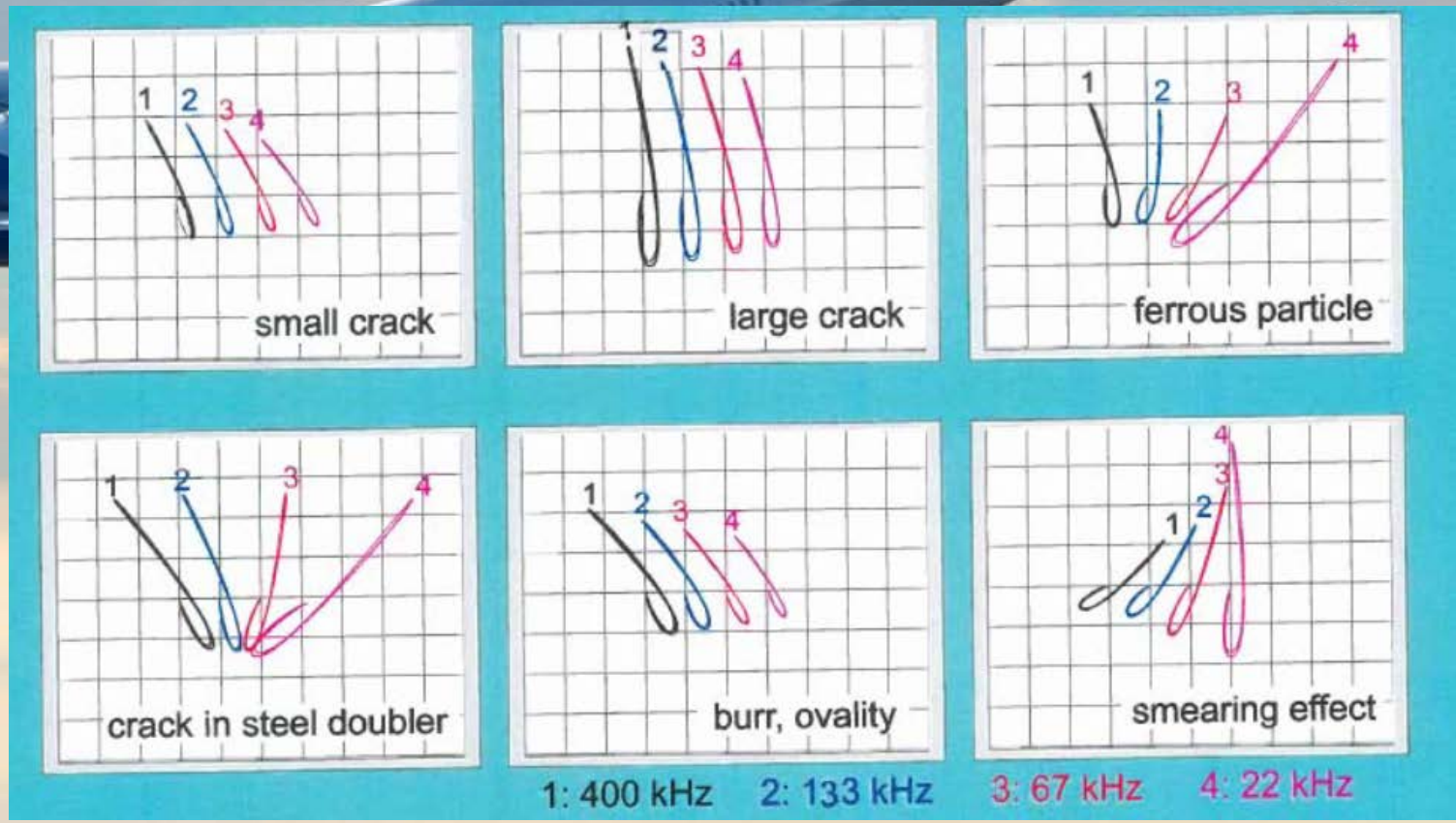
- This method introduces the possibility to determine ‘estimate’ within certain limits the ‘depth’ of a defect into the material from the bore hole, and to measure the length of defect along the bore hole.
- Also the tooling trialed, provides the possibility to ‘auto-calibrate’, which should help to reduce the variability of the calibration due to human influences.



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- Currently the tooling is a little more cumbersome, than single frequency equipment:
- The Instrument is
  - Laptop PC sized, with additional module,
  - And needing mains power.
  - Is more transportable than portable.

- The Rotor Unit is roughly the same size as a ‘mini-rotor’:
  - Has an added encoder, for depth measurement,

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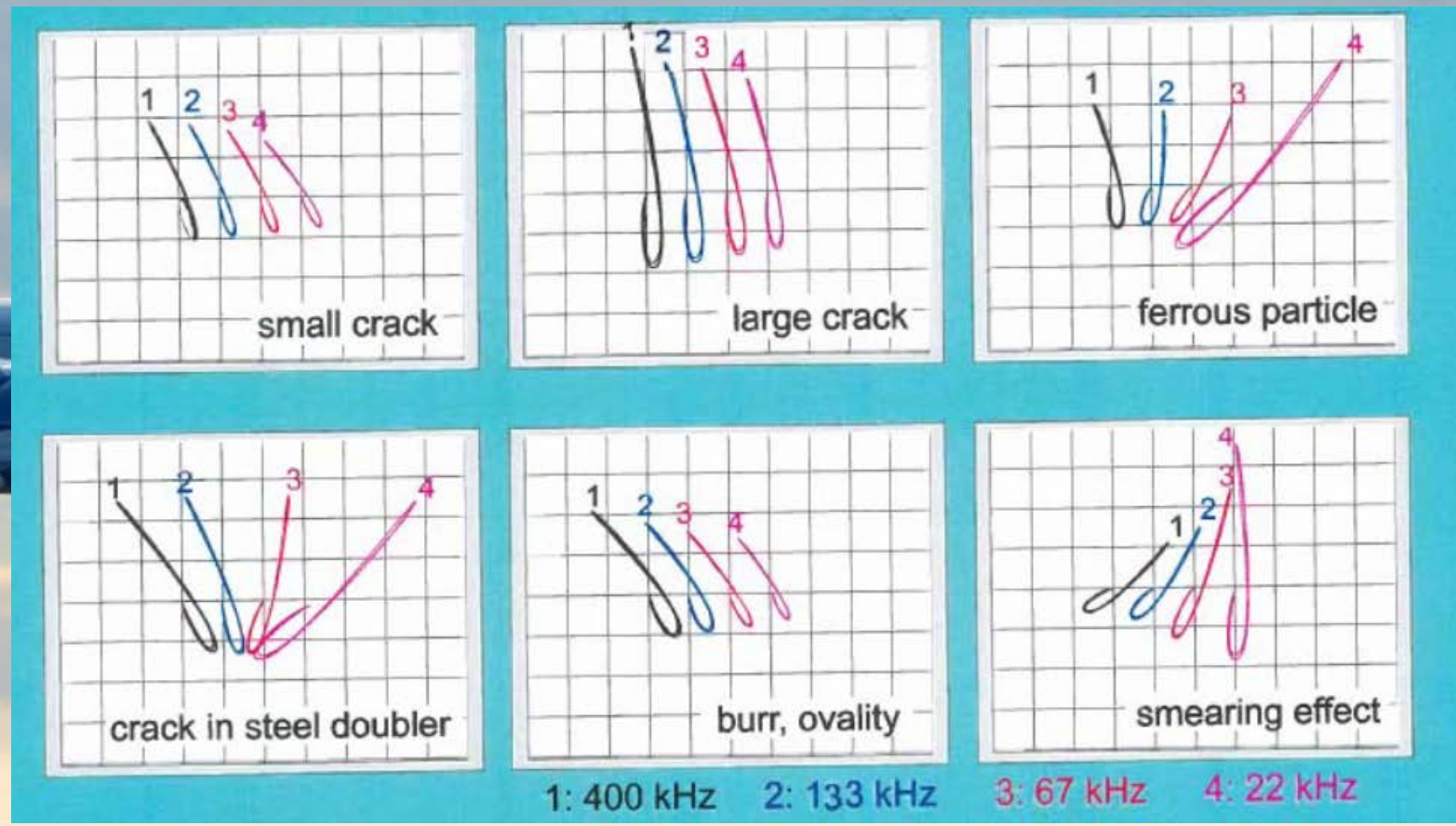
- Signal interpretation, is similar to current single frequency interpretation:
  - Larger signal = larger defect
  - Phase angle relates to defect type
    - As explained in NTM 51-10-01



- Plus, using the C-Scan and amplitude display, it is possible to estimate the defect depth into the material.

- However, for small crack defects, burrs and hole ovality:
  - you can see the phase angle, is quite similar, making them a little difficult to differentiate!

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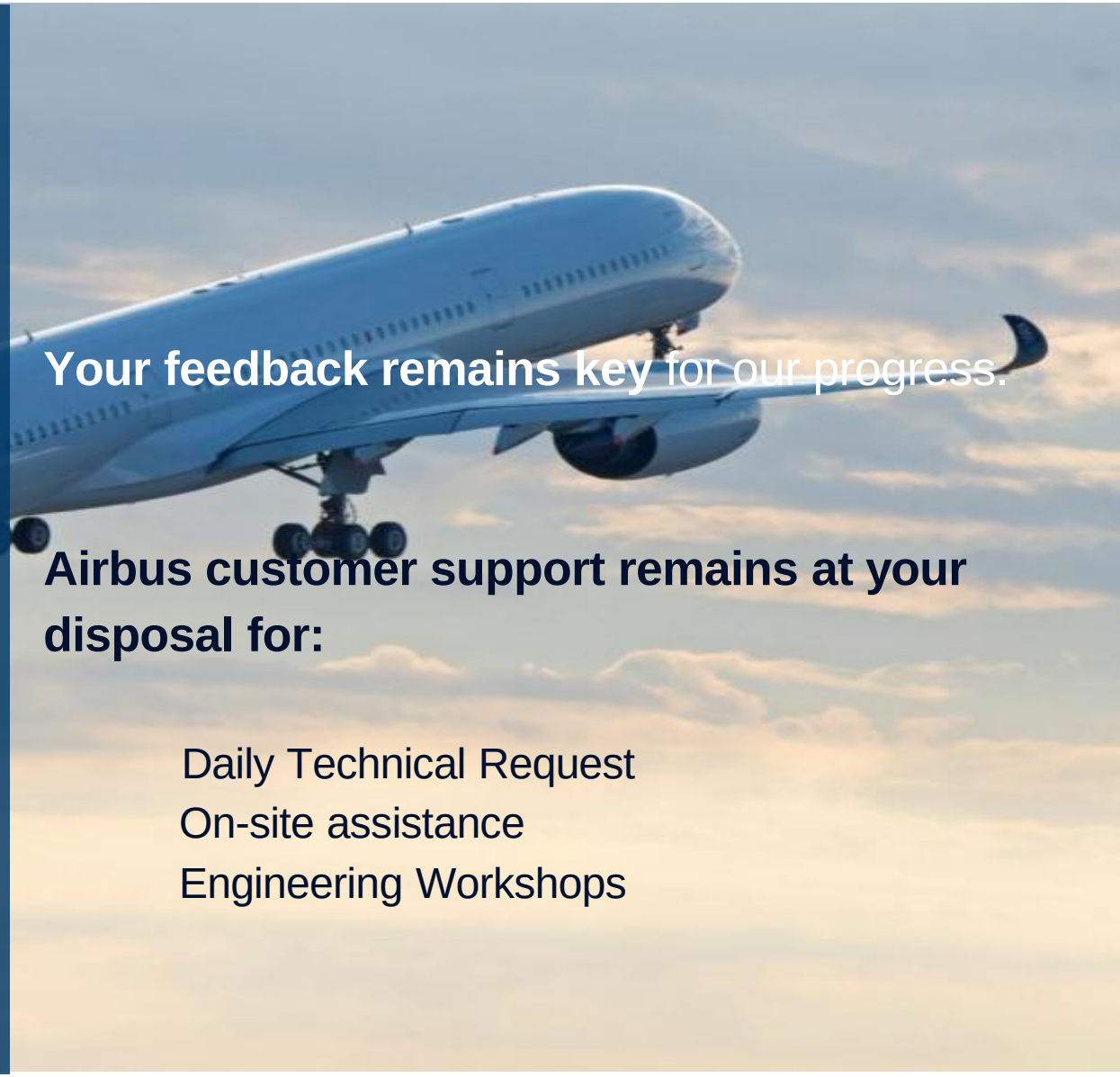
CONCLUSION:

Airbus is continuously looking for **innovation and improvement in NDT technics and tooling** to always support our customers in Aircraft Maintenance activity.



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Thank you

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Questions ?

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