TS application news

FOERSTER

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Improved test results for ferromagnetic bars at MFL testing

With TS product news 35 the mechanical improvements of the new CIRCOFLUX wear shoe have been announced. The test results have improved significantly together with the since July 2010 by default equipped DIP-Array (Differential Inductive Probe). Below there is a comparison with a conventional DKD-Probe (Doppel Kern Differenz – Double core differential) in regard to reproducibility of short events.

Fig 1: Usage of the new DIP-Array in all CIRCOFLUX sensor systems Ro 75/Ro 100/Ro 130/ Ro 180

Test demand

While scanning the material surface with the probe elements, the signal amplitude varies for short events or pores on the test material depending on the position to the probe element.

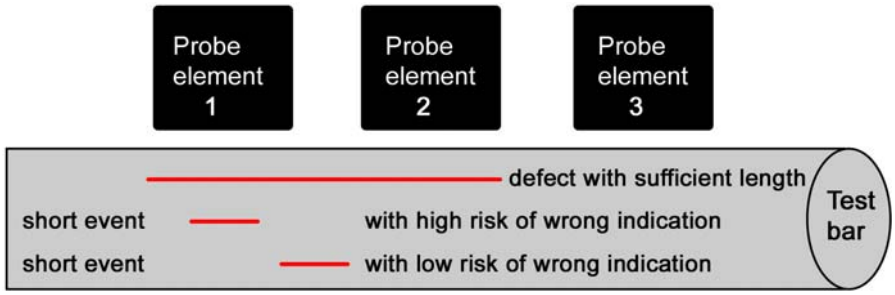

Fig 2: Schematic of probe elements alignment and possible positions of short events while scanning

It may happen that the test signal for short events varies at multiple test sequences. Even a different classification in good or bad test material is possible. Surface roughness and pores may cause high interference level which can be indicated as pseudo defects depending on the position to the probe element. The new developed DIP-Array by Foerster minimizes the risk of wrong indications.

Test facility

A complete CIRCOFLUX test head and a test bar with 30 mm diameter are fixed to a mechanical device. The test bar is set to rotation and the test head is moved in parallel direction to collect the test signals. The results are displayed on the scope window of the CIRCOFLUX DS test and evaluation electronics. A conventional DKD with probe clearance of 7.5 mm and a new DIP-Array with probe trace width of 7.5 mm are compared.

Fig 3: Test facility

Defect detection

Three artificial test defects are sawed into the test bar with 0.1 mm depth and 0.1 mm width in each case. The lengths are 10 mm, 5 mm and 2 mm. Both probe alignments have at the test defect with 10 mm length similar test results related to the reproducibility. The maximum signal amplitude is set to a 100% threshold.

Fig 4: CIRCOFLUX DS

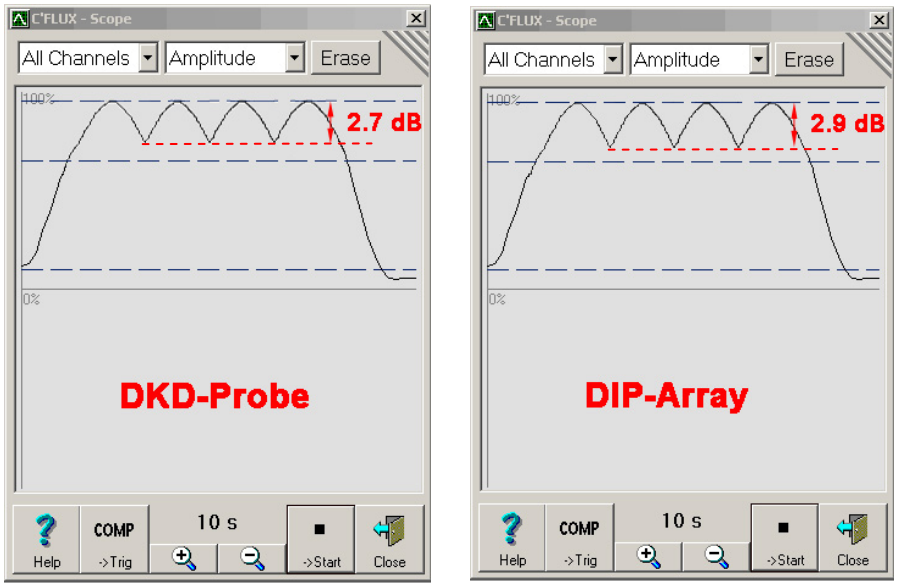

Fig 5: Test signal of defect with 10 mm length

On both oscillograms the signal amplitudes of the four probes in the middle are displayed. The signal differences between the best and the worst defect position are with less than 3 dB nearly the same at DKD-Probe and DIP-Array.

Then both shorter defects are examined with this test setting.

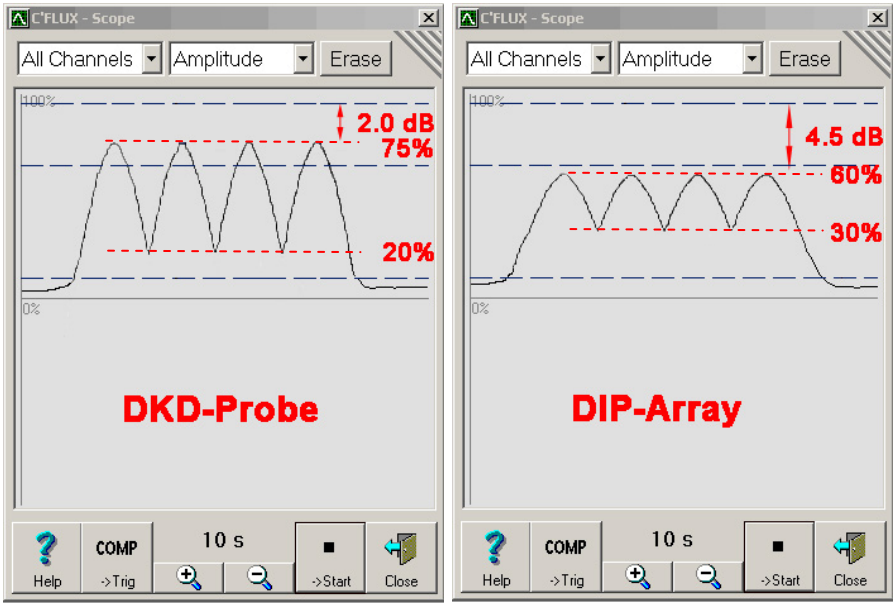

Fig 6: Test signal of defect with 5 mm length

The signal amplitude with the DKD-Probe varies between 75% and 20%. Pores with similar geometrical characteristic will be indicated different with nearly factor 4 depending on the position to the probe at multiple test sequences.
The signal amplitude with the new DIP-Array varies between 60% and 30%. This minimizes the risk of pseudo defect classification.

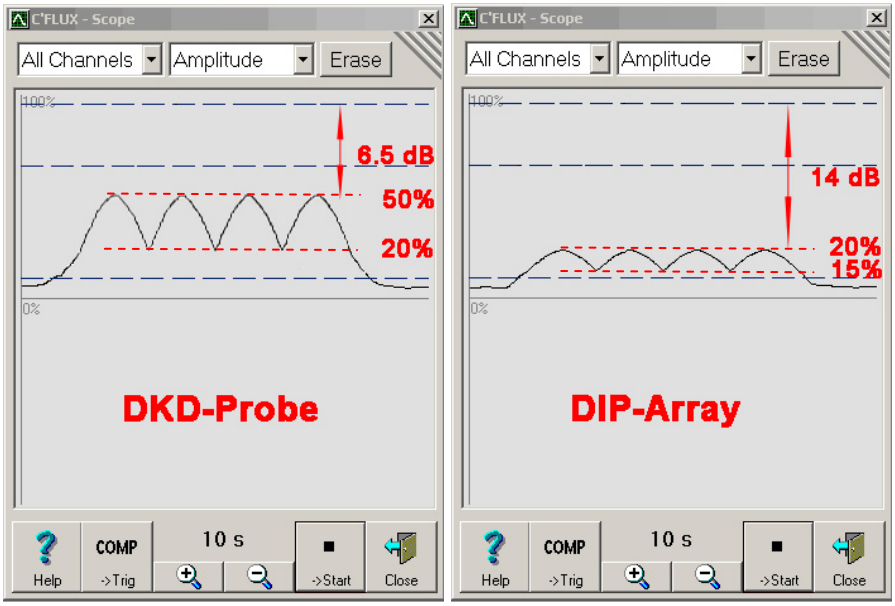

Fig 7: Test signal of defect with 2 mm length

The signal amplitude with the DKD-Probe still reaches up to 50%. The signal amplitude with the new DIP-Array is low at any position as desired for this short event.

Conclusion

Beside the improved test results also the life time of the probes increases with the innovative DIP-Array. The aging process of the probe elements caused by thermal force and vibration is reduced with the highly integrated design. The mechanical and electrical compatibility with the conventional DKD-Probe permits an easy change to the new DIP-Array for any existing CIRCOFLUX sensor system.