

1.3.22. INDUSTRIAL APPLICATION OF REAL-TIME 3D IMAGING BY SAMPLING PHASED ARRAY

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The “Sampling Phased Array” technique compared with the conventional phased array approach became very popular in the last years making use of the propagation of (Huygens principle) elementary waves generated by individual elements of the sensor array to reconstruct the composite phased array signal by high-speed numerical computation for any arbitrary, individual angle or focus depth within the physical limitations. As the near field of the transducer is that of a ‘quasi’ point source, transducer-near inspection regions are much better to inspect than in the conventional case where the near field is determined by the full aperture of the transducer. Furthermore, the special IZFP-approach allows a very fast 3-dimensional visualization of inspection objects by combining – slice by slice – 2-dimensionally calculated SAFT-B-images to a 3-dimensional data-cube with a manifold of possible data projections for evaluation and analysis of the inspection results. 3-D-SAFT algorithms taking into account also a modified transducer design with a wide-angular sound beam characteristic in each space direction are under development.

The present paper gives an overview to the basic principles of the “Sampling Phased Array” method and documents its advantages by means of several industrial applications.