

1.3.28. COMPAS-XXL – A NOVEL PHASED ARRAY SYSTEM WITH EXTENDED CAPABILITIES

Schenk G., Ploigt R., Dohse E.,
BAM Federal Institute for Materials Research and Testing, Berlin, Germany;
Bauer L., ASIC-Design Werder, Werder, Germany;
Deutsch A.K.W., Karl Deutsch, Wuppertal, Germany

In NDT with ultrasound 3-dimensional soundfield control requires a large number of instrument channels as well as high-speed data acquisition. A matrix array of e.g. 16×16 elements demands 256 active receive and transmit channels, and must be equipped with a complete set of phased array specific functions as delay control, digitizers and beam-forming stages. Furthermore all circuits, especially the units for conveying inspection data, have to meet strict requirements with respect to real-time-imaging. Increasing the number of channels for such arrays, although complex, has obviously huge application potential in the field of NDT. For this reason a new Phased Array inspection system, the COMPAS-XXL, has been developed at BAM in cooperation with Karl Deutsch Prüf- und Messgerätebau. The system is designed for maximum user flexibility and is based on small scalable units which may be extended up to 1024 channels.



Fig. 1. COMPAS-XXL inspection system (128 channels)

Representing the latest member of the COMPAS (Compact-Phased-Array-System)[®]-family the COMPAS-XXL stands for state-of-the-art technology. Up-to-date FPGA-chips as well as brand new power-saving high-speed AD-converters were employed. As in many applications high-speed imaging is a necessity, the conversion of the raw-data of complete A-scans is performed by a special DMA-based technique. Thus ensures the reconstruction of inspection data in real-time. Beyond that new designed hardware techniques permit the implementation of exceptional functions as Sample Phased Array technique and simultaneous scans.

The outline extensions of the unit, another important goal, were minimized by the use of high integrated programmable technique (FPGA) and the increased application of surface mount devices. Thus a single-board unit with an on-board computer is available, which may be equipped with at least 64 channels. A special interface technique provides the assembly of 16 of these units to a complete inspection system of 1024 channels, which should be sufficient for a large variety of applications in the field of ultrasonic testing, promoting the increased employment of matrix arrays.