

Development of an Infrared Marker based Encoder System as a Non-Contact Positioning System for Ultrasonic Probes

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The digitalization of testing procedures is one of the challenges in the development of modern non-destructive testing systems. In order to guarantee a high level of inspection reliability, the assignment of measurement data to the measurement position plays an important role as well as the optimal inspection hardware. In a cooperative research and development project, an optical tracking system has been developed with which it is possible to determine the positions of different ultrasonic probes in space without contact. Thus, the position of the measurement is linked to the measurement results directly. Infrared LED markers attached to the ultrasonic probes are used for this purpose. The position of the markers are tracked in space with a camera. By linking several cameras and trackers, a positional accuracy of a few millimeters can be achieved for a camera specimen distance of 2 m. The more cameras are used the bigger the investigated part can be. For the tracking system, an existing optical camera system is coupled with a conventional of the shelf ultrasonic phased array device by means of a newly developed universal encoder. Different single transducer probes or phased array probes can be used. The costly and time consuming use of mechanical encoders is thus eliminated. This combination enables the further digitalization of hand-guided ultrasonic testing precisely in those areas where robot-based testing is not feasible. Additionally, a much easier way of documentation is possible. Due to the exact position determination a better evaluation of the measurement data can be carried out via a subsequent 3D display of the ultrasound data.