

Wolf Kleinert

Defect Sizing Using Non-destructive Ultrasonic Testing

Applying Bandwidth-Dependent DAC
and DGS Curves

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Preface

In 1982 I started my career in the Krautkrämer Company in Cologne. Since then I have worked in the field of non-destructive material testing using ultrasonics up to my retirement in the end of 2014. In the past couple of years I was particularly engaged with the distance–gain–size (DGS) method for the sizing of reflectors.

This activity started when a colleague of mine, Michael Berke, came to me showing the result of a software test. The software tested was the implementation of the DGS method in an ultrasonic Flaw Detector. The software test showed strange deviations using the DGS method applied to measurements with an angle beam probe. The first approach, assuming a software bug, had to be abandoned quickly. This led to the development of new innovative angle beam probes, single element as well as phased array probes. Many iterations were necessary during this development. The prototypes were improved step-by-step until the result was satisfactory. In Chaps. 4–6 the development is described in great detail.

A lot of insight was gained during the years of this development, finally resulting in probes which are fully modeled. The sound fields of these probes can be calculated easily. Due to this fact, bandwidth-dependent DGS curves, respectively DAC curves for flat-bottomed holes and side-drilled holes could be engineered.

GE Sensing & Inspection Technologies GmbH in Huerth, Germany applied for several patents covering these new probes including the bandwidth-dependent DGS and DAC curves. When referring to these probes the term *trueDGS*® will be used which is a registered trademark of GE Sensing & Inspection Technologies GmbH.

Bonn
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Wolf Kleinert

Acknowledgments

Without the help and assistance of my former colleagues the development of the *trueDGS*[®] probes would have been impossible. Particularly with Gerhard Splitt I spent a lot of time discussing the next steps in the development. Additionally he checked all my equations and formulas for the calculation of these probes. In the patent application of the *trueDGS*[®] probes both of us are mentioned as the inventors. Furthermore I appreciate the work of York Oberdoerfer and his team. They built these probes and were very patient following all the necessary iteration steps. It is hard to imagine how many measurements using test blocks were needed to validate the new probes. This large number of measurements was carried out by York and his team. York and I have had lots of technical discussions which all helped to improve the new probes.

Last but not least, I thank my wife Brigitte who patiently accepted my mental absence during the writing of this book which was sometimes connected with a bad mood. Additionally I thank her and my sons for proofreading this document several times.

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