

Effect of Wall Thinning on Defect Depth Measurement

For the eddy-current testing of the U-bends in steam generator tubing, the defect depths are calibrated on a straight tube with uniform wall thickness. However, the cracks that have been detected are on the top of the bend of the tube, in an area where the wall thickness has been reduced due to the forming of the tube. In order to determine the effect that the calibration of the probe on one wall thickness, and then applied to the measurement of a defect depth with another wall thickness, a computation was performed using the Vic3d modeling program. The computation used the 0.080-inch diameter coil, since the plus-point coil is not available at this time in the Vic3d program.

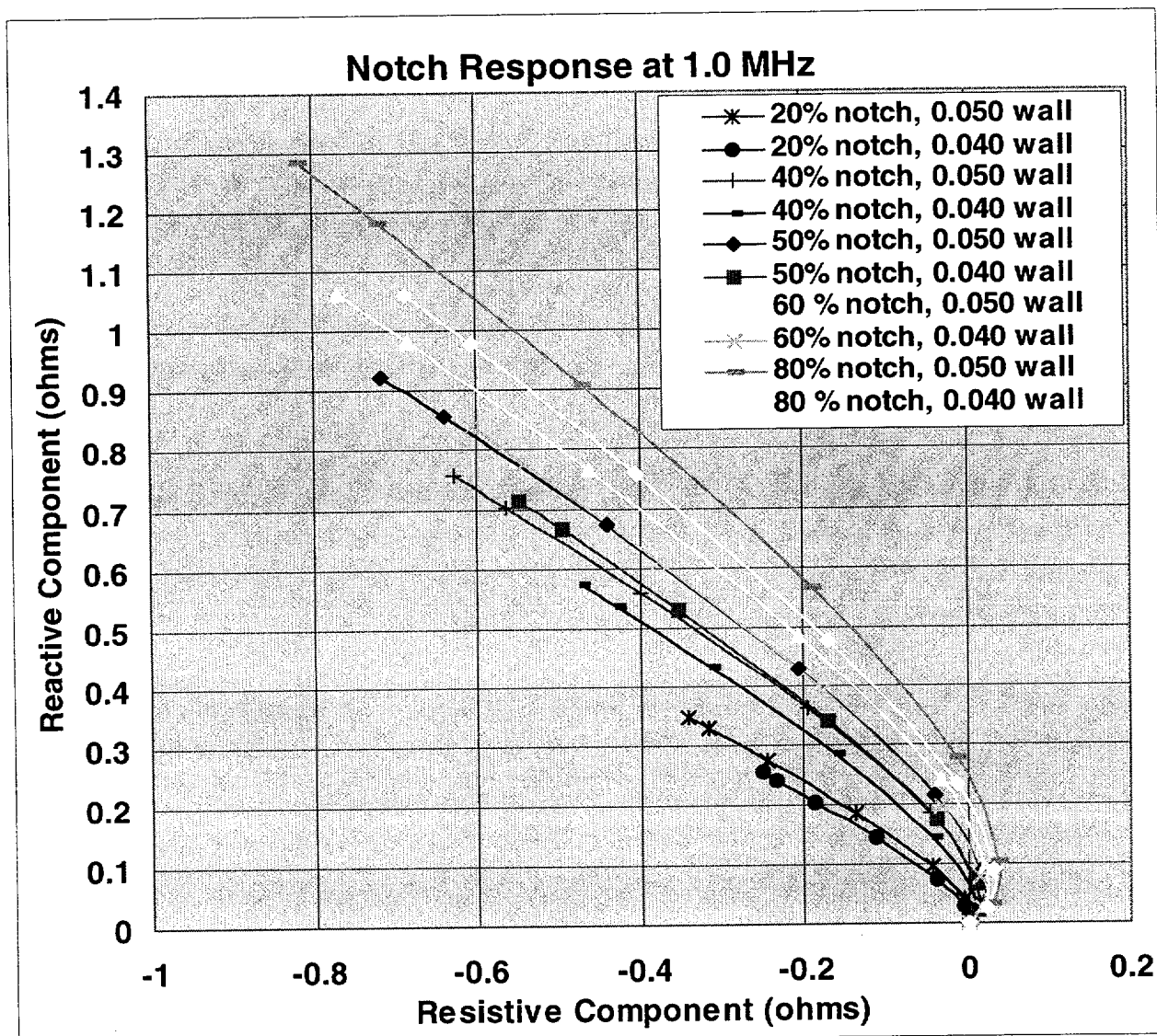


Figure 1 Notch depths computed for 0.050-inch and 0.040-inch wall thicknesses

In Figure 1 we show the results of the computation. Different notch responses were computed for wall thicknesses of 0.050-inches and 0.040-inches. The plot shows that, for the 0.010-inch

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decrease in wall thickness, the notch response will indicate the notches are about 10% more shallow than they actually are. For instance, the 60% notch with the 0.040-inch wall thickness will produce the same response as 0.50% notch will on the 0.050-inch wall thickness. This means that the notches will measure more shallow than they actually are, which is in the non-conservative direction. Therefore, this error must be considered and accounted for in the calibration for u-bend standards.