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Application of ultrasonic testing for quality evaluation of Magnetically Impelled Arc But Welded drive shafts of motor vehicles

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The article presents contemporary ultrasonic methods that can be applied to evaluate the quality of transmission drive components of motor vehicles. The issues of non-destructive analysis of discontinuities in manufactured drive shafts, consisting currently of thin-walled tubes, were investigated in this study. The driveshaft elements were joined by using innovative method called Magnetically Impelled Arc But Welding (MIAB). For many years a major challenge for engineers working with ultrasonic techniques was joining of thin-walled components (having thickness below 3 mm). In addition of this limitation, the problem of variable geometry of the weld flash on the weld perimeter was highlighted. To reduce the impact of mentioned factors the pseudo-surface waves (also known as lateral waves) have been applied in this study. For optimal parameters selection of the ultrasonic beam propagation and understanding the physical-acoustic phenomena, the Finite Elements Method modeling was performed also. The phenomena of wave transformation on medium boundary and reflections from artificial flaw have been analyzed. The results of numerical analysis were confirmed by experimental research. Manufactured MIAB welding joints were tested by ultrasonic method with using designed experiment setup. Selected configurations with various shapes, dimensions and process variables have been investigated. The results confirm the usefulness of ultrasonic methods for quality evaluations of butt welds made by MIAB welding parts transmission shafts of motor vehicles.

Biography

Kustron P is an Assistant Professor at Wrocław University of Science and Technology. He professionally works with welding technology and FEM analysis of welded joints. He is Specialist in the field of destructive and non-destructive tests. He is actively cooperating with automotive industry in modeling and analysis techniques of manufacturing methods.

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