A new approach to NDT of projection welded nuts by magnetic flux density analysis

Christian Mathiszik[1], Jörg Zschetzsche[1], Uwe Füssel[2]

[1]CHAIR OF JOINING TECHNOLOGY AND ASSEMBLY, Technische Universität Dresden, Germany,
[1]CHAIR OF JOINING TECHNOLOGY AND ASSEMBLY, Technische Universität Dresden , Germany

Projection welding is a very efficient welding process with a high degree of automation. It is widely used in various industries for the production of automobile bodies, rail vehicles, kitchen appliances, etc. Due to rising safety requirements in these industrial sectors and an increasing variety of the used steel alloys and their coatings, a reliable quality assurance of these welds is becoming more and more important. Since the welds are not visible from outside, like spot welds, visual testing is not possible for quality assurance. So far, the welding and machine process parameters are recorded during the welding process and used for process monitoring and control. In addition, the welds are periodically tested destructively to determine the quality of the welds. In the field of non-destructive testing (NDT) methods, no industrial standard has yet been established. One possibility is radiographic examination. However, this is both time-consuming and cost-intensive and therefore useful only on a small number of samples, on components with very high safety requirements or in research and development. In principle, ultrasound testing represents another option. However, it has not prevailed in series application so far. Latest research at Technische Universität Dresden focuses on analyzing the magnetic flux density of projection welded nuts for quality assurance. In this talk, the theoretical approach as well as the experimental measurement concept of the new NDT method for projection welded nuts will be presented by magnetic flux density analysis. In addition, the results of the process monitoring are analyzed and compared with the results of NDT. Correlations between failure patterns and head tension forces will be identified. It will be shown how both systems can complement each other in series operation. Based on these results, the high potential and the transferability to other possible applications will be demonstrated.