

X-ray diffraction study of residual stress distributions at S355 welds

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Welding seams are usually a critical part of iron structures such as bridges etc. Machine components also have this problem. In the preparation phase. Good preparation helps a lot. The residual stress distribution near and at the weld seam plays an important role in crack initiation. There are three zones: the weld, the heat-affected zone and the base material. In the heat-affected zone there is an increase in hardness and an increase in brittleness. This combination is mostly responsible for crack initiation at the weld seam - heat-affected zone transition for a higher probability of crack initiation. the disadvantage is that only surface measurements can be made on structures and components. A detailed residual stress analysis can help to prevent cracking and additional steps can be taken to improve the residual stress condition. One step is shot peening. Another important aspect is that the weldments may or may not be fixed, giving a significantly different stress field. this study examines weld seams (X-shape and MAG welded) to provide a detailed map (1mm spacing between measurement points) of surface residual stresses before and after shot peening with and without fixation. In the laboratory also a dedicated points residual stress profile to depth is done to see how the measured stresses at the surface will evolve to depth.