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Determination of residual stress by X-ray diffraction in a weld cord

H. Nezzari, L. Chekour, H. Berkane, S. Boudrahem, A. Djermoune

Abstract : In this study, the implementation of the method for determining residual stresses by X-ray diffraction and apply it to the case of a bead of solder. Welding processes induce changes in the microstructure and residual deformations and stresses that it is so difficult to control that important. To study this phenomenon of welding two pieces and low alloy low carbon, were welded to the electrical arc with coated electrode of mild steel. The morphology of the samples was characterized by optical and electron microscopy, showing the significant change in the microstructure in the different area of the cord. The hardness profiles obtained show that the hardness is stable (200 Hv) in the base metal and increases in the cord (230 Hv). In this work, the X-ray diffraction was used to analyze the residual stresses. The results of measurements on the crude sample show that the constraints are all compression, with a higher level in the side region to the cord and in the base metal. The relief annealed at 650 ° C relaxes the constraints to a lower level while remaining compressive. These results show that the present solder interesting mechanical and structural characteristics, having regard to the present of residual compressive stresses, the absence of structural defects and cracks. Which promotes good performance and long life of the part in its operation.

Keywords : soudage, contraintes résiduelles, diffraction de rayon X, microscopie.