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Determination of residual stressby X-ray diffractionin a weld cordon

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Abstract : In this study, the implementation of the method fordetermining residual stresses by X-ray diffraction andapply it to the case of a bead of solder. Weldingprocesses induce changes in the microstructure andresidual deformations and stresses that it is so difficult control that important To study this phenomenonof welding two pieces and low alloy low carbon, werewelded to the electrical arc with coated electrode ofmild steel. The morphology of the samples wascharacterized by optical and electron microscopy, showing the significant change in the microstructure in the different area of the cord. The hardness profilesobtained 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 allcompression, with a higher level in the side region to the cord and in the base metal. The relief annealed at650 ° 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.