

인장법에 의한 박판 판재 용접부의 잔류 응력 거동 특성에 관한 연구

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A Study on the Behavior Characteristics of Residual Stress of the Thin Butt Weldment by Mechanical Tensioning Method

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Abstract

For thin panel welded structure, the various welding distortions were found due to the low resistance against welding deformation. Especially, buckling distortion induced in the thin panel welded structure produce severe problems related to cost in production stage and safety in service life. So, many researches including mechanical and thermal tensioning method for preventing the occurrence of buckling distortion in the production stage have been performed. The purpose of this study is to identify the behavior of longitudinal residual stress at the SA butt weldment with thin plate of 6mm thickness under tension load by 3 dimensional FEA. For it, mesh design for 3D FEA was constructed with 20 nodes brick element for butt weldment and 8 nodes shell element for base metal. According to FEA results, the longitudinal compressive strain inducing tensile residual stress at the butt weldment decreased. It was because the compressive thermal strain in way of weldment was reduced by tension load. The control effect of residual stress increased with an increase in tension load. So, if the amount of tension load applied to the weldment exceeds 1.5 times of longitudinal shrinkage force, the amount of longitudinal residual stress decreased below the critical value inducing the buckling distortion at the SA butt weldment. Its validity was verified by experiment.

Key Words : Buckling Distortion, 3 Dimensional FEA, Tension Load, Longitudinal Residual Stress, SA Butt Weldment, Mechanical Tensioning Method