Residual Stress Analysis in Welded Component.[1] SHAHAB ROUHI, SANICHIRO YOSHIDA, Southeastern Louisiana University, FUMIYA MIURA, TOMOHIRO SASAKI, Niigata University — Due to local heating, thermal stresses occur during welding; and residual stress and distortion result remain welding. Welding distortion has negative effects on the accuracy of assembly, exterior appearance, and various strengths of the welded structures. Up to date, a lot of experiments and numerical analysis have been developed to assess residual stress. However, quantitative estimation of residual stress based on experiment may involve massive uncertainties and complexity of the measurement process. To comprehensively understand this phenomena, it is necessary to do further researches by means of both experiment and numerical simulation. In this research, we conduct Finite Element Analysis (FEA) for a simple butt-welded metal plate specimen. Thermal input and resultant expansion are modeled with a thermal expansion FEA module and the resultant constitutive response of the material is modeled with a continuous mechanic FEA module. The residual stress is modeled based on permanent deformation occurring during the heating phase of the material. Experiments have also been carried out to compare with the FEA results. Numerical and experimental results show qualitative agreement.

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