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Thermal and Mechanical Welding Analysis and Decreasing Methods of Welding Residual Stresses

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ABSTRACT

In welding process, stresses after cooling, which remain in body, are called residual stresses. Sometimes, the magnitude of stresses is high and reduces the strength of welded pieces, moreover, they cause crack in the weld. To predict welding residual stresses, it is necessary to do thermal and mechanical analysis.

In this paper, some parameters which influence the welding using ANSYS software are investigated. Results show that even by decreasing the travel speed of torch, it makes no differences in the amount of residual stresses, but preheating causes decreasing the produced stresses about 22 percentages. Suitable welding sequences also, decreases residual stresses up to 25 percentages.

KEYWORDS

Welding Residual Stresses, Welding Residual Distortions, Thermal and Mechanical Welding Analysis



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$$\frac{\partial}{\partial x} \left[K_x(\phi) \frac{\partial \phi}{\partial x} \right] + \frac{\partial}{\partial y} \left[K_y(\phi) \frac{\partial \phi}{\partial y} \right] + \frac{\partial}{\partial z} \left[K_z(\phi) \frac{\partial \phi}{\partial z} \right] + Q(\phi) = \rho c(\phi) \frac{d\phi}{dt} \quad []$$

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ϕ $Q(\phi)$ $K(\phi)$ ρ c



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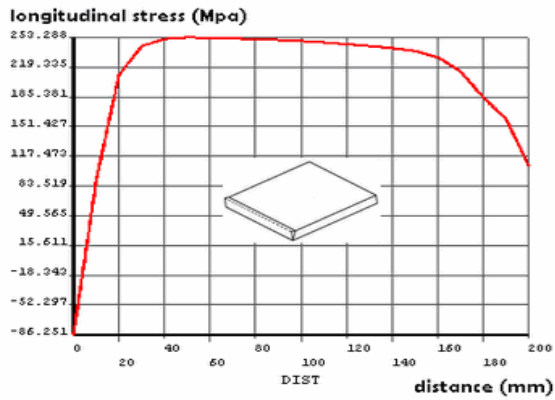
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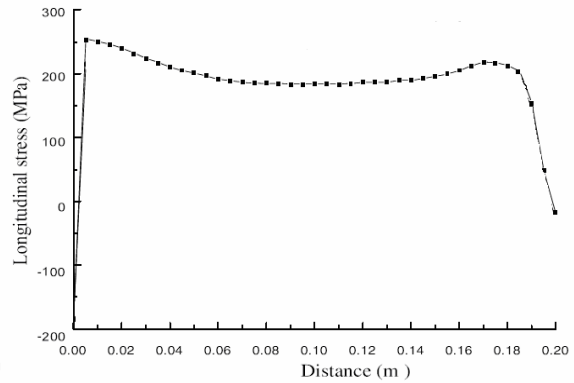
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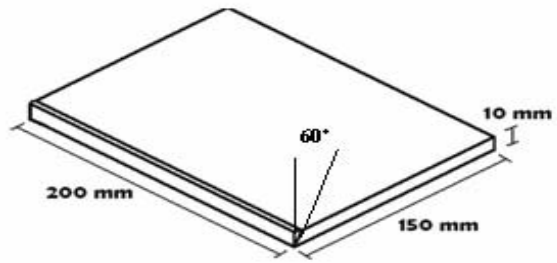
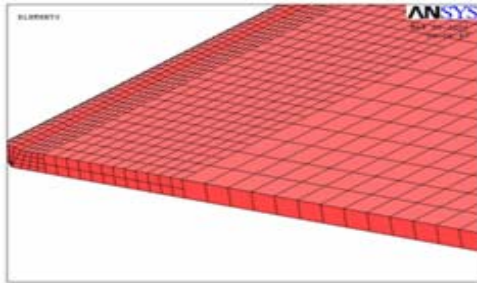
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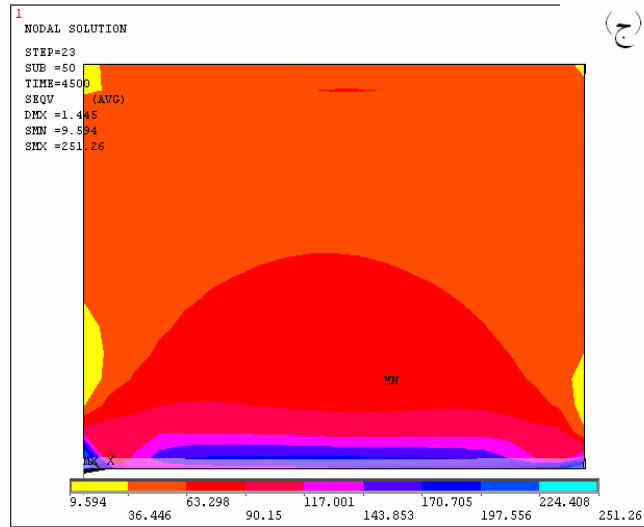
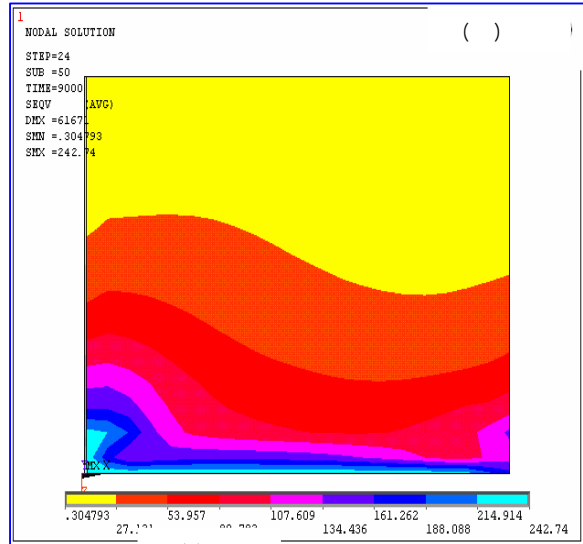
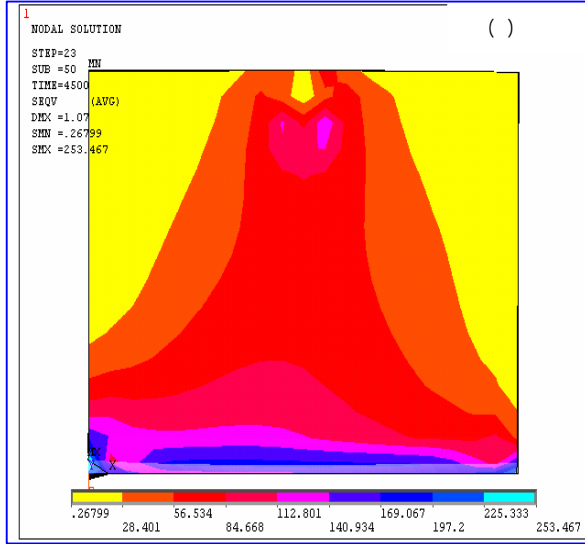
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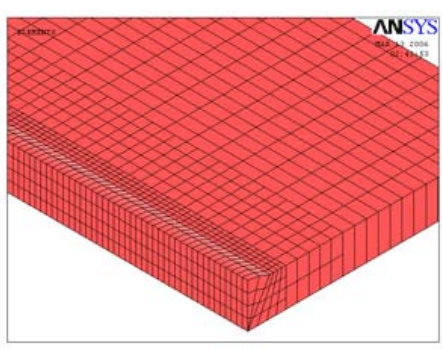
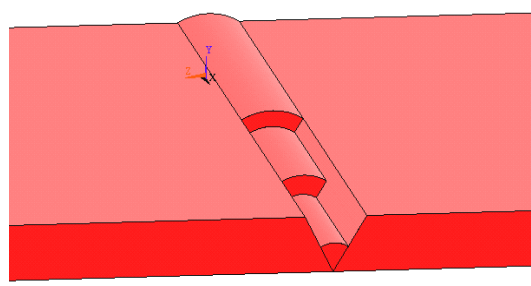
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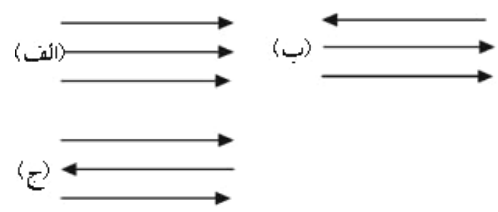
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(C)	(MPa)		(GPa)	(W/M^ C)	(^- (/C))	(J/KgC)	(W/mc)
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(J/Kg) : (Kg/m³) *

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