عنوان مقاله:

Effects of Geometrical Tolerances on Residual Stresses in a Compound Shrink Fitted Pressure Vessel

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خلاصه مقاله:

Shrink fit process is a useful technique in order to introduce beneficial residual stress in compound pressure vessels. In this paper, the effects of geometrical tolerances on residual stresses have been studied for a compound shrink fitted pressure vessel, practically. Three layers, which are designed based on an optimum nominal thickness and overlap dimensions and tolerances, have been fitted by shrink fitting to obtain a multi-layered high pressure vessel with desirable residual stress distribution. But in the manufacturing process, variations of inner and outer diameter of each layer have been observed within the design tolerances. The geometrical tolerances considerably affect the residual stresses. In this work, experimental results for residual stress are obtained from measurements of inner diameter of innermost cylinder due to two stages of shrink fitting. Then, the residual stress distribution is compared with analytical solution and finite element method at the lower limit and upper limit of tolerance domains. It is shown that very small geometrical tolerance could have a significant effect on residual hoop stress distribution. Also, the experimental results have a good agreement with analytical and finite element results.

کلمات کلیدی:

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