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Estimation of Residual Stresses in Railroad Commuter Car Wheels Following Manufacture

By U. S. Department of Transportation

CreateSpace Independent Publishing Platform. Paperback. Condition: New. This item is printed on demand. 106 pages. Dimensions: 11.0in. x 8.5in. x 0.2in. A computer simulation of the manufacturing process of railroad car wheels is described to determine the residual stresses in the wheel following fabrication. Knowledge of, and the ability to predict, these stresses is useful in assessing the ability of wheels to perform safely under expected service conditions. A finite element analysis is performed which simulates portions of the processing sequence. A heat transfer analysis determines the transient thermal distribution during quenching. The mechanical (stress) analysis employs an elastic-plastic material model with kinematic hardening and includes viscoelastic creep behavior. A baseline scenario is developed to represent the best available estimate of processing parameters and material properties for the analysis. Predictions indicate development of residual circumferential (hoop) compression on the order of 200 MPa (29 ksi) in the wheel rim of approximately 3.75 cm (1.48 inches). Modifications to the baseline scenario were studied in order to understand which aspects of the analysis resulted in the most significant changes in the results. This item ships from La Vergne, TN. Paperback.



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