

Engineering Institute Quarterly Tutorials

Residual Stresses

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Residual stresses are the stresses existing in a body that is free of external loads. They are left behind by most manufacturing processes. Just like applied stresses, they contribute to failures caused by fatigue, fracture, stress corrosion cracking, distortion, etc. But they can be particularly insidious because they are ubiquitous, offer no external evidence of their existence, and they are difficult to predict or measure.

This tutorial, aimed at a general technical audience, will answer a broad set of practical questions on residual stresses. How do they arise? Why do we care and when do we not care? How do we measure residual stresses? How do we predict their effect on failures? How do we manipulate residual stresses to our benefit? Many practical examples will be used to illustrate these issues.