Hole drilling residual stress measurement

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Hole drilling overview

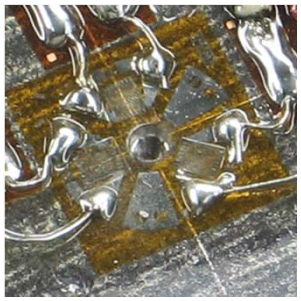
Hole drilling is a method for determination of near-surface residual stress in a material. The method can be applied to quantify the average residual stress over the depth of a hole (appx. 1.0 mm) or incremental hole drilling can be performed to determine the distribution of residual stress versus depth from the surface. Hole drilling is a common method for measurement of residual stress that can be applied under a variety of circumstances.

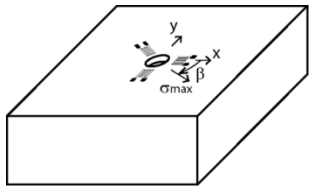
Hole drilling is based on the principle that residual stress causes a body to deform when it is cut, and drilling a hole into a body while measuring its deformation (using strain gages) allows calculation of the initial (pre-cut) residual stress distribution.

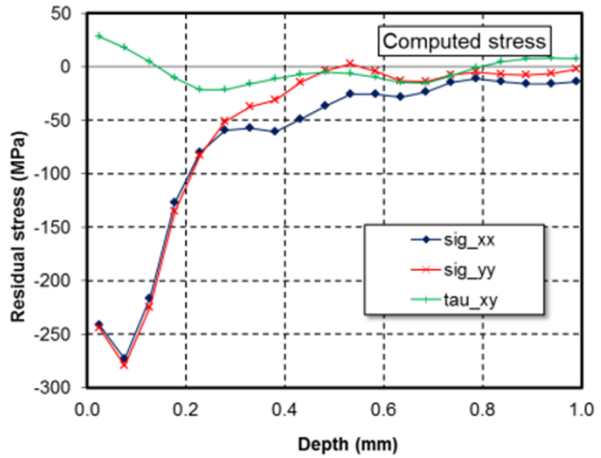
Residual stress is determined from the measured strain versus depth data through an elastic inverse solution based on the principles of elasticity. Hole drilling is standardized by ASTM under E837.

"The knowledge transfer from Hill Engineering to Lockheed Martin is consistently well documented and delivered in a highly usable format. They don't just tell you a number."

Dale L. Ball, Ph.D.
Lockheed Martin Senior Fellow







Hole drilling applications

Hole drilling is well-suited for a wide range of conditions. The following are examples where hole drilling excels:

- Near-surface residual stress (less than 2 mm (0.080 inch))
- In-situ measurements on structures, large parts, and assemblies
- Applications requiring industry standardization (ASTM E837)
- When cost and throughput are a priority
- Multiple residual stress components (in-plane principal stresses)
- Applications with challenging measurement access

Why Hill Engineering?

Hill Engineering has a reputation for providing high-quality residual stress measurement data suitable for engineering analysis. Our in-house laboratory performs residual stress measurements using a variety of techniques to meet the needs of industry.

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