Slitting method residual stress measurement

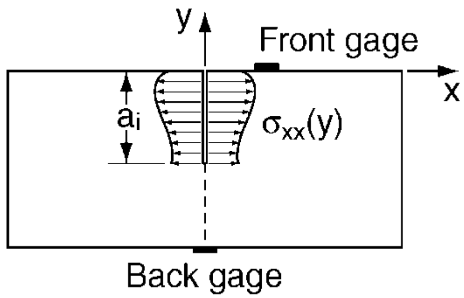
Slitting method overview

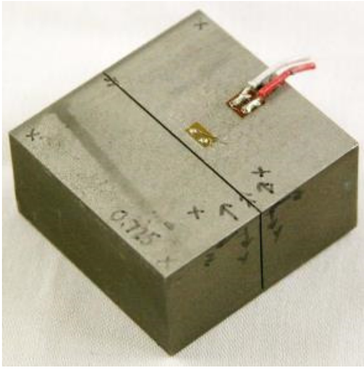
The slitting method determines the distribution of bulk residual stress as a function of depth from the surface. Slitting is often used to determine residual stress in simple coupons (blocks, disks, and cylinders) but is also useful for complex parts.

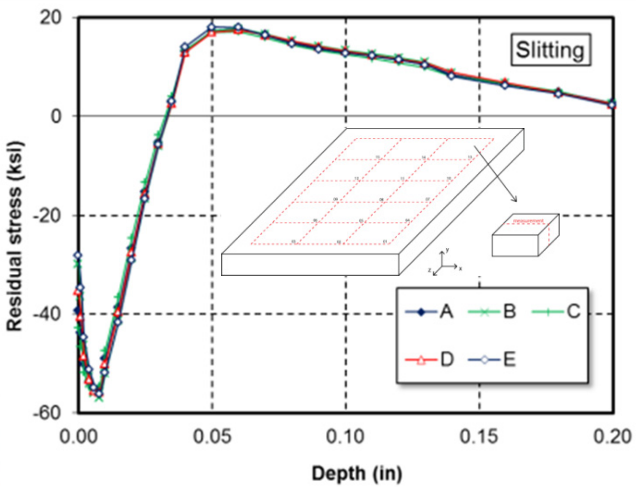
Slitting is based on the principle that residual stress causes a body to deform when it is cut and cutting progressively through a body while measuring its deformation (using strain gages) allows calculation of the pre-cut residual stress distribution.

Slitting is realized through careful cutting of a slit through the depth of a part while monitoring cut-induced deformation using metallic foil strain gages. The record of strain and cut depth are then used to compute the pre-cut residual stress distribution using the principles of elasticity.

Hill Engineering has a reputation for using the slitting method to provide accurate, repeatable results.







Slitting applications

The slitting method has excellent precision and repeatability and is often used for process assessment, monitoring, or quality control. Slitting is also useful for parts that are more complex, having been used to find residual stress near a weld toe or at the root of a gear tooth.

Hill Engineering continues to develop new uses for the slitting method in addressing customer needs. The following are some examples:

- Applications requiring excellent measurement precision
- Near-surface and bulk residual stress measurement
- Wide range of material types (e.g., metals, plastics, FGMs, and single crystals)
- Parts with large or complex geometry
- Coatings and layered materials
- Materials with complex or variable texture, microstructure, or large grains

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