

The Technique

When an incident neutron beam strikes a specimen it is diffracted at an angle that depends on the distance between the planes of atoms. This angle is measured with a neutron diffractometer and the distance calculated.

The technique requires an intense neutron source and precise alignment of the neutron beam. At Chalk River, neutrons are provided by the high-flux NRU research reactor.

Measurement locations are defined by precise, computer-controlled specimen translations and rotations. Specimens can range in size from a few grams to 500 kg.

Applications

The depth to which neutrons will penetrate depends on the type of material, but is approximately 30 mm in steel and 300 mm in aluminum. This allows the technique to be applied to a wide range of important engineering materials and full-scale critical components.

- aircraft components
- steel-forgings
- weldments
- pipe steels
- rail steels
- ceramics
- composites
- turbine blades
- pressure vessels
- reactor components
- heat-exchanger tubes

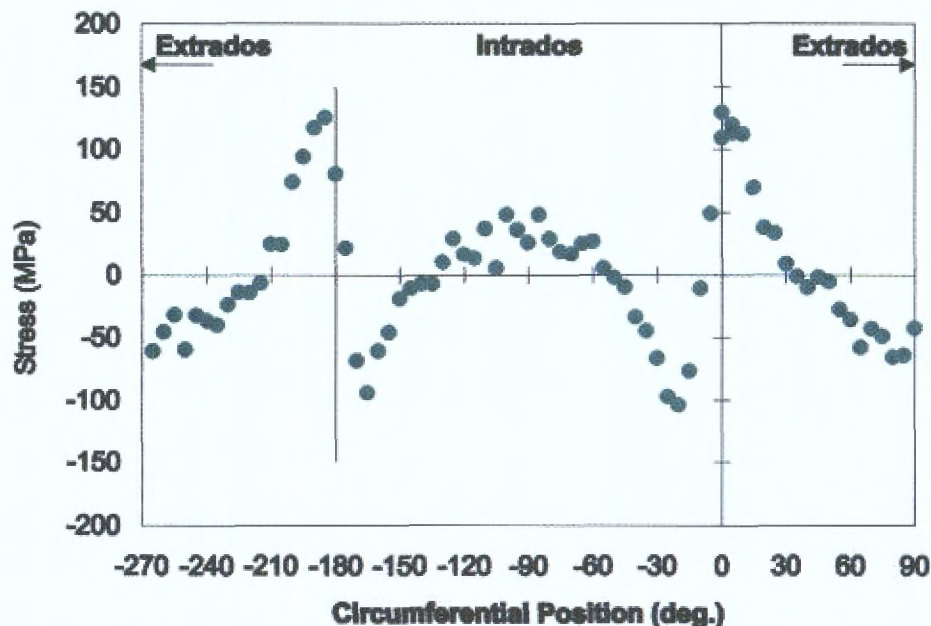


Figure 2: Residual stress variation (in MPa) measured around the circumference of a bent tube. The nominal flank position is at 0°.

For more information or to arrange measurements contact Dr. John Root:

National Research Council Canada
Steacie Institute for Molecular Sciences
Neutron Program for Materials Research
Chalk River Laboratories
Chalk River, Ontario
Canada, K0J 1J0

Phone: 613-584-8811, Ext. 3974
1-888-243-ANDI
FAX: 613-584-4040
E-mail: NPMR@nrc.ca
WWW: <http://neutron.nrc.ca>