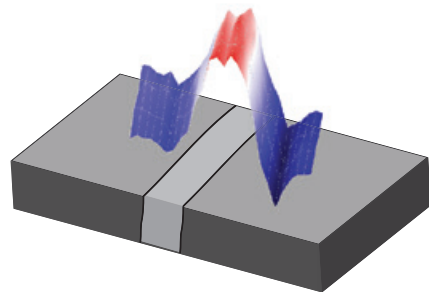




RESIDUAL STRESS MEASUREMENT AND PIPELINES

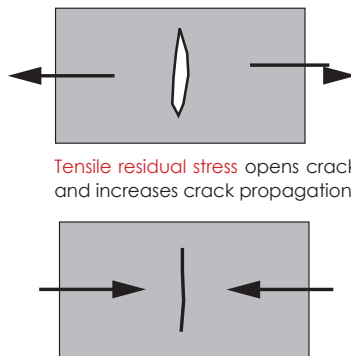


PROTO MANUFACTURING



Welding can produce **tensile residual stress** in the weld and the HAZ (heat affected zone).

RESIDUAL STRESSES IN WELDS

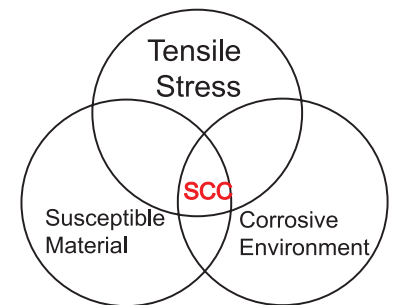


Tensile residual stress opens crack and increases crack propagation

Compressive residual stress closes crack and slows crack propagation

RESIDUAL STRESS & CRACK PROPAGATION

X-RAY DIFFRACTION SYSTEMS & SERVICES



RESIDUAL STRESS & SCC (STRESS CORROSION CRACKING)

Residual stress plays an important role in many of the issues found in pipelines such as, Stress Corrosion Cracking (SCC), Hydrogen Induced Cracking (HIC), Fatigue Cracking, Welding Stresses, Heat Treatment Effectiveness, Surface Enhancements due to Cold Work, Bending due to Seismic Activity and Installation Stresses. The significant effect that residual stress has on the performance and life of a component makes it extremely important to characterize these stresses. The full benefit of a design can only be achieved when the correct beneficial residual stresses have been introduced into a component and harmful residual stresses have been minimized. X-ray diffraction is a portable, non-destructive, quantitative, highly accurate and robust method to quantify residual stress. Modern equipment makes it quick and easy to do measurements in the laboratory, in-line and in the field. Proto's portable measurement systems enable measurements to be easily performed on pipelines in the field.