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Calculated Values

Length of succor rod:	40 ft = 480 in
Change in temperature:	-27.78 (K)
Change in length:	-0.167 in
Strain:	$-3.471 * 10^{-4}$ in/in
Stress from Strain:	10.31 ksi
Axial Force from Thermal Deformation:	4554.7 lbs

Objective

Determine why a material failed and what can be done to fix/prevent it. Our group chose a fence made from drill pipe and succor rod that failed when the temperature wen from 10F to almost -40F in one night.

Project

A 40ft piece of succor rod was welded to a drill pipe using an E6010 Weld Rod. Overnight, when the temperature dropped, the pipe broke from weld. It was only welded at each end and supported by clips throughout the length of the fence. We assumed that because only one end of the rod failed, it experienced all the force from the thermal deformation.

This led us to believe that the E6010 weld rod had produced a brittle weld that could barely support the axial force from the thermal deformation. Combine that with less-than-perfect weld conditions, it makes sense why the weld failed.

Outcome

Our studies led us to believe that a more appropriate weld rod should have been used to prevent failure. We concluded that an E7018 rod should have been used.