CURVE FITTING LOAD CELL FOR SYMMETRICAL OUTPUT

Abstract

Load Cells are normally designed with mathematical predictability with respect to capacity, linearity, hysteresis, creep, output, extraneous moments, fatigue life, and weight. Symmetrical output is generally not the deciding design criteria, but is sometimes desirable when specific machine control loops are required. Symmetrical output is typically achieved, when it becomes an application requirement, by evaluation of historical data on a given structure. Then modifications to other criteria are done until structure symmetry is achieved.

Problem

Determine a curve fitting technique to achieve the benefits of a symmetrical output, without design sacrifice to other parameters.

Solution

Curve fitting can be accomplished by utilizing one of the following three techniques:

Technique I

The solution involves leaving one side of zero at its actual slope, then forcing the opposite slope to match. Error is induced on the "forced" side. The magnitude is determined by the amount of correction needed.

Technique II

Determines a "best fit-straight line" through both sides of zero that minimizes the error on both sides.

Technique III

Creates a "new" slope that is the mathematical average deviation of a best-fit line from full tension to full compression.

Recommendation

SensorData recommends **Technique III** as the optimum solution to achieving symmetrical output, while preserving the linear integrity of the load cell.

A. Load cell symmetry achieved is virtually 100%.

B. Straight line deviation between interpolated and actual values, in both tension and compression, are always the same percent of reading, in the same direction, at any given point on the line. This allows a single "correction factor" to be used that, when added to each measurement reading at any given point in the line, provides an optimally minimized error for any point from 100% tension to 100% compression, through zero.