

Strain gauges, mounted on an object, measure deformation (elongation, contraction, etc.) caused by applied forces. This deformation alters the gauge's electrical resistance, allowing measurement of tensile, compressive, bending, torsional, and shear stresses, even minute ones. Primarily used in load cells – force/pressure transducers converting mechanical load into electronic signals – they're crucial in weight measurement, automation, process control, biomechanics, equipment/building monitoring, and quality control. Modern load cells often employ multiple gauges for increased accuracy. This technology, advanced by William Thomson in 1856, relies on the strain gauge factor ( $G_f$ ), a proportionality constant relating resistance change to strain.