



BUILT SMART
BUILT TO SURVIVE

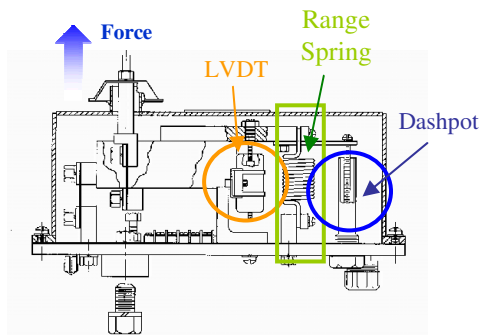
THAYER LC-137 Load Cell

The Series LC-137 Load Cell is a high precision, high reliability LVDT (type) load cell specifically designed to interface with Thayer Scale's instrumentation and Force Measurement Suspension Systems ("FMSS"). Its flexible range of capacity offerings, superb accuracy and unequalled robustness is the result of a number of separate key developments in the fields of metallurgy, analog/digital circuitry, and "fine-tuning" software. Utilization of low expansion and constant modulus alloys on critical mechanical parts, precision grade excitation and A/D electronics, and proprietary linearizing and temperature compensating algorithms have produced an extremely accurate measurement device that can operate reliably in heavy industrial environments.



The LC-137 is of simple design in principle (see diagram below), and consists of a single flexure fulcrum-ed lever operating against a constant thermo-elastic deflection element (a modified form of "Elvinar") affixed to its free end. The load is then applied (upwardly) to some midrange point on the lever through a tension link connected perpendicular to the lever. Also connected to the lever is the armature of the LVDT, whose vertical displacement from its "null" (center balance) position is the analog of the load being measured. The body of the LVDT is held at a fixed location in space by a bracket composed of a series-combination of alloys having a net thermo-expansion coefficient that is compensatory to the residual thermal expansion/contraction effects of all remaining structures. The armature, having an outer diameter that is less than that of the open core of the transformer, is free to move without interference with surrounding parts. This complete physical isolation between the deflecting armature and the rest of the transducer, explains why LVDT load cells do not experience overload failure as is common with strain gauge types. A mechanical stop places a safe limit on deflection. A constant AC input is applied to the primary winding. The secondary winding produces an AC output voltage which is proportional to the displacement, or force sensed. Thayer Scale's various instrumentation lines provide well matched excitation and signal processing circuitry, including A/D conversion, for maximizing the performance of the LC-137. In all cases, the load cell's *un-amplified* voltage output is at least 100 times higher than that of conventional strain gauge load cells, providing a far superior signal-to-noise ratio in all applications. THAYER Instrumentation front-ends include either 20 bit or 24 bit A/D's, depending on instrument selection.

Other noteworthy features include hydraulic damping for protection against vibratory disturbances near resonance, and the ability to mechanically establish the preload point (the pretension necessary to establish zero).



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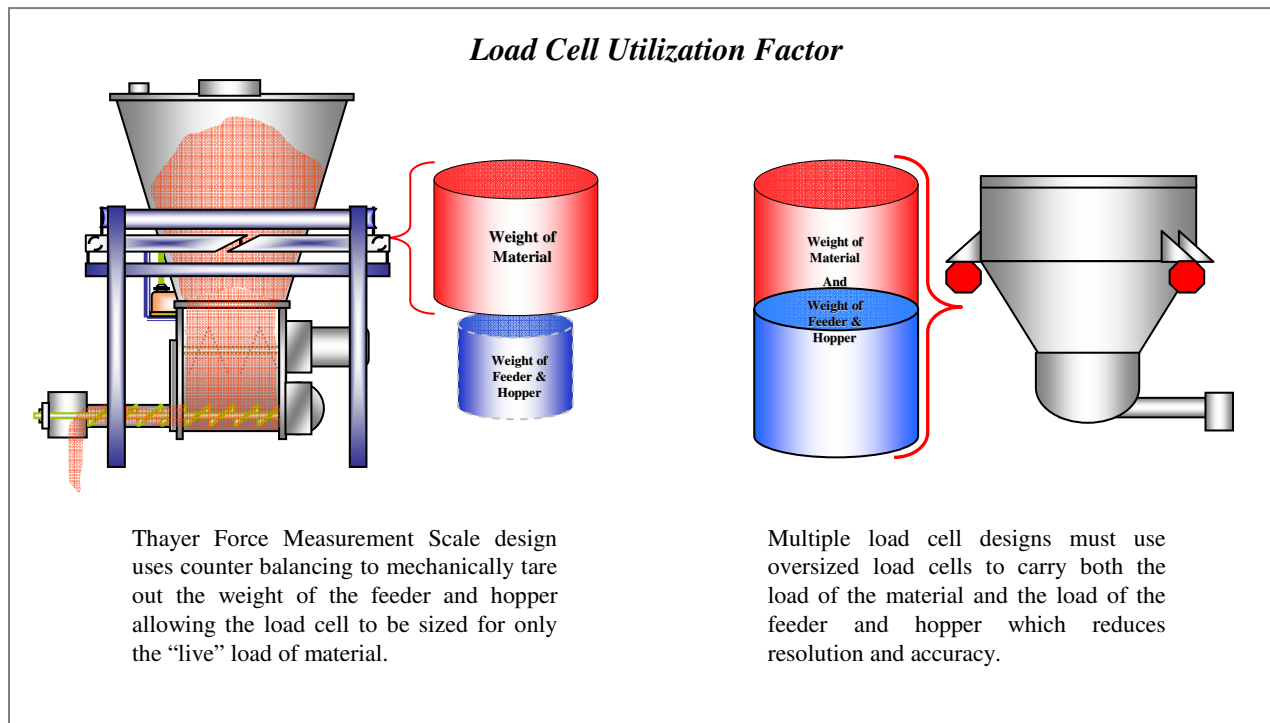
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Load Cell Utilization Factor

The performance of a load cell and its associated instrumentation is specified on the basis of the load cell's rated output. If the load cell is supporting a quantity of dead weight (i.e. hopper, screw feeder) then the amount of range left to do the job of weighing is only a fraction of the load cell's rated output. The situation is further aggravated by the limited availability of conventional load cell capabilities. The percentage of a load cell's rated output reserved for the the actual job of weighing material is called the *Load Cell Utilization Factor*.

Permitting a condition to exist wherein the *Load Cell Utilization Factor* is a mere 20% (not unheard of, or even uncommon), results in drift, non-repeatability and temperature induced shifts that can be as much as 5 times worse than what is stated on specification sheet describing the transducer and measuring system.

At Thayer Scale, we custom build our load cells with capacity ranges that step up in fine increments. Our applications computer can pick the best load cell for the job; one that will have a range that is ideally suited to the service it will perform. This, in combination with our cable suspension system which mass counterbalances the dead load of the hopper and screw feeder, enables us to reach a 90–100% load cell utilization factor on all applications.



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