

Load Cell Calibration

Calibration can be defined as a set of operations that compares the accuracy of a measuring instrument of any type (such as a load cell) against a recognised standard. The process of calibration may also include adjusting the measuring instrument to bring it in alignment with that standard. By calibrating measuring devices in this way, they can then be traced back to show they comply with International Standards, and are providing accurate measurement data.

Why Calibrate Load Cells?

A Load Cell is a device that is used to measure weight or force in a number of different applications. The load cell itself is a transducer that is used to convert a force into an electrical signal. This signal is usually only a few millivolts and requires amplification before it can be used. Most load cells use strain gauge technology to obtain the electrical signal, which is a very well established technology and has been proven for more than 40 years.

Load cells are frequently used as part of a weighing system because they offer non-intrusive, highly accurate load measurement data, with properly installed and calibrated load cells routinely achieve accuracies of around 0.03 to 1% (depending on load cell type). These systems are of fundamental importance to many industrial sectors including aerospace, offshore, marine, heavy lifting and automotive. Product liability and safety issues demand that force measurements are demonstrably accurate, which is usually achieved by calibration to National Standards. This traceability to a National Standard is also often a requirement for compliance to ISO9000, resulting in company procedures that specify calibration schedules and the maintenance of appropriate records as part of their Quality Management System.

As all load cells are subject to deterioration due to use, mistreatment, drift or ageing, calibration at regular intervals should to be carried out to establish how the load cell is currently performing, irrespective of whether the company has a Quality Management System in place. Load cells can also become less reliable due to electrical influence, mechanical effects, instrumentation faults and loose cables etc. Failure to inspect or clean load cells is another significant factor that can lead to operational issues, as particulate matter can build up around load cells even in clean environments. Unless calibrations are routinely carried out, load measurement readings can become less and less accurate, with the user potentially being unaware that they are using flawed data.

Keeping Up Standards

ISO9000 and many other standards specify the maximum period between recalibration as once every two years and more frequently if the instrument deterioration is significant during that period (typically more than 1%.) Many load cell users adopt an annual calibration as the standard interval to ensure that measurements are always as accurate as possible, which is particularly important if they are being used for safety critical applications. However, although many load cell users choose annual calibration, very few do a comparison between the current calibration and the previous calibration to determine the degree of accuracy drop-off. This is a highly useful exercise, as the results can be used to determine a more suitable re-calibration time period, which may be even more frequently than one year if the load cell is being used in a particularly harsh environment or arduous operational conditions (high vibration levels, excessive cyclic loading).



Load Cell Calibration

What Is a Standard Calibration

A standard calibration will test load cell repeatability and linearity, which are both used to determine the accuracy. A '5 Step' method is most commonly used, where a known load is applied to the load cell incrementally, and output readings are taken at each step. For example, a 100 tonne load cell would have readings taken when subjected to loads of 20, 40, 60, 80 and 100 tonnes. This process is repeated twice, and the difference in the results used to determine its repeatability/accuracy. As most load cells are used with some form of read-out/display to form a weighing system, the load cell and instrumentation should always be calibrated together whenever possible.

Where do I get Load Cells Calibrated

Most manufacturers will supply calibrated and traceable load cells, although many will use an independent service. However, LCM Systems has a calibration facility with a wide range of calibration test machines, and additionally has also taken the bold step of commissioning the building and installation of a 1500 tonne calibration test machine to benefit its customers.

The addition of this machine means that all load cells, shackles and pins with capacities up to 1500 tonnes in compression, and 150 tonnes in tension, can be calibrated in-house. Having the ability to carry out calibrations up to 1500 tonnes is also rather unique, as apart from The National Physical Laboratory, there is only one other calibration machine in the UK capable of testing load cells with such high capacities.

For customers, this means that prices can be reduced and faster delivery times achieved for larger capacity load cells. And of course, all calibrations are traceable to national standards using calibration equipment tested in accordance with ISO 7500-1.