Four factors to consider when choosing load cells

Load cells are used to measure force in a variety of applications. They do so by converting mechanical force into electrical signals through the use of strain gauges. Typically a load cell will have four strain gauges mounted to form resistors. The four gauges form a Wheatstone Bridge Circuit where the resistance is balanced so that no current flows unless force is applied. When force is applied the electrical signal is proportional to force.

Load cells can be used in applications ranging from scales and vessel weighing applications to test equipment such as force test stands. While there are many applications, there are as many different types of load cells. They come in a variety of shapes including S beam, canister, shear beam, bending beam, and double bending beam. These are available in a variety of materials with multiple mounting hardware options. With so many choices, selecting the correct load cells for your application may seem daunting.

While we do always suggest talking through the specifics of your application with one of our measurement experts, there are some factors to always consider when choosing load cells. Being prepared with this information can help our application specialists more quickly and accurately find the correct product for your measurement application.

Legal for Trade Requirements: Are you buying or selling based on the weight?

If so, you will need to make sure that your load cells are NTEP approved for the capacity and resolution for which you plan to use them and the device that they are incorporated into is capable of meeting application requirements of the NIST Handbook 44. If you are using NTEP approved load cells, they are not considered legal for trade if you stretch the resolution beyond the parameters stated on their Certificate of Conformance. Take a look at this article on accuracy, precision, and resolution to learn more.

Environment: In what type of environment will you be using your load cells?

The first environmental consideration is always going to be whether or not you require intrinsically safe components. If your system is going into a hazardous environment you must be sure that all segments of your system comply with the recommended certification standards such as FM. *Please note that working in intrinsically safe areas is inherently dangerous and we absolutely do not recommend purchasing equipment for these areas without speaking with one of our experts.*

Next, consider what other substances will come in contact with your load cells. Are they in a wash down environment? Will they encounter corrosive liquids, gases, or solids? If so, you must consider the IP, or ingress protection rating of your load cells.

The temperature in which the load cells will be operating can have an impact on the product you select. If you intend to utilize your load cells in very hot or cold temperatures, you will need to ensure your system able to function properly in that environment.

If you are looking for very high resolution, you should consider factors such as vibration and wind/air flow in the area around your measurement equipment. While some indicators can compensate these factors, it will depend on the exact needs of your application.

Application: What are you measuring and how?

As previously mentioned, there is a wide variety of ways that load cells are utilized to measure force. Generally load cells are categorized as tension, compression, or both. Tension load cells are used to suspend the item being measured and measure how the load cell flexes as it is pulled. Compression load cells do just the opposite, forced is applied directly to them and the force is measured based on the way the load cell flexes when weight is applied.

In some instances, such as a test stand where there is a need to measure force both by compression and tension, dual purpose load cells can be utilized. Most scales, will utilize compression load cells, while vessel weighing can be accomplished by placing compression load cells under the legs of the vessel or by suspending the vessel with tension load cells. The correct choice for your application can depend on a number of factors including space, structural limitations, environment, and cost.

Other application factors to consider are the way in which the measurement system will be loaded. If items are coming in from the side – for instance on a conveyor belt, considerations must be taken into account for the shear force that will be exerted horizontally on the load cells. If your system will be used in a way that might shock the load cells, for instance if items must be dropped onto the scale, you will need to make sure that the load cells are rated for the additional force to be exerted on them.

Capacity/Resolution: How much force will you be measuring and how small of an increment do you need to see the change?

While we have touched on both capacity and resolution, this does warrant a section unto itself. You must ensure that your load cells are rated for a high enough weight

so that they both do not risk being over loaded and that they are not weighing at so close to full capacity that repeatability and accuracy suffer. That being said, you also do not want your capacity to be so high that you cannot achieve the needed resolution. Because load cells work on electrical signals, the actual millivolt output per increment gets increasingly smaller as the resolution increases. For this reason, the smaller the millivolt output being measured becomes, the more difficult it can become to detect small changes.

Though there are many other considerations that may influence the load cell choice for your application, being aware of these key considerations will prepare you for the initial discussion with one of our application specialists. If you are ready to start the process of finding the right equipment for your operation, contact J.A. King today!