Checkweigher Design using Two (2) Load Cells

Introduction

The intent of this technical note is to provide a brief explanation of how checkweighers with large table / belt dimensions can be implemented by using two 'platform' (single point) load cells instead of one load cell. If the dimensions of the table / belt are larger than the maximum 'platform' size specified for just one load cell, two load cells can be used (with one load cell at each end of the table / belt.

This application note is applicable to other large platforms, as well as Checkweigher 'tables'.

Mounting configuration using two load cells:

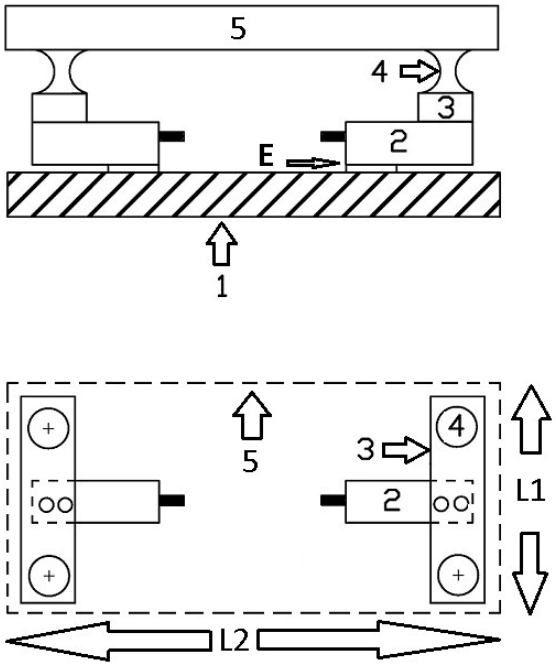

Figure 1. Mounting configuration

Key to components shown in Figure 1:

1. Bench / base
2. Load Cell (qty. 2)
3. Cross bar
4. Rubber mount ("silent-block"), spring or ball bearing joint
5. Table / conveyor belt of checkweigher (also referred to as the 'platform')

E. Spacer plate for raising load cell above the platform (to permit its deflection under load)
L1. Maximum platform width
L2. Maximum platform length

Suggested procedure:

1. Attach the two load cells (item 2) to a solid bench / base (item 1).
2. If necessary, use a spacer plate (item E) to raise each load cell slightly above the bench / base, thus allowing each load cell to freely deflect under the applied load.
3. Attach two cross bars (item 3) of sufficient stiffness to the load cells (item 2) using the appropriate hardware.
4. Attach the rubber mounts (item 4) to the ends of the cross bars (item 3).
5. Carefully attach the weighing table / conveyor belt section (item 5) to the rubber mounts (item 4).

Design considerations

The use of rubber mounts reduces the interference between the deflections of the two load cells caused by any bending of the table / conveyor belt 'platform'. This should provide enough freedom of movement to the weighing structure to allow for accurate, high precision, repeatable weighing.

The choice of which rubber mount to use should be in accordance with the load to be applied; the rubber should not be too hard because it will not be able to move as required to reduce / eliminate the interference between the two load cells.

As an alternative to a rubber mount, other components can be used – such as springs, ball bearings or other components performing a similar function. Such examples can be seen in Figure 2 below;

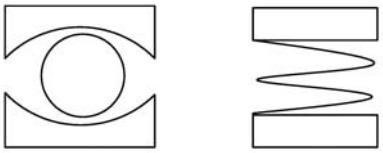

Figure 2. Alternative components to reduce / eliminate interference between the load cell deflections

Platform size considerations

'Platform' load cells (the single point type) are primarily selected to support an off-centre load located on a weighing 'platform' of maximum dimensions A x B. The dimensions A and B are usually identical and are defined for each load cell within its associated datasheet. Figure 3 shows the typical configuration for a 'platform' (single point) load cell installation.

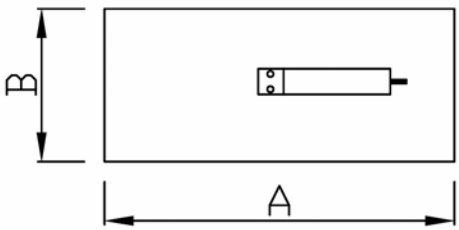

Figure 3. Typical single point installation under a weighing platform

If we consider the checkweigher platform (item 5 of Figure 1) this is a platform with width L1 and length L2. The width L1 will be limited by the maximum allowable width (dimension B for the selected load cell) such that $L1 \leq B$

However, the length L2 of the platform has no limitation. Longitudinally the platform can be considered as a beam supported at both ends, so theoretically it will not transmit any torsion to the load cells. For that reason, the platform should be designed such that it's stiff enough to be used for weighing without significant deformations occurring due to its self-weight or any applied loads. In order to absorb the inevitable small deformations, rubber mounts can be used; these will give mobility and repeatability to the weighing system.

Electrical wiring considerations

Every load cell has a tolerance on its output signal, which means that small weight differences can be observed when applying the same load at every location on the platform. It is recommended that multiple load cells are connected into to a junction box having signal adjustment potentiometers, in order to carry out a fine 'corner adjustment'. The precision potentiometers in the junction box will allow the user to equalise these small differences in output signal, thus obtaining the same weight value a given weight applied anywhere on the weighing platform.

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