



*Weigh Pack Electrical*

## CHOOSING THE RIGHT WEIGHBRIDGE



**As weighbridges become a mandatory part of the transportation requirements in each state, companies will need to spend more time assessing what is best for their needs.**

Weighbridges have become an almost mandatory tool to help avoid implication in overloading fines since the introduction of the Chain Of Responsibility Legislation

that can implicate anyone and everyone involved with the loading, transporting and receiving of goods from an overloaded vehicle.

Due to the many types of weighbridge designs now available, considerable research is necessary to ensure the correct design type, physical positioning and configuration achieves the best results for each individual application.

There are many types of weighbridge designs, each with both good and bad points, including:

- Aboveground weighbridges
- In-ground weighbridges
- Semi-pit weighbridges
- Multi-deck weighbridges
- Static axle weighbridges
- In-motion weighbridges
- Metal deck relocatable weighbridges

## Aboveground Weighbridges

Aboveground weighbridges using a concrete deck supported by steel beams are the most frequently installed weighbridge type as they are also the most cost-effective weighbridge to purchase and install. Unfortunately, aboveground weighbridges also require more available space than any other type of weighbridge. The “total installed length” of a reasonably short 20 metre weighbridge requires nearly 30 metres of land and even more on sites that are on sloping ground which may require long approach and departure ramps.

The concrete foundations of aboveground weighbridges are usually at ground level with the load cells mounted slightly higher and supporting the elevated weighbridge deck. At least a one metre clearance is also required on each side of the weighbridge to provide access for servicing the load cells, adjusting the end stops and for cleaning under the weighbridge deck as required.

For accurate weighing's, the trucks/ trailers should fit completely onto the weighbridge deck, but if this is not possible, then government regulations stipulate the required length of level approaches and departures at each end of the weighbridge deck which can add considerably to both the project cost and the amount of land required.

The length and height of the weighbridge ramps are also determined by the physical height of the weighbridge load cells and their mounting hardware. A low-profile load cell and mountings can considerably reduce foundation costs. This total installed length of the weighbridge can further impact harshly on available space if the truck also needs to turn

onto or off the weighbridge as the truck must be in a straight line entering the weighbridge and cannot begin to turn off until it has fully cleared the weighbridge's departure ramp.

Before considering and budgeting for this weighbridge design, careful consideration of whether

there is room for the “total installed length” of the weighbridge plus turning space for trucks is required. The overall legal lengths of trucks have steadily increased over time and may continue to do so which could impact further on weighbridges installed into limited spaces.



## In-ground Weighbridges

Fully in-ground weighbridges have the weighbridge deck fitted at ground level with the foundations and load cells mounted below ground in a pit. Due to the extra excavation work, additional concrete and labour required for construction, in-ground weighbridges are the most expensive weighbridge type to install.

Because the weighing deck of the in-ground weighbridges is positioned at ground level, this type of weighbridge requires very little site area, other than the length of the deck and the required minimal level approaches. Trucks are usually able to turn off immediately upon leaving the weighbridge deck and this weighbridge is ideal for sites where the weighbridge forms part of the traffic road system. This type of weighbridge is usually classed as confined space and requires access permits, stand-by personnel and air quality checks before anyone is allowed into the pit for servicing or cleaning needs, which can substantially increase future servicing costs. As the load cells can be accessed from within the pit, there is no need for extra width that allows this weighbridge to be installed closer to existing buildings and other traffic areas.

In-ground weighbridges also need some means of drainage, usually in the form of an automatic submersible pump, which then requires 240V access. Lights are also a welcome addition for service crews to make their job much easier in the dark pit confines. The foundations usually include raised kerbing along both sides of the weighbridge deck to ensure the vehicle to be weighed can only enter and leave along the weighbridge axis and over the entry and departure ramps/pads.

The overall installed height of the weighbridge load cells and mounting hardware do not impact as severely

as they do on an aboveground weighbridge design as the pit height and strength is already very substantial.



## Semi-Pit Weighbridges

Semi-pit weighbridges are a combination of both aboveground and in-ground weighbridge designs and carry some of the positive and negative features of both types. The concrete weighbridge deck is installed at ground level with the foundations and load cells mounted below ground, but in an open pit rather than a confined space.

The main benefit of a semi-pit weighbridge over an in-ground weighbridge is that it is not classed as a restricted space and does not require access permits, stand-by personnel and air quality checks before servicing or cleaning is performed. This weighbridge type does require the mandatory one metre space either side of the weighbridge for load cell servicing and cleaning needs that can impact on weighbridge positioning.

Budget-wise, these weighbridges fall midway between an in-ground weighbridge and an aboveground weighbridge as they still require excavation work, additional concrete plus metal grates or safety railing surrounding the open pit.

Like an in-ground weighbridge, this type of weighbridge is ideal for sites with limited space available lengthwise, but this is sometimes offset by the requirements for a one metre clear space down both sides of the weighbridge deck to comply with legislative requirements for weighbridges, allowing service personnel to access the load cells.

The foundations include raised kerbing along both sides of the weighbridge deck to ensure the vehicle to be weighed can only enter and leave along the weighbridge axis and over

the entry and departure ramps/pads. Alternative semi-pit designs can reduce or eliminate one or both clear spaces.

However, exemption from legislation must be sought in writing from the National Measurement Authority.



## Multi-Deck Weighbridges

Multi-deck weighbridges can be constructed in any of the above weighbridge types with the number of decks not only having a profound effect on the total weighbridge cost but also making the weighbridge a more usable tool with greatly enhanced weighing capabilities. Typically, single-deck weighbridges utilising six load cells and a digital weight indicator are used for weighing gross vehicle mass only. A dual-deck weighbridge comprises two weighbridge decks each supported by four or more load cells and a digital weight indicator for displaying gross mass of the truck separately to the gross weight of the trailer. A digital summing indicator adds the weight of both decks to display the total vehicle mass.

Multi-deck weighbridges comprising three or more individual weighbridge decks are usually configured with decks of various lengths to suit nominal truck axle spacings. A true multi-deck weighbridge has the ability to display the weight of all truck axle groups during a single weighing operation to readily identify overloaded axles. Similar to a dual-deck weighbridge, each individual deck requires four load cells, a separate digital weight indicator and then a summing device to display the total vehicle mass.

As a very high proportion of overloading fines are issued for overloaded axle groups and not for exceeding total vehicle mass, true multi-deck weighbridges are becoming increasingly more important for the transport industry in spite of the higher initial outlays. A multi-deck weighbridge can ensure maximum truck carrying capacity is fully utilised while also ensuring compliance with legal axle loadings.



## Static Axle Weighbridges

Static axle weighbridges are used for weighing single axles or an axle group. This process requires multiple weighing operations as the truck positions each axle/axle group over the deck of the axle weighbridge while a weight reading is taken.

Axle weighbridges can be positioned in very limited spaces but the length of the level approaches has a great effect on achieved accuracy, which is less than all other weighbridge types. Traditionally, this type of weighbridge was for non-trade applications, but trade approved versions are now available.

Axle weighbridges are best utilised when installed close to the loading point, such as in a quarry, to ensure axle groups do not exceed legal weight limits before the truck is taken to a full-size weighbridge for trade weighing. This location not only saves time if the product does require repositioning, it also avoids delaying other trucks from using the weighbridge on busy sites.

Axle weighbridges can also be installed immediately prior to a full-length weighbridge, taking advantage of the level approaches and the weighbridge deck for increased accuracy, but again, at the expense of potentially tying up the weighbridge from performing other weighing's.

Axle weighbridges usually comprise a metal weighbridge deck contained in a self-supporting metal frame that is either mounted below ground in a shallow pit or above ground and using access ramps. A single axle weighbridge can be as small as one metre long by three metres wide for weighing one axle at a time.

Larger axle weighbridges can weigh an entire axle grouping at once using a weigh-bridge deck measuring five metres long by three metres wide. Axle weighbridges are available in many standard sizes, but can also be engineered to suit the client's needs.

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## In-Motion Weighbridges

In-motion weighbridges can be described as an automatic axle weighbridge that does not require the truck to stop to weigh each axle. The truck is driven slowly over the in-motion weighbridge for a special weighbridge integrator to automatically capture and accumulate the individual axle weight readings and to generate the total vehicle mass.

WPE's 100 series in-motion axle weighbridge can achieve accurate

truck weighing's and it can also be certified for trade use, in site specific conditions. This type of weighbridge can be a very cost-effective alternative to a full-length weighbridge. It is best suited for weighing short wheelbase trucks or for sites with an existing level concrete hardstand either side of the axle weighbridge.

In order to achieve maximum accuracy with axle weights, the quality of the entry and exit approaches must be

considerably high (level to within  $\pm 3\text{mm}$ ) for the entire length of the vehicle being weighed. Unless weighing short wheelbase trucks, the additional concrete and materials required to construct the precision approaches can make axle weighbridges a less attractive option compared to a full-length weighbridge.

## Metal Deck Relocatable (Portable) Weighbridges

These weighbridges are specially designed to be relatively easy to relocate to different sites as the need for a localised weighbridge changes. Portable weighbridges almost exclusively comprise a metal weighbridge deck contained in a rigid metal frame that can withstand the rough -treatment to which this type of weighbridge is usually subjected.

Previously best suited for non-trade applications using compacted earth as a base, the latest breed of relocatable metal deck weighbridges is being installed on lightweight concrete foundations and can be used for trade weighing applications. Best suited for lighter truck loads and less frequent use, these weighbridges are usually not ideal for demanding applications such as expected in a busy quarry where heavy vehicles are weighed continuously all day long. The foundation costs are lower than on an equivalent concrete deck weighbridge due to the lighter steel construction of the weighbridge requiring a lighter load-bearing foundation. Installation costs are also reduced as the lighter steel beams are more easily positioned during assembly and without the normal three weeks curing time for the concrete weighbridge deck.



## Weighbridge Software Identifies Axle Weights

Weighbridge software packages are becoming increasingly more flexible and some packages can provide axle weights from a truck entering a single-deck weighbridge. Similar to using an axle weighbridge, the truck is slowly driven on to the weighbridge deck, pausing as each axle/axle group enters the deck.

The weighbridge software recognises the changed weight readings and automatically transmits the axle group weight to an external remote display for the driver to see. After all the truck axles are on the weighbridge, the software can print a non-trade weight ticket, listing each axle/axle group weight. On a trade-approved weighbridge, a

legal weight ticket is then produced separately.

The weighbridge software also tracks trucks, materials and clients and usually generates invoices and delivery dockets.

## Weighbridge Maintenance

Ongoing weighbridge maintenance is often overlooked to the detriment of expected load cell operating life. When electronic weighbridges were first introduced, one of the primary selling points was the greatly reduced servicing requirements. Unfortunately, many weighbridge owners took this to mean the new load cell-based weighbridges do not need regular servicing at all.

True, all the mechanical components of a lever system-based weighbridge were totally eliminated, but even though the load cells are deemed to be fully electronic, basic mechanical principles still apply. The load cell is really a mechanical device housing encapsulated electronics that are used to generate the weight readings.

Many weighbridge load cells are based on the rocker pin design and fitted with hardened steel cups at each end, with

just enough internal clearance to allow the load cell to freely rock back and forth to a maximum of approximately five degrees. This rocking clearance is necessary for two reasons:

1. To cope with the expansion and contraction of the weighbridge deck caused by temperature changes.
2. To cope with the inherent weighbridge movements caused by trucks braking and accelerating when entering and leaving the weighbridge deck.

The degree of load cell tilt must be strictly controlled as the load cells can suffer physical deformation if allowed to tilt at higher than expected angles. The load cell tilt is regulated by the total weighbridge movement, which in turn is limited by physical stops fitted with adjustable bolts. These end bolts usually need regular adjustment due to

seasonal changes and wear and tear caused by heavy truck braking if the expected load cell life is to be achieved.

The hardened steel cups of the load cells need to be inspected regularly for damage caused by excessive loadings and weigh-bridge movement. The entry of dust and dirt can form a grinding paste when mixed with the grease in the load cell cups and soon render both the cups and load cell inoperable.

To help minimise weighbridge load cell damage caused by excessive truck braking, it is advisable to fit speed humps or Boom Gates immediately before the weighbridge entry to minimise truck speeds. A correctly maintained weighbridge will weigh more accurately and cost far less in repairs than a weighbridge that has been neglected.

For any further assistance visit our website:

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