SYSTEM SCALE

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Truck Scales Buying Guide
Basic Scale Choices

Understand the choices that every truck scale owner must make:

- Sizes
- Styles
- Configurations
- And more

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The Scale Project Team

Assemble a team for your truck scale project:

• **Internal project team.** This should include the people within your company who handle facilities,
operations, traffic, computer systems and finances.

• **Scale supplier.** Get in touch with prospective suppliers early. They can give you good advice and help through the process. They also can recommend experienced people for the other positions. The scale supplier will likely be the one who installs and tests your scale. In some cases, they may perform the initial calibration, unless your local weights and measures guidelines require that it be done by a government agency.

• **General contractor.** A contractor will typically prepare the site by putting in the foundations and approaches, building the roads and parking areas, erecting the scale house and running needed utilities. Get recommendations from scale suppliers and others in your area who have put in a scale over the last few years. In some cases, your scale supplier can provide the general contracting services.

• **Engineer.** Your local government may require that a civil engineer certify the plans for your scale's foundation, and other components. Ask your scale supplier what your location requires.

Talk to prospects for these positions early. Get to know them and select those who can do the best job and with whom you can work most comfortably. Tips on selecting a good scale supplier are included throughout this guide. Once the team members are selected, introduce them to each other and open up the lines of communication.

Evaluating Scale Suppliers

• Maintenance – What standard preventative maintenance is required?
• Unplanned downtime – How much has been experienced? Have they needed to replace any load cells or other components? Were repairs acted upon swiftly by the service provider?
• Calibration – How long does it take?

Eventually, you will review contracts and purchase orders. Read over all the documents before you sign them to make sure you understand their content. The unbundling of services, products and pricing is an art form. Features and services that you think should be standard may be considered extra-cost add-ons by the other party. Ensure that the scope of supply by all players is what you expect. Throughout the quoting process, be certain that all prospective vendors are quoting

to the same specifications.

Scale Size

The deck of your weighbridge needs to physically accommodate the footprint of the largest truck you plan to weigh. Vehicle sizes can vary throughout the world, but it is a good idea to consider your needs well into the future because a well-made scale can last 10 to 20 years. Consider the possibility of using larger vehicles in the future than you do presently.

Many scale manufacturers will offer standard-sized weighbridges, but will also accept custom dimensions. If you are replacing a pre-existing scale and utilizing an existing foundation, you will need your new scale to fit those dimensions. In those cases, often a scale company representative will visit the site to take measurements before the scale is manufactured.

Length

In applications in which you need to weigh the entire truck, your truck scale must be long enough to hold all of the wheels of the longest truck you plan to weigh. That usually means 18-24 m. (60-80 ft.) long for tractor- semitrailers, and up to 30 m. (100 ft.) for double trailers. The overall maximum length of over-the-road tractor trailers is typically regulated by regional/state/provincial authorities.

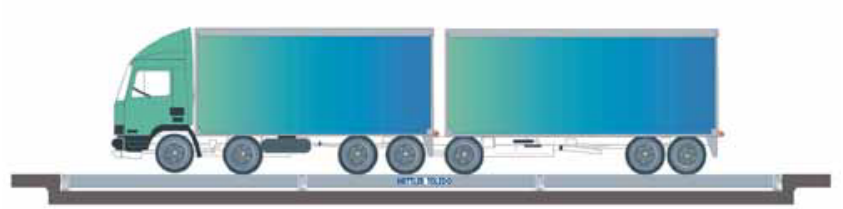
Width

Typical truck scales average 3-3.5 m. (10-11 ft.) in width. A wider scale can make it easier to maneuver the truck onto the scale. A recent trend has been for many customers to choose wider scales than was customary in the past.

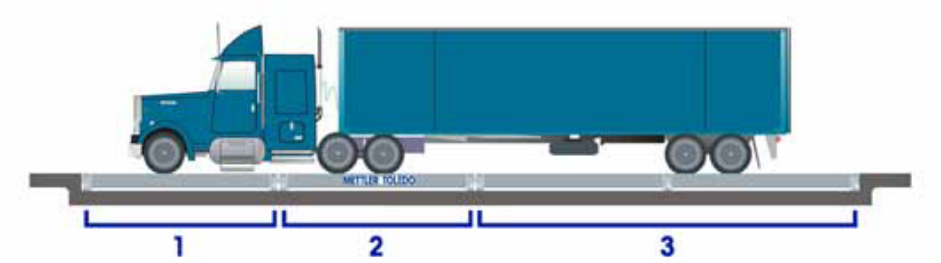
Scale Configuration

There are three main configurations of scales that can be used to weigh over-the-road vehicles: single-axle scales, full truck scales and multi-axle scales. The style that is best for you depends on the type of weight information you need for your application and legal requirements.

Single-axle scales typically are composed of a single scale module, or platform, large enough to accommodate a single set of truck axles. The main reason that a facility may choose this configuration is cost; these smaller scales cost considerably less than one that accommodates the entire truck. By separately weighing each set of axles, these scales can provide an estimate of the total weight of a truck. However, this method is not accurate enough to be used in legal-for-trade applications (in fact, this method can be off by 450 kg., 1000 lbs., or ore). These scales are primarily used to check for compliance with maximum roadway limits.



Full truck scales are weighbridges typically composed of multiple modules, or deck sections, that are connected together in a length long enough to accommodate the entire truck. This is the most common type of truck scale, because most legal-for-trade requirements specify that the entire truck must be weighed at once.



Multi-axle truck scales look much like full truck scales but with one key difference. Instead of interconnected modules and shared load cells, each module or set of modules has its own load cells. This lets these modules or sets or modules operate as separate scales. The scale can provide the full weight of the entire truck and allows the user to see the weight of each axle or group of axles. These scales are more expensive than a full truck scale because they require additional load cells and related hardware. Depending on the type of trucks weighed, they may only be able to provide individual axle weights in one direction of travel due to the lengths and configurations of the modules.

Deck Construction – Steel vs. Concrete

The deck is the upper surface of the weighbridge. It's the part over which the truck tires roll. In most scales, you have your choice of steel or concrete deck surfaces. Steel and concrete decks should provide equal weighing performance because both

are built to the same design specifications. However, there are some differences that could make one deck type more advantageous for your site or application.

Comparison: Steel Deck vs. Concrete Deck

	Steel	Concrete (site-pour)
Installation time	1 day	~30 days for concrete to cure
Portability	Lighter weight	Much heavier than steel
Traction	Can be slippery when wet	Good traction when wet
Point loading	Not recommended	Suitable
Maintenance	Comparable	Comparable
Service life	Comparable	Comparable
Total project cost	Comparable	Comparable

Steel Deck

Steel decks are built in factories and usually welded to an internal system of beams or structural components. Steel deck scales are ready for operation as soon as installation is complete. Because they are fully built in factories, there are few variables to performance. Most steel decks use a diamond-pattern tread plate as the driving surface. This assists with traction when the scale is wet. Some users prefer the traction of concrete in wet or snowy environments, but in most cases driving traction with a patterned tread plate is comparable to concrete. However, pedestrian traffic may experience better wet traction with a concrete deck as opposed to steel.

Concrete Deck

Concrete deck scales are steel structures into which concrete is poured during installation to create the driving surface. The scale supplier builds in all the structural components and reinforcement needed, and the concrete is then typically poured by a third-party contractor based on the scale supplier's specifications. The concrete requires up to 30 days to fully cure before trucks can drive on the scale.

When looking at the cost of a concrete deck scale, be sure to include the cost of the concrete and pouring services. The concrete deck has a much higher static weight

than steel, which may also require a more stout foundation, adding to the cost. All things considered, prices between concrete deck scales and steel deck scales can be comparable.

Some manufacturers will offer factory-poured concrete decks. This eliminates the need for curing time on-site. However, these scales can be susceptible to concrete damage during transport. They are also vastly heavier than their unpoured counterparts, making them more expensive to transport – sometimes requiring two trucks as opposed to one. They also may require a larger crane to install. If you consider this option, be sure you are familiar with how this affects the cost of your project.

Overall, a concrete deck can offer advantages, particularly for small truck scales. Because they have about four times the mass of steel, concrete decks are better a ble to resist the longitudinal forces caused by the truck's drive wheels during acceleration. The concrete deck also provides a uniformly strong surface for trailer-only use in bulk filling applications. The stationary wheels of a trailer can be lowered anywhere on a concrete deck and find all the support they need for high-point loadings.

Corrosion resistance is a separate consideration. Steel is the better choice for some corrosives, while concrete is preferred for others. Your scale supplier can provide recommendations for your application.

Pit Foundation vs. Open-Sided (Pitless) Design

You will need to decide if you want a pit scale or a pitless scale. A pit scale, as the name implies, is built over an excavation, and the surface of the weighing platform is flush with the ground. At one time, all truck scales required deep pits because they needed to house large levers and suspension systems. Today, those mechanical scales are antiquated, making deep pits optional.

Even if a pit is used, the depth requirements are subjective, although the depth of the pit can affect the ease of maintenance and service procedures. This is because a pit that is too shallow can leave little room for service personnel. Be aware, though, that the depth of a pit may be stipulated by local weights and measures authorities in some areas. They may also stipulate the size of manholes.

Pitless, or open-sided scales, are built up from a gradeand have a profile about 28-

51 cm. (11-20 in.). They may have one or both sides open.

While the choice between a pit or pitless installation is often based on preference, there are a few instances that may require the use of a pit. One is when you don't have enough physical space to build a ramp to the pitless scale's raised-deck surface and still allow enough maneuvering space for the trucks once theyexit the scale. Also, some industry safety requirements could make a pit scale more practical, because there is no possibility of the truck driving off of the edge of the scale.

Another situation calling for a pit is when you are faced with height restrictions. Let's say, for instance, that your new scale will be used to control a bulk filling process. The overhead filling structures may already be in place and can't be moved. The maximum allowable elevation of the scale's deck is at grade, and the only place to go is down.

However, some sites find that open-sided designs are easier to own for a number of reasons:

• **Access –** Pits require access points or "man holes" in the weighbridge or scale foundation for maintenance personnel to crawl beneath the scale and inspect critical components. On the other hand, most pitless scales only require the removal of a protective panel to access the scale's load cells and often don't require travelling under the scale deck.

• **Drainage –** A pit will require that rain/snow water drainage is considered in its design. Typically this will require the use of a drain and sump pump, which is one more system that will eventually require servicing or replacing. Open-sided scales allow water to escape naturally.

• **Safety –** Depending on the safety requirements of your facility and region, entering a pit for routine service can require special protocols. Because it is often classified as a "confined space," safety requirements can include the use of harnesses, cable man-lifts, air-quality monitors and more. In some chemical plants, pits can collect heavier-than-air gases, posing a unique danger. Because open-sided scales typically don't require going under the scale, they can require fewer safety preparations.

• **Other –** Pits have a tendency to collect debris, trash, spilled product and mud. They are difficult to clean, and can become the perfect home for pests and rodents.

Portable/Temporary Truck Scales

In some situations, you may need to weigh vehicles for a finite period of time. Sites performing construction, logging or on-site materials batching may need a portable or temporary truck scale.

Instead of a purpose-built concrete foundation, portable scales make use of a steel frame that typically bolts together in sections. The frame includes mounting locations for the load cells on which the scale deck rests. These scales almost always use a steel deck, as they are much easier to move from one location to another. In most cases, the scale is designed to be partially disassembled for relocation simply by unbolting sections of the frame and deck structure. A crane can then be used to lift the sections as needed.

Portable scales will usually have special guidelines for site preparation – including compacted soil or gravel, or, if possible, concrete. It may be the customer's responsibility to ensure the surface is adequate. The scale approaches, or ramps, may be included with the scale. Often, these must conform to specific regulations defined by the weights and measurements authority in your region.

Additionally, weights and measures guidelines in some areas will have special usage requirements for portable scales. For instance, they may require that a portable scale be relocated at certain intervals (6 months, for example).

Scale Interface and Data Management

Today's scales can take advantage of modern technology to streamline business processes and transactions by collecting the following information:

- Material type
- Price
- Truck weight (tare)
- Net weight
- Customer/Account number
- Purchase contract
- Third-party hauler information
- Driver identification number
- Truck identification number
- Surcharges, fees, taxes

• Material grade
• Material origin

To accomplish this, scale suppliers typically provide three general levels of data management for truck scales. Some features may vary based on manufacturer. They include the scale terminal, basic scale software, and advanced or customized scale software.

Vehicle Scale Indicator/Terminal

• Displays weight value
• Performs simple transactions with gross, tare and net weights
• Stores tare weights to calculate net weights

Optional features

• Calculates simple accumulations, for example, daily tonnage per truck or commodity
• Outputs data to a printer, remote display or other peripheral devices
• Stores limited data and transaction information
• Offers self-diagnostics
• Controls the traffic system
• Operates multiple scales with a single unit

Basic Vehicle Scale Software

• Interfaces with scale terminal for control of scale, traffic lights, loops and gates/barriers
• Provides one-pass, two-pass and multi-pass weighing transactions
• Offers a database with tables to store information about vehicles, products, accounts, etc.
• Configures reports and tickets
• Calculates advanced pricing
• Speeds up transactions with presets and group information
• Imports and exports data

Advanced and/or Customized Vehicle Scale Software

• Controls multiple scales
• Performs advanced transactions: credit checking, vehicle weight checking, product sampling
• Offers industry-specific modules for waste, forestry, agriculture, etc.
• Configured for multiple users on a network
• Remotely calculates transactions via web browser
• Synchronizes data among multiple networked sites

Unattended Weighing

A growing number of sites are considering hardware that allows truck drivers to process their own weighing transactions. This capability can be ideal for scales that operate around the clock or that process repetitive transactions. With an unattended driver terminal, you can potentially eliminate the cost of building a scale house next to the scale and employing an on-duty scale operator. Unattended driver terminals commonly offer the following features:

• Card/RFID reader for quickly identifying drivers/ vehicles
• Display for prompting drivers to enter data

• Keypad/keyboard or touch screen for entering data
• Ticket printer

Optional features include:

• Wireless networking
• Voice intercom capability (standard or voice-over-IP)
• Camera systems for remote monitoring

If this option seems right for your facility, ask your prospective scale suppliers about their unattended terminals and software programs to run them.

Used Vehicle Scales

While this guide is intended to address the purchase of a new vehicle scale, there are often second-hand options available as well. The cost savings over a new scale can be huge, but there are a number of risks and drawbacks that can make this option only viable for a limited few:

• **The size of the weighbridge** cannot be modified, as it would harm the structural integrity and void any weights and measurements certifications. So a foundation would need to be built to the existing size of the weighbridge, which may not be optimal for the application.

• **The warranty** will be void, with the possible exception of any new components that are installed.

• **The condition of the entire system** is subjective, and unless the scale is still installed and operational, it can be impossible to fully test the system.

However, many weighbridges can be modified to accept entirely new load cell systems. For businesses willing to accept the use of a pre-owned weighbridge, this can offer like-new performance at a fraction of the cost of a new scale. This leads us to a related topic: Upgrading an existing scale

Upgrading an Existing Scale

Many weighbridges can be made to accept new load cells, even from a different manufacturer, with the use of new conversion mounting hardware. For businesses that have an existing scale, this can offer a great return on investment by eliminating frequent service calls or questionable accuracy on an old scale.

This opportunity began with scale companies offering upgrades to their own installed base of aging scales. Upgrades offer life extension for weighbridges and foundations that are still structurally sound. This has since expanded to companies fitting their load cell systems into competitors' scales. From the customers' standpoint this offers advantages, allowing them to use new technologies while leveraging existing capital equipment.

Because these projects can have many variables, it is best discussed directly with your scale supplier. In some areas, local weights and measures regulations may stipulate whether a truck scale may be upgraded or not.

Here are some general criteria that an existing scale should meet to be considered an acceptable candidate for a load cell system upgrade:

• **Foundation** The scale foundation must be in good condition and structurally sound.

• **Weighbridge** The weighbridge must be evaluated for signs of fatigue, corrosion, cycle history, etc.

• **Checking and/or suspension systems** These components must still be capable of functioning as designed, and deemed appropriate for the requirements of the new

load cell system.

- **Accessibility** The existing scale must allow adequate physical access for technicians to remove old components and install new ones where needed.