Weighbridge Technology

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PARKERFARM
WEIGHING SYSTEMS

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Choice

These work horses of weighing come in all different shapes, sizes and designs, manufactured from **steel, steel-concrete composite** and **pre-stressed concrete**. Designs include **pit mounted, surface mounted, modular** and **portable.** Typical capacities range from 30 to 100 tonnes, in lengths of 9, 15 and 18 metres. The common factor for all these variants is that they need to be robust, accurate and reliable.

The choice for a particular application will depend on factors including maximum vehicle sizes and weights, available space, usage and, of course, budget. Most weighbridges are operated in a drive-through manner. In other words the vehicles drive on at one end and off at the other. However in applications where space is at a premium, vehicles may go on and off from the same end. For plants where vehicles are weighed in and out, the obvious choice is to operate two separate weighbridges. Not only does this streamline traffic flow but it also gives the opportunity to service one bridge whilst keeping the other operational. However this is clearly a more expensive option and in many applications one weighbridge is sufficient.

Design

Most mechanical weighbridges have now given way to fully electronic versions where the weighbridge deck or deck sections are supported on a number of strain gauge load cells, connected to weight instrumentation.

Pit mounted weighbridges are flush with the ground. As a result they pose no restrictions to vehicles and are therefore particularly useful at sites where vehicle flow can be in multiple directions. Most mechanical weighbridges were installed in pits so when they are upgraded or replaced the new pit mounted weighbridges provide a very cost effective answer.

Surface weighbridges offer one of the strongest designs and the side frames ensure vehicles always drive centrally through the bridge. Approach and departure ramps can either be of steel construction or pre-cast in concrete on-site. Removable steel ramps have the advantage of being able to be moved with the bridge if relocation is required, leaving the site level.

Portable weighbridges have special load cell assemblies and feet, allowing temporary installation with minimum foundation preparation. Steel ramps provide access.

Concrete weighbridges can offer advantages for certain applications. Pour on site composite versions provide a cost effective solution for medium use operations. These consist of a steel outer frame, inner strengthening beams and reinforcing mesh. Once the unit is assembled on site, the ready mixed concrete is poured in and when the deck has cured, the load cells are fitted. Alternatively the complete weighbridge can be constructed at the factory and delivered to site.

Weighbridges are expected to operate in the harshest of environments, fully open to the elements. Therefore a well structured finishing procedure is essential to provide optimum longevity. In a typical coating process all steel is shot-blasted to remove mill scale and surface imperfections prior to painting. This ensures maximum adhesion of the surface coating applications. In parallel sound design principles ensure a well drained deck and no hidden traps underneath where hidden corrosion can occur.

The foundations of any weighbridge are crucial to their performance. It is of little use having the most accurate load cells and well designed weighbridge structure if the foundations are unlevel or unstable. For pit weighbridges, adequate drainage is also important to prevent flooding. Where applicable it is possible to install weighbridges on sloping terrain using special steel wedges in the load cell mounting assemblies.

Significant end to end forces can be generated when vehicles drive on and off the weighbridge, especially if heavy breaking occurs. Such

forces can damage critical components such as load cells and can also cause serious damage to the surrounding structure. Built-in restraints are therefore an important part of any weighbridge design.

Load cells

Load cells are the prime measuring sensors for weighbridges and therefore are the most critical component. Modern sealing methods and materials of construction provide excellent environmental protection whilst well-designed mounting hardware ensures optimum load introduction. Two basic types of load cell are used in weighbridges - analogue and digital. Although analogue load cells are well tried and tested, giving excellent service, digital load cells offer distinct advantages, especially during installation, calibration and troubleshooting. The capability of being able to communicate with individual load cells brings important benefits and in addition, each load cell stores pertinent weighbridge calibration data which can be transferred to a new load cell if replacement is necessary.

Certification

Weighbridges are classed as non-automatic weighing instruments (NAWIs) and if the weight data is used as part of any commercial transaction they require approval to European weights and measures standards. This involves the bridges being tested with calibrated weights when first installed, and then re-verified at regular periods or when any critical components are replaced. (*Some companies insist their weighbridges are weights and measures approved even if they are not used for commercial transactions. This ensures that the weighbridges are maintained and certified for optimum precision.)*

Ownership options

There are a number of ways of 'owning' a weighbridge. These include outright purchase, lease purchase and hire. Portable weighbridges are ideal for short term usage or where the weighbridge has to be moved from one part of a site to another or to a different site. Purchasing weighbridges and support services on cost alone can be false economy. No-one likes paying more for their products than necessary, but a number of factors should be considered when choosing a weighbridge supplier. **Cost of ownership may be an over-used cliché, but it is still very relevant when it comes to weighbridges.**

Modern technology

Traditionally the weighing process in many weighbridge applications has been relatively slow and data collection has been confined to local printouts of tickets and daily tally rolls. Now more emphasis is being

placed on developing key peripheral areas. This is aimed at speeding up throughput of vehicles, improving security and extending weighbridge operational periods, together with improving and simplifying data collection and distribution. Technologies employed include Ethernet communication for remote access, automatic vehicle recognition systems, smart card or key readers, wireless interfacing, the world wide web and GSM. Bespoke, yet configurable, software packages can now be tailored for specific applications and are designed for the seamless integration with existing management systems such as ERP.

Driver operated systems

Driver operated systems (often referred to as unmanned weighbridge systems) have been one of the most effective developments for weighbridge operational efficiency and security. Such systems offer a number of advantages and remove the need to have permanently manned weighbridges. Access is via a designated swipe card or key and the unit provides a complete material handling management system which is easy to use by both vehicle and site operators. Not only does the system speed up weighing operations, but it also extends the available working period for weighbridges.

Automatic number plate recognition systems

Automatic Number Plate Recognition (ANPR) systems provide a powerful and flexible tool for a wide range of weighbridge based operations, especially at remote or unmanned installations. Recent advances in ANPR technologies are leading to the increased integration of this technology within weighbridge applications.

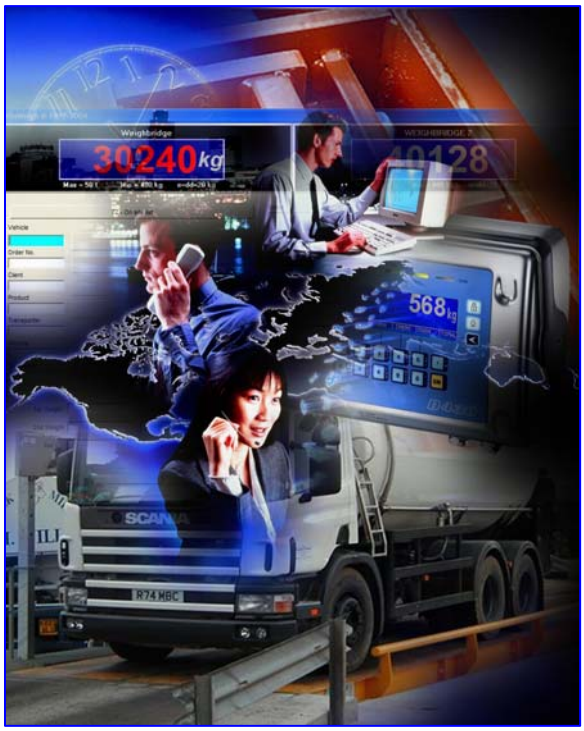
The technology introduces a high level of site control and security, allowing pre-registered vehicles to carry out weighing procedures in a highly efficient manner. Such systems, which can be used to operate traffic lights and control security barriers, is an important asset to any driver-operated system.

Number plate details can be programmed directly into the weight terminal without the need for a separate PC and related information can include product/crop descriptions and vehicle tare weights. The use of stored tare weights removes the need for double weighing, thereby speeding up collection or delivery procedures. Unlike CCTV/PC systems, modern systems can read dirty plates and compensate for variations in plate reflectivity, strong headlamps and adverse weather conditions, making them ideal for agricultural applications.

Service and support

Service and support is a critical issue for weighbridge operators especially for equipment working in harsh environments. The new technologies are bringing important changes to the way in which servicing can be optimised and this is particularly useful at remote unmanned sites. Any weighbridge breakdowns have a rapid and major impact on daily operations and therefore effective servicing and trouble shooting is very important. However traditional methods of servicing do not necessarily cater for the changes in the working pattern of a particular weighbridge. Typically estimates are made to establish the frequency of servicing, often with the emphasis on minimising costs.

Most of us are familiar with the built-in service monitors on modern cars, which assess servicing requirements based on a combination of factors including time, mileage and how the car is driven. This technology is now available for weighbridges advising, for instance, when the next service is due based on time, number of weighments or a combination of both. The system can also record a history of peak loads, which may be above normal operating capacity and detrimental to the working of the bridge. This information can be useful in determining why, for instance, a particular weighbridge is going out of calibration or suffering from excessive component failure.



Although regular servicing and maintenance can help to minimize problems, predicting what and when things will go wrong is very difficult with traditional weighbridges. Therefore the ability to offer remote maintenance service support can save considerable time and effort especially for equipment operating in harsh, remote areas.

With such a system installed, any problems with the weighing equipment are automatically flagged up at the supplier's offices. Details are immediately forwarded to the local engineer who can then dial into the weighing system remotely and make a risk assessment of the situation. In many cases the engineer can carry out a range of checks and where possible rectify the problem without having to visit the site. If not, then if appropriate, plans can be made to carry out any remedial work during the next scheduled visit, thereby minimising the disruption to the site operation.

Conclusion

Modern weighbridge systems can offer considerably more than weight information and their integration with other technologies is bringing dramatic changes to a wide range of industries. However the quality of the data they provide is still totally dependent on sound mechanical design principles and well defined installation procedures.

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