

CARDINAL SCALE MANUFACTURING COMPANY

COMMERCIAL VEHICLE ENFORCEMENT WEIGHING

The world today, as never before, requires that we all work harder to accomplish more while expending fewer resources. Efficiency has become a major consideration in every business decision. Nowhere is this more evident than in commercial vehicle weight enforcement. Our nation's highways serve as the arteries of commerce and are called upon to deliver more goods in less time and at less cost than ever before. All this



with little or no increase in the number of weigh stations along our highways. Add to this the fact that overweight trucks not only make our roads more dangerous to travel but also continue to inflict costly damage on the road surface and it becomes clear that something has to be done. One potential solution is to increase the throughput of existing weigh stations by weighing only those trucks that are found to be overweight allowing the others to

continue on their way without stopping to be weighed. Many states have recognized this fact and have taken steps to implement sorting programs at their weigh stations to select suspect vehicles for static weighing. That's where Cardinal comes in.

Cardinal Scale is one of only a very few companies worldwide that can offer a total solution to your commercial weight enforcement needs. Cardinal manufactures not only a wide variety of vehicle scales, all certified to commercial tolerances, but also several models of in-motion vehicle scales. The load cells (force transducers that convert the weight into an electrical signal), including the internal components, are also designed and manufactured by Cardinal. By offering a full line of commercial weighing products and vertical integration of manufacturing, Cardinal can offer single source responsibility and compatibility along with an economical and cost-effective solution to your weight monitoring and enforcement requirements.

Perhaps the most important component for increasing the throughput or capacity of a new or existing weigh station is the in-motion vehicle scale. It is the in-motion scale that serves as a "filter" by identifying those trucks that need to be weighed statically on the main roadway before they even begin to slow down. By statically weighing only those trucks which are found by the in-motion scale to exceed preset limits, the remaining trucks are allowed to continue on their way substantially reducing the number of trucks that must stop at the weigh station. This reduction in the number of trucks that have to stop greatly increases the capacity of the weigh station while ensuring that overweight trucks are still identified and weighed statically for enforcement purposes. If desired, the in-motion scale can randomly select a percentage of trucks for review by weigh station personnel regardless of the truck's weight.

Cardinal offers two types of in-motion vehicle scale. The load cell-based or CWIM series of in-motion scale is a good choice when the sorting function is performed on the approach lane to the weigh station and at speeds of 50 mph or less. The scale consists of



Model CWIM In-Motion Scale

two independent platforms each supported by four 50,000 pound capacity compression load cells allowing the weights of each end of the axle to be measured. The two platforms are mounted in a steel framework that is placed within a concrete foundation in the roadway. The load cells used in this scale are constructed from stainless steel and are of the same type used in Cardinal static truck and railroad track scales. The weighbridge design and high capacity load cells result in a robust and rugged scale but one with a high resonant frequency as well. The CWIM In-Motion Scale meets the performance criteria for a Type III scale as defined in ASTM 1318E. This scale provides information including the vehicle axle weights, axle group weights, gross weight, speed, axle spacing, side-to-side imbalance and vehicle classification.

The Cardinal QWIM series of in-motion scale uses quartz sensor technology for high-speed in-motion vehicle weighing. The scale consists of two or more sets of quartz sensors located in shallow cuts made in the road's surface. The sensors work on a piezo-electric principle producing a voltage output proportional to the force applied to them. A loop detector is included to sense the absence or presence of a truck while optional off-scale sensors are used to detect a truck that does not pass fully over the sensor set. The QWIM sensors can be installed in a day with minimal disruption of traffic. Additional sets of sensors can be used to improve the performance of the scale while adding a level of redundancy. Like the load cell-based in-motion scale, the QWIM also offers ASTM 1318E Type III performance at speeds in excess of 80 mph. The QWIM also provides data on side-to-side imbalance, axle weight, axle group weight, gross weight, axle spacing, speed and vehicle classification. With the addition of an over-height optical detector, either in-motion scale model can also check for trucks that exceed height

limitations while they are being weighed. The QWIM is an ideal choice when the scale must be placed in the mainline or where vehicles are moving at highway speeds.



QWIM Sensor

To complete the truck weighing package, Cardinal offers a variety of static truck scales; all equipped with Cardinal manufactured strain gauge load cells. Truck scales can have either concrete or steel decks, low profile or pit mounted, single or multiple platforms and with bending beam or compression load cells. Regardless of your requirements, Cardinal has a truck scale that meets them. All truck scales and load cells have been evaluated and have been issued NTEP Certificates of Conformance. Scales are available in most any length and configuration and are



Cardinal Pit-Type Multi-Platform Static Scale

backed by a nation-wide service program.

Of course, a scale is no better than the instrumentation to which it is connected. Cardinal instrumentation includes programmable weight indicators that accept a wide range of interface and I/O cards and, when loaded with special software for your application, can easily fill most any requirement. Traffic control systems are managed either from a programmable weight indicator or from a computer and include manual controls with graphic layouts for easy operator interface. The net result is a system that can track a vehicle from entry to exit from the weigh station, maintain a database of vehicle characteristics, print selectable summary reports and most any weight-related function.



Typical Multi-Scale Weigh Station Instrumentation

Cardinal service is only a phone call away. Cardinal maintains a Technical Support Department that provides telephone support to assist you in getting the most from your system. Should you have a problem, Cardinal service technicians can be at your site in a matter of hours rather than days or weeks. Special in-motion service vehicles that contain all the equipment necessary to install or service your in-motion scale are dispatched from our factory to your site. And, because the vast majority of the parts used in the weight enforcement systems are manufactured by Cardinal, the likelihood of having to wait for a replacement part is remote.

Cardinal's staff of engineering and software professionals is ready to assist you in the design of a weight enforcement system that fits your needs and will for years to come.

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