

Advantages and Disadvantages of a Concrete Deck Truck Scale

Truck scales have evolved over the last 60-70 years from wood bridge plank platforms, to concrete deck and steel deck designs of today. While there are very few wooden platforms any longer, the debate continues over whether steel or concrete decks are the best choice for today's customers. There are advantages and disadvantages to each that should be considered when making recommendations to potential customers.

- **Concrete decks were for many years the standard on the older style pit type scales. (circa 1950-1980) For that reason many customers who owned the concrete pit style preferred the concrete design of today.**
- **Concrete decks as a general rule, will last longer than steel deck scales. Checkered plate has a tendency to wear especially in abrasive applications like quarries, mines, etc. High traffic volumes can also result in a wearing of the diamond treads.**
- **Concrete decks generally require less maintenance than steel decks. They do not require repainting. They do not show surface wear as steel decks often do.**
- **Concrete decks provide better traction in wet or slippery weather than do steel decks, which can be very slippery even in light rainy conditions. Mix the rain with a little oil from truck traffic, and surfaces can become very hazardous.**
- **Concrete decks because of their design, have tendencies to better distribute the load over a wider area of the platform than does a steel deck. Most concrete decks are anywhere from 5-6" thick, compared to only 1/4" or 3/8" for a typical steel deck. Because of the concrete deck thickness, the load of an axle on the scale is more evenly distributed over the entire weighbridge, thus reducing stresses. With a steel deck, there is more of a tendency to have pin-point loading in the footprint of the tire (approximately 8" square) that can result in eventual "cupping" of the steel plate. This can result in steel fatigue, and a premature failure of the top plate and or the weighbridge.**
- **Because of the weight of a concrete deck and the mass there is far less movement of a concrete weighbridge, minimizing wear on steel components such as links, stands, and load supports.**

- Concrete as a material was designed for use in a “compression application” above the neutral axis of the structure. In other words, concrete as an element was not designed to bend. When concrete bends, it eventually breaks. The single most important consideration in the purchase of a truck scale is the structural integrity of the scale weigh-bridge. The design characteristics of the steel support structure of the weigh-bridge is especially important for a concrete deck scale. The Weigh-Tronix BridgeMont is the best and this is why. Concrete as a material, was designed to be used in a compression application, with the concrete above the *neutral axis* of the structure. Concrete extending below the *neutral axis* can be exposed to bending or tension forces resulting in eventual cracks, that can lead to a rapid deterioration of the deck, and eventual failure. Generally steel components are designed for both tension and compression applications. Steel components are designed to bend and return to their original shape, as long as they are not loaded beyond their original design characteristics. If weigh-bridge components are too light, components can become fatigued over a period of time resulting in a premature failure of the structure. Weigh-Tronix uses only first quality steel components, carefully selected to optimize bending stresses and minimize deflection of steel members under load. Many competitive weigh-bridges use steel members which are too light for the loads, and attempt to make up for these components by pouring a 9” or 10” thick concrete deck. On designs of these types concrete is used in both a tension and compression application, resulting in dangerous bending of the concrete structure. Very often surface cracks can become evident after only a short period of use. Road salts, freezing, and thawing conditions can rapidly contribute to a serious deck deterioration problem.

The BridgeMont BMC Series is designed to optimize the design characteristics of both steel and concrete. All of the concrete is in a compression application, and the steel components are correctly in both tension and compression. With the Weigh-Tronix BMC the 5” concrete deck is actually sitting on an intricate 5-1/8” steel deck substructure fully supporting the length and width of the weigh-bridge. This BMC weigh-bridge is made up of (2) 10” outside beams, (5) 5” longitudinal I-Beams and a 3/16” lower steel plate, welded to the lower flange of the beams. This lower steel plate is the main stress carrying member of the steel weigh-bridge, and virtually eliminates excessive deflection of the bridge. Nelson studs, are positioned both horizontally and laterally, to insure an integral bonding of the steel and concrete elements. The extraordinary design of the Weigh-Tronix BridgeMont BMC weigh-bridge provides you the most rugged design available in a concrete deck scale.

Disadvantages of Concrete Deck Scales

- **Concrete Decks are heavy and therefore if relocation is a possibility, a steel deck may be preferred. A typical BMC-7011 scale will weigh approximately 73,000#, or about 24,300# per module.**
- **Concrete Decks require final cure strength of 3500-4000 PSI normally achieved after 21-28 Day cure time. If quick start up of the scale is necessary, a steel deck scale may be the best choice. Additives may be added to the concrete, which will accelerate the normal cure time. A 7-14 day cure time is achievable. New epoxy resin additives have reportedly been developed which could provide a 24-Hour curing time.**
- **In some extremely cold environments a concrete sealer may be necessary, to offset the porous nature of concrete.**
- **If a concrete deck should fail, it is virtually impossible to replace. Weigh-Tronix has never experienced a failure on one of our concrete deck scales.**
- **Concrete decks should be shored during the curing process, which can create some obstacles, especially in pit installations.**

Summary

Many competitive decks have experienced serious problems with their concrete deck designs primarily due to the fact the concrete element is exposed to bending forces. Concrete, as an element was not designed to bend. When concrete bends it breaks. This applies especially to concrete placed below the neutral axis of the structure. The Weigh-Tronix concrete design incorporates the same construction principles as used on bridge construction for roads in the U.S. and this design has proven very effective.