

The ORCA Advantage

Introduction

For many businesses, a truck scale is more than just a piece of equipment—it's a crucial component of many industrial operations, often acting as the "cash register" for products and materials. Accurate and reliable weight measurements are essential for determining the value of goods, which directly impacts revenue. When trucks are weighed to determine the weight of transported goods, any inaccuracies can lead to significant discrepancies in billing, ultimately affecting the bottom line. The precision of a truck scale ensures that businesses can charge appropriately for their goods, avoiding undercharging or overcharging, which can damage customer relationships and profitability.

Efficiency – Operational disruptions caused by downtime or inaccurate weighments can be particularly costly. If a truck scale fails or provides incorrect readings, the entire logistics chain can come to a halt. This can result in delayed deliveries, increased labor costs, and potential penalties for late shipments. In industries where timing and accuracy are critical, such as manufacturing, logistics, and agriculture, the reliability of the truck scale is paramount. Investing in a high-quality truck scale that performs consistently over its expected lifespan minimizes these risks, ensuring that operations run smoothly and efficiently.

Safety & Compliance – Beyond operational efficiency and revenue accuracy, investing in a reliable truck scale is also a matter of safety and compliance. The chain of responsibility in transportation means that all parties involved, from the manufacturer to the carrier to the receiver, share accountability for ensuring loads are within legal weight limits. Overloaded or inaccurately weighed trucks can lead to dangerous situations on the road and significant legal and financial repercussions. Therefore, scale owners must invest in safe, reliable truck scales that comply with regulatory standards. This not only helps prevent accidents and legal issues but also promotes a culture of safety and responsibility within the organization.

Truck Scale Ownership Costs – The majority of service calls for truck scales are related to breakdowns in the load cell system of the scale. Expensive, complicated to replace, or difficult to procure load cells can add substantial and unexpected costs in the event of a failure.

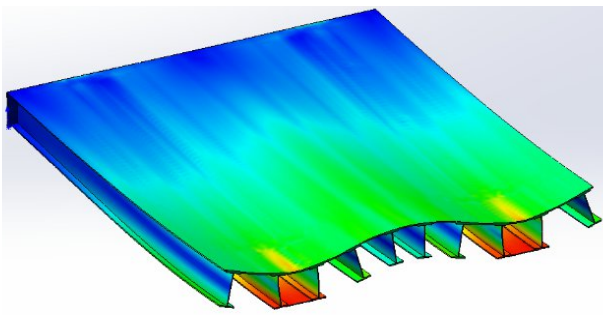
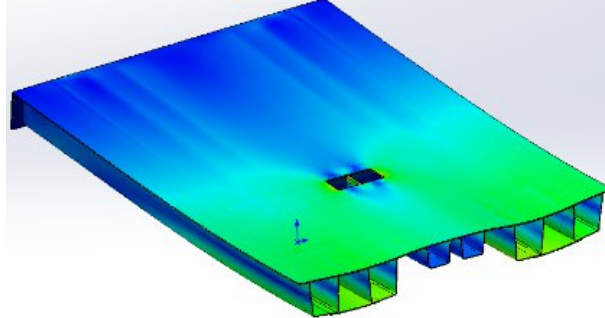
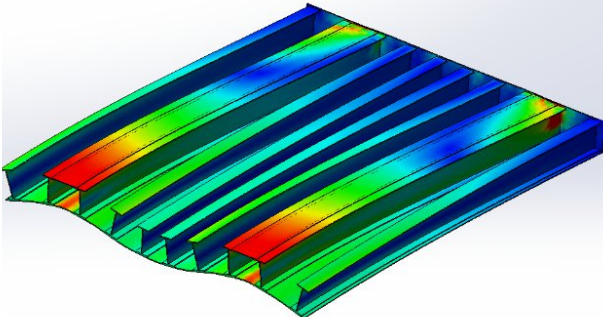
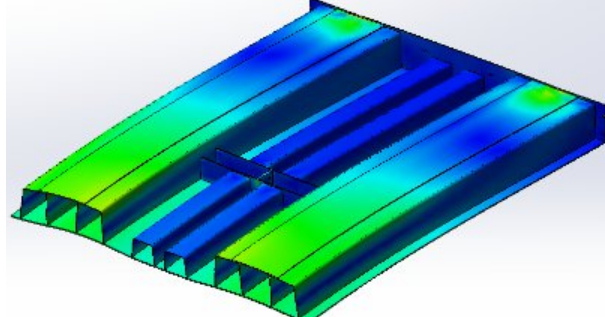
Overview of ANYLOAD Truck Scales

At ANYLOAD, we understand the critical role that truck scales play in your business. Our truck scales are designed with a focus on durability to ensure that your weighing operations run smoothly. Drawing on advanced design principles and manufacturing excellence, ANYLOAD truck scales are built to withstand the toughest conditions and deliver consistent performance for many years.

Design Approach

Durability and Reliability

At ANYLOAD, our primary focus is on designing truck scales that offer exceptional durability and reliability. We understand that a truck scale must endure constant use and harsh environmental conditions without compromising performance. Our engineering team utilizes advanced design techniques, especially Finite Element Analysis (FEA), to identify and address potential stress points, ensuring superior structural integrity and extended lifespan for our scales.

Like-for-like Comparison	
Top View	
	
I-beam (with bottom plating)	ORCA U-Channel
Bottom View	
	
I-beam (with bottom plating)	ORCA U-Channel
Result Analysis: FEA simulation with like-for-like comparison where the top deck thickness is the same and bottom plating is applied. There are hotspots in the I-beam design that can be prone to fatigue and permanent deformation whereas the U-channel design is much more uniform. Note that most competitor models do not have the same top deck thickness nor is there bottom plating along the length of the scale.	

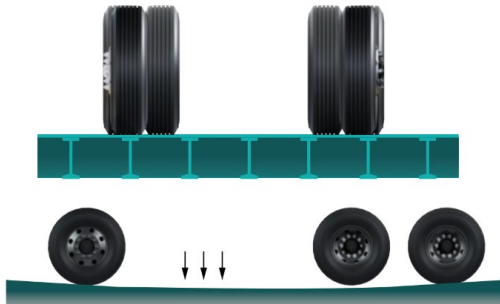
In addition, our design process is heavily guided by feedback from our network of dealers and local partners. These industry experts have extensive experience with various truck scales from different manufacturers and across a wide range of applications. By incorporating their insights, we can optimize our designs, address common concerns, and improve on the shortcomings of other products in the market.

Lock Washers on All Critical Fasteners

Split or spring lock washers apply a continuous mechanical resistance that keeps the bolts securely in place, even under dynamic loads or thermal expansion/contraction. Compared to chemical thread-locking compounds which may degrade over time or crack in extreme cold, lock washers provide lasting effectiveness without specific application conditions or need for reapplication. The use of lock washers on all fasteners of a truck scale will ensure long-term, problem-free operation by preventing loosening in high-vibration environments across all environmental and temperature conditions.

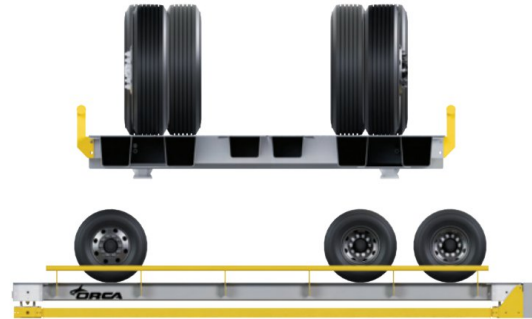
Deep U-Channel Design

Competitor Truck Scale
I-Beam Construction



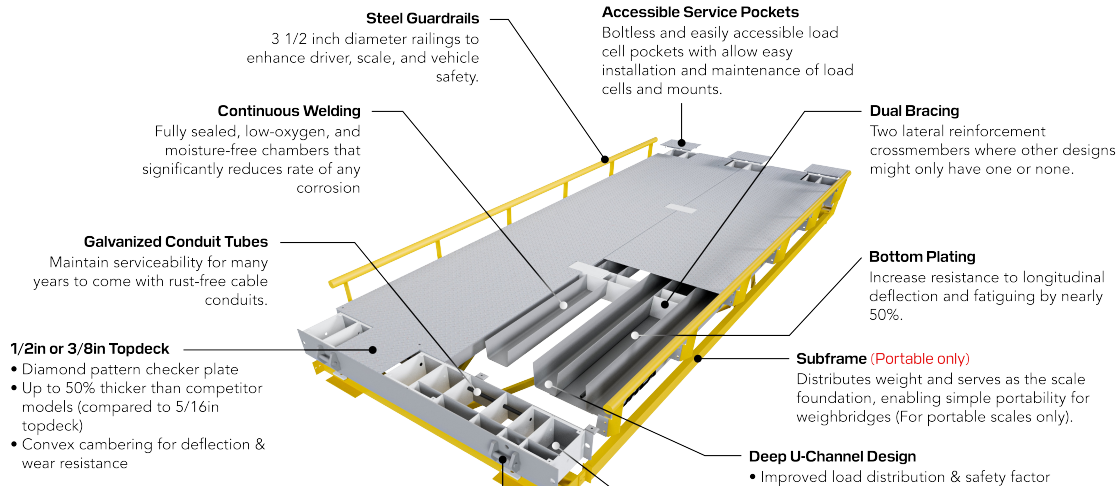
I-Beam construction is more prone to deformation.

ORCA™ Truck Scale
U-Channel Construction



U-Channel distributes load more evenly, reducing deformation.

- **Load Distribution:** Unlike I-beams that primarily carry the load through the vertical web, U-channels have a wider and more even load distribution, reducing the stress on individual components and localized areas. This increases the scale lifespan by minimizing wear and tear.
- **Torsion and Bending Resistance:** The flanges of U-channels are wider than those of I-beams, providing better stability and rigidity. This makes U-channels more robust and capable of withstanding the heavy loads and dynamic forces encountered in truck scale applications. The wider footprint of the U-channels reduces fatigue and the risk of web buckling that commonly occurs in the thin upright sections of I-beams.
- **Dual Axle Coverage:** U-channel flanges run directly underneath truck axles, with at least two flanges guaranteed to directly buttress each axle.
- **½in (12mm) Treadplate Top Deck:** >50% thicker than most standard competitor models which are typically 5/16 in or less. Far more resistant to wear over time.
- **Bottom Plating:** Continuously welded bottom plates run along the entire length between axle load bearing U-channels to provide additional reinforcement. Designs without bottom plating, especially I-beam designs, are prone to latitudinal deflection over time.
- **Dual Cross Bracing:** Extremely resilient double lateral cross-bracing runs twice over each weighbridge section.
- **Continuous Welding:** Prevent moisture ingress and airflow. A low-oxygen internal environment also helps to significantly restrict corrosion. With all channels sealed, there are no ledges for debris to accumulate like in I-beams.
- **Pre-cambering:** CNC hydraulic bending during section welding process to resist latitudinal deflection. Deformations over time by the weight exerted by the axles can lead to water and debris pooling on the scale deck, leading to inaccuracies in weighing.



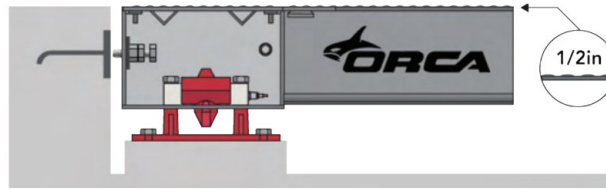
Minimizing Costly Downtime

We recognize that downtime can be costly and disruptive to your operations. Therefore, our truck scales are designed to minimize maintenance requirements and reduce the risk of unexpected failures. Key features like integrated load cell pockets and robust structural components ensure that our scales deliver consistently accurate weighments, even under heavy usage. By preventing common issues such as stress fractures and corrosion, ANYLOAD truck scales help you avoid costly repairs and keep your business running smoothly.

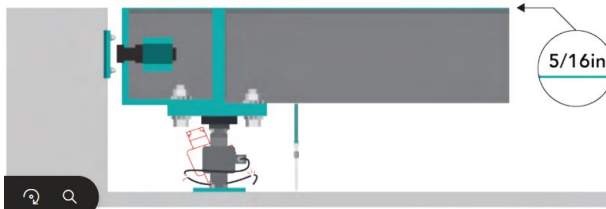
M1 Mounting System

- **Centre-pivoted Suspension Link:** Highly resilient mounting system that can withstand significant planar movements to the scale body, resists shock loading, and allows for up to 15° of natural inclination.
- **Eliminates Check Rods:** The design of the mounting system eliminates the need for check that must be installed underneath truck scales using rocker column type load cells. That is one fewer component that requires installation and is liable to fail.
- **Debris-free Loading Area:** There are no areas in the live components of the load cell and mounting system that allows for the accumulation of debris, which can often include abrasive sand or gravel that will damage the load cell and mounting area over time. Rocker column type load cells require must rely on rubber boots, grease, and other improvised means to prevent debris ingress into load bearing areas, especially the base cup. However, rocker column type load cells still generally have a shorter service lifespan as compared to double ended beams.
- **Reduced Reliance on Bumper Bolts:** While bumper bolts are still provided with every ORCA truck scale, there is less of a reliance on bumper bolts to protect the ramp or scale foundation from damage caused by the natural swaying of the weighbridge when vehicles above brake and accelerate. The suspension link mounting system allows for a controlled degree of movement without the need for additional hardware.

ORCA™ Truck Scale



Competitor

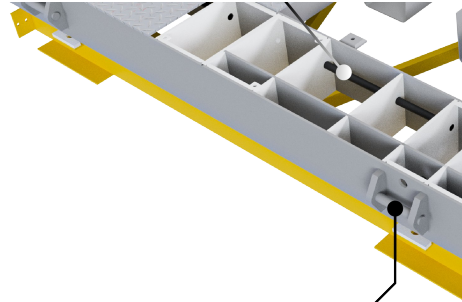


Simplified Installation and Portability

Efficiency and ease of use are central to our design philosophy. ANYLOAD truck scales are engineered for quick and straightforward installation, allowing you to start using them with minimal delay. Our scales feature self-seating locking plate connectors and pre-sorted hardware configurations, making the assembly process faster and more efficient. For applications that require portability, our truck scales are outfitted with subframes to be easily disassembled and reassembled, ensuring flexibility and convenience for your operations.

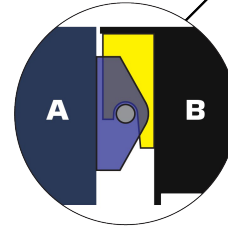
H-Bracket Interlock Design

- **Simple to Install:** The new H-bracket interlock design simplifies the installation process by providing a bolt-free mechanism. Scale service providers can quickly and efficiently assemble the weighbridge sections, setting down three or four sections of a weighbridge very quickly.
- **High Tolerance Installation:** The ORCA truck scale is designed to allow for high tolerances during installation at all parts of the process from assembly to positioning each complete scale section in the foundation. The M1 mounting system, H-bracket sectional connectors, our load cells, and junction boxes all contribute to making the installation as simple as possible.
- **H-Bracket Interlock Design:** Compared to standard bracket or pin style connectors, the H-bracket system features two sections that lock together vertically, providing enhanced structural strength durability and resistance to deformation under load. This design minimizes lateral and vertical movement, ensuring a tight and robust connection between the weighbridge sections.
- **Streamlined Maintenance:** With its self-locking capability and robust construction, the H-bracket interlock simplifies the process of disassembly for maintenance or relocation, saving time and reducing operational downtime.



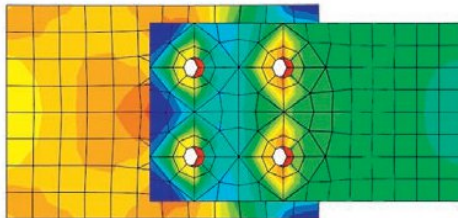
H-Bracket Installation

The H-shaped pin bracket allows quick alignment, flexible operation, and easy relocation. Its bolt-free design supports natural expansion from temperature changes, ensuring consistent load distribution and reliable performance in various conditions.

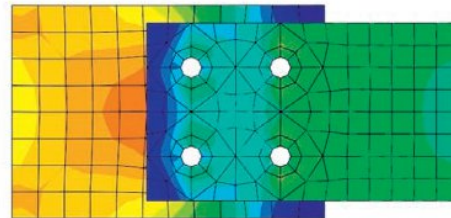


Bolted vs. Welded Platform Assembly

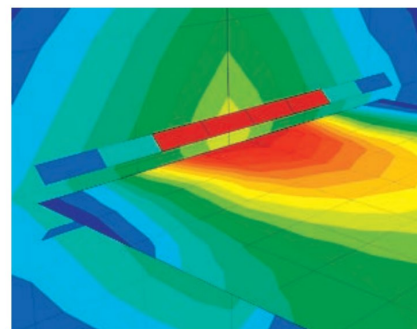
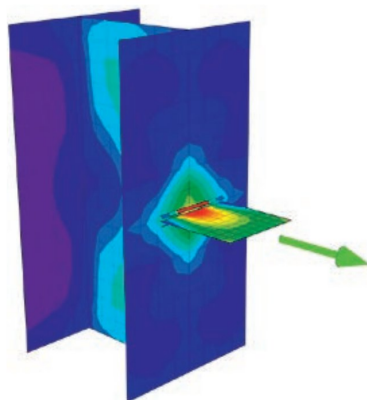
- Pre-loading Hardware:** One of the main benefits of incorporating bolts instead of welding is the ability to firmly lock two flat joints together. This makes the force transfer occur across the whole face of the material through friction rather than resting on the side of the bolts and relying on its shear strength – its ability to withstand perpendicular loads. This results in a much more even distribution of force – even as the scale thermally expands and contracts – that cannot be accomplished by welding. Welding is only able to permanently join materials where they make contact. Preloading a structure to be welded is not practical and the temperature required to join such thick material could undo the preload or warp the structure.



Standard bolts – Force transfer by bearing



Preloaded bolts – Force transfer by friction between members



- Consistent Joint Strength:** Weld strength is highly dependent on operator skill, surface preparation,

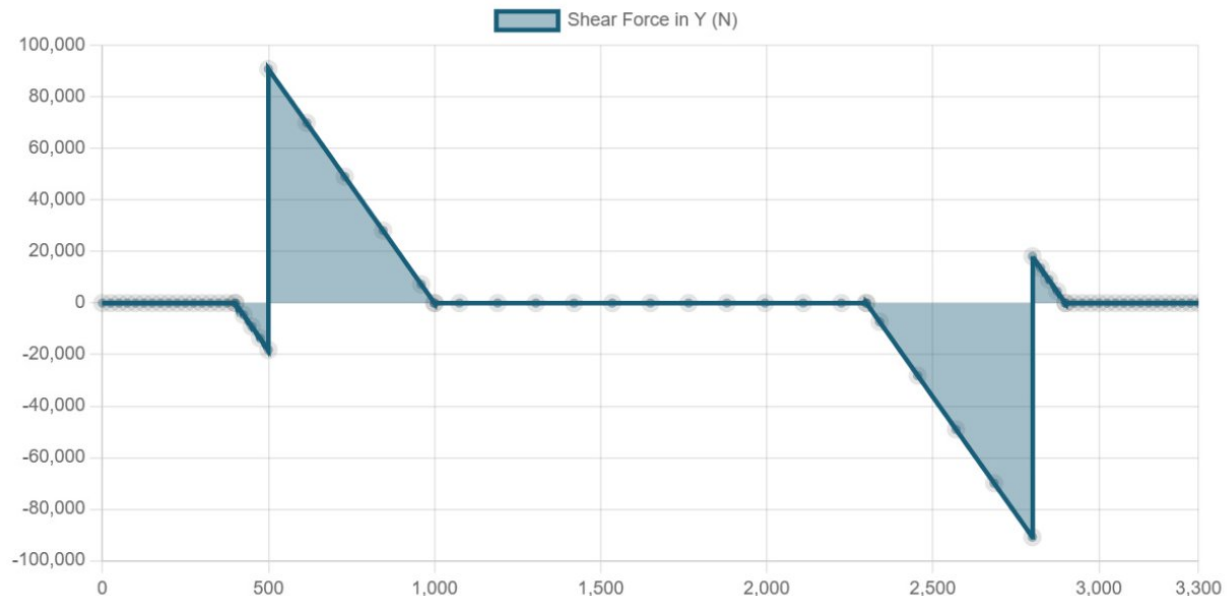
and environmental conditions. It can also suffer from poor penetration, porosity, or localized warping of the metal. Bolts offer a consistent installation result with no risk of damaging the material underneath if the manufacturer torque specifications are followed. Bolts also retain the ability to be disassembled whereas welding is permanent, easing certain maintenance or replacement procedures.

- **Inspection:** Unlike welds, bolted joints can be easily inspected for fatigue or diminished strength. If a bolt shows signs of wear, it can be individually dealt with and minimize scale downtime. The permanent nature of welds means as the metal is fatigued over time, its remaining strength cannot be measured or effectively dealt with other than replacing the entire affected unit.
- **Force Distribution:** To better put this into perspective let's calculate the forces exerted in the center of the truck scale if an overloaded 100t truck were to pass over it. The total force exerted by a 100 metric ton truck is approximately 981 000N. Assuming the contact patch of each pair of tires is approximately 600mm in width and the truck has 9 pairs of tires distributed evenly, that's 181.67N/mm per pair. The applied force is symmetrical and is applied almost directly on top of the load cells, leaving only residual moment forces at the center of the scale. The maximum observed moment is 21.8kN-m, approximately 1.1m away from the applied force.

$$\text{Shear force} = \frac{M}{r} = \frac{21.8}{1.1} = 19.81\text{kN}$$

The shear and tensile strength of a single M20x80 grade 8.8 bolt is 150.8kN and 251.3kN respectively, both nearly an order of magnitude greater than the observed forces in the middle of the truck scale. Considering each platform uses 18 bolts to join the two halves, and most of this force will be absorbed directly through friction between the two large halves of the scale, the observed force is not a concern for the bolted fixture.

The forces seen at the point where the two halves of the platform are bolted together would be equivalent to parking a large family sedan directly in the middle of the scale. When you consider that a fully loaded truck is ~50x heavier than a consumer sedan and the number of bolts that hold a single section together, the force is inconsequential.



Manufacturing Excellence

1. Material Processing

We employ advanced material processing techniques, including laser cutting, CNC plasma cutting, and CNC laser cutting, to handle raw materials with exceptional precision and accuracy. These cutting-edge technologies allow us to achieve fine tolerances and intricate shapes, ensuring each component meets exact design specifications. Laser cutting provides clean edges and minimal thermal distortion, while CNC plasma cutting offers versatility in handling various material thicknesses with high-speed precision. CNC laser cutting combines the advantages of both, delivering unparalleled accuracy and efficiency in material preparation.

For secondary molding, we utilize CNC bending equipment to process the raw material U-beams. This technology ensures precise and consistent bends, crucial for maintaining the structural integrity and perfect shaping of the truck scales. The CNC bending process allows for the exact replication of design parameters, reducing variability and enhancing the overall strength and durability of the U-beams. This meticulous approach to material processing ensures that each component contributes to the robust construction and long-term reliability of our truck scales.



2. Welding

Our welding processes incorporate advanced techniques such as automated welding, nitrogen dioxide arc welding, and CNC manipulator welding. These state-of-the-art methods ensure precision and consistency in weld quality, crucial for the structural integrity of our truck scales. Automated welding systems provide uniform welds, reducing the likelihood of human error and ensuring each weld meets exact specifications. Nitrogen dioxide arc welding is utilized to achieve deep penetration and strong weld joints, essential for withstanding the heavy loads and dynamic forces experienced by truck scales. CNC manipulator welding further enhances precision, allowing for complex weld paths and consistent application across all units.

We employ full-length welding techniques to seal the entire length of joints, effectively preventing moisture and water ingress that can lead to corrosion within the weld cavity. This comprehensive welding approach mitigates the risk of crevice corrosion, which is common in partially welded joints. By eliminating potential entry points for corrosive elements, we significantly extend the service life and durability of our truck scales. The combination of these advanced welding technologies ensures that our products maintain their structural integrity and performance over extended periods, even in

the most demanding environments.



3. Assembly

After welding, each truck scale is pre-assembled to ensure that all parts fit together properly. This step verifies that every component aligns perfectly, ensuring seamless installation and reliable performance in the field.



4. Shot Blasting

We perform 360° shot blasting on the scale body with a 12-jet automated blasting machine to systematically remove grease, dust, dirt, rust, oxide, coating, and other foreign substances from the

metal surface, meeting ISO8501 metal surface cleaning level Sa2.5. This thorough cleaning ensures excellent paint adhesion to the truck scale surface. Shot blasting is a crucial step because, without it, even the best quality paint will not adhere properly to the metal. Contaminants and residues on the surface can cause the paint to peel, blister, or flake off over time, leading to inadequate protection and potential corrosion.

Proper surface preparation through shot blasting ensures that the paint bonds effectively with the metal. This process not only cleans the surface but also roughens it slightly, creating an ideal texture for the paint to grip onto. This enhances the longevity and effectiveness of the coating, providing a durable barrier against environmental factors such as moisture, chemicals, and abrasive materials. Ensuring a strong bond between the paint and the metal surface is essential for maintaining the scale's appearance and protecting its structural integrity over the long term.

Additionally, shot blasting reduces the residual stress caused by bending and welding, minimizing deformation and enhancing the overall durability of the truck scale. By relieving these stresses, the scale becomes more stable and less prone to structural failures.



5. Painting and Curing

Our truck scales undergo a dual-coating process with high-performance anticorrosive resin coatings applied in a dedicated paint spraying booth. This controlled environment, equipped with precise HVAC systems, ensures that the coatings are not compromised by external variables such as temperature fluctuations, humidity, airborne particulates, and other contaminants.

Maintaining a stable microclimate during the painting and curing stages is crucial, as deviations can adversely affect film formation and inter-coat adhesion. For instance, high humidity can lead to surface condensation, impeding proper adhesion, while airborne dust can embed in the coating matrix, creating discontinuities that compromise corrosion resistance.

The dedicated paint spraying booth and the controlled paint curing process facilitates a consistent and contaminant-free application process. This meticulous approach not only enhances the surface aesthetics but also significantly bolsters the mechanical properties and longevity of our truck scales. The high-quality resin coatings employed form an impermeable barrier against moisture ingress, chemical attack, and oxidative degradation, ensuring superior rust inhibition.



Dealer & Factory Support

A network of hundreds of scale dealers across North America able to provide full suite on-site services, from installation to integration to maintenance.

2-year factory warranty on all ANYLOAD load cells and weighing electronics.

About ANYLOAD

ANYLOAD is an ISO9001:2015 designer and manufacturer of load cells, scales, and weighing systems and solutions. With over 30 years of experience in designing and producing dependable weighing solutions that are trusted around the world, we have accumulated deep expertise in structural, mechanical, and electrical engineering, metrology and calibration, and logistics and project management.