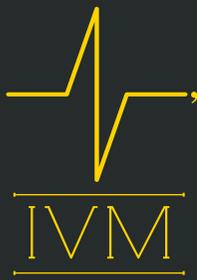
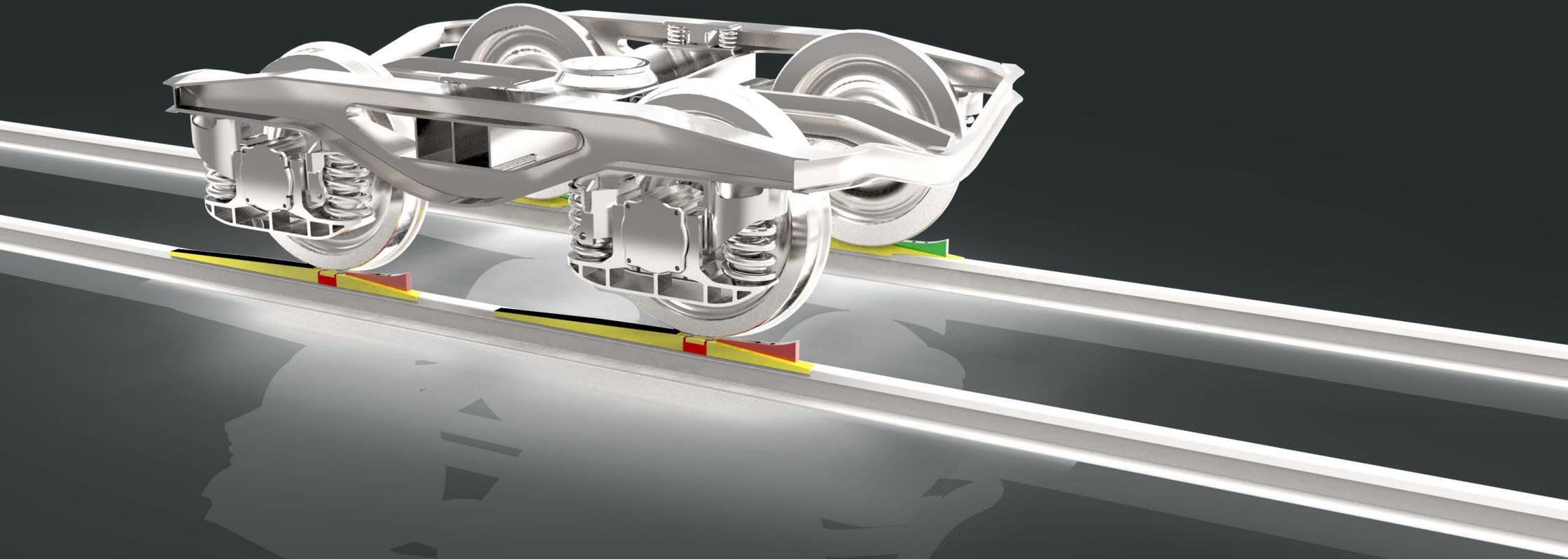


POWERVE



PORTABLE WEIGHER FOR RAILWAY VEHICLE

PRODUCT DESCRIPTION AND DETAILS





POWERVE PORTABLE SCALE

ivmtech.it/powerve

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The first and only **fully portable** system to weigh trains. We, at IVM, have engineered an **innovative measuring instrument** which measures the static weight force distribution loaded on track, by each rolling stock wheel. The system is so light and easy to use that can be quickly used by just **two people**. The easy installation and portability makes it perfect for use both **along track** and at **workshops**, you will be able to move the system to the track you prefer minimizing the movements of rail cars.

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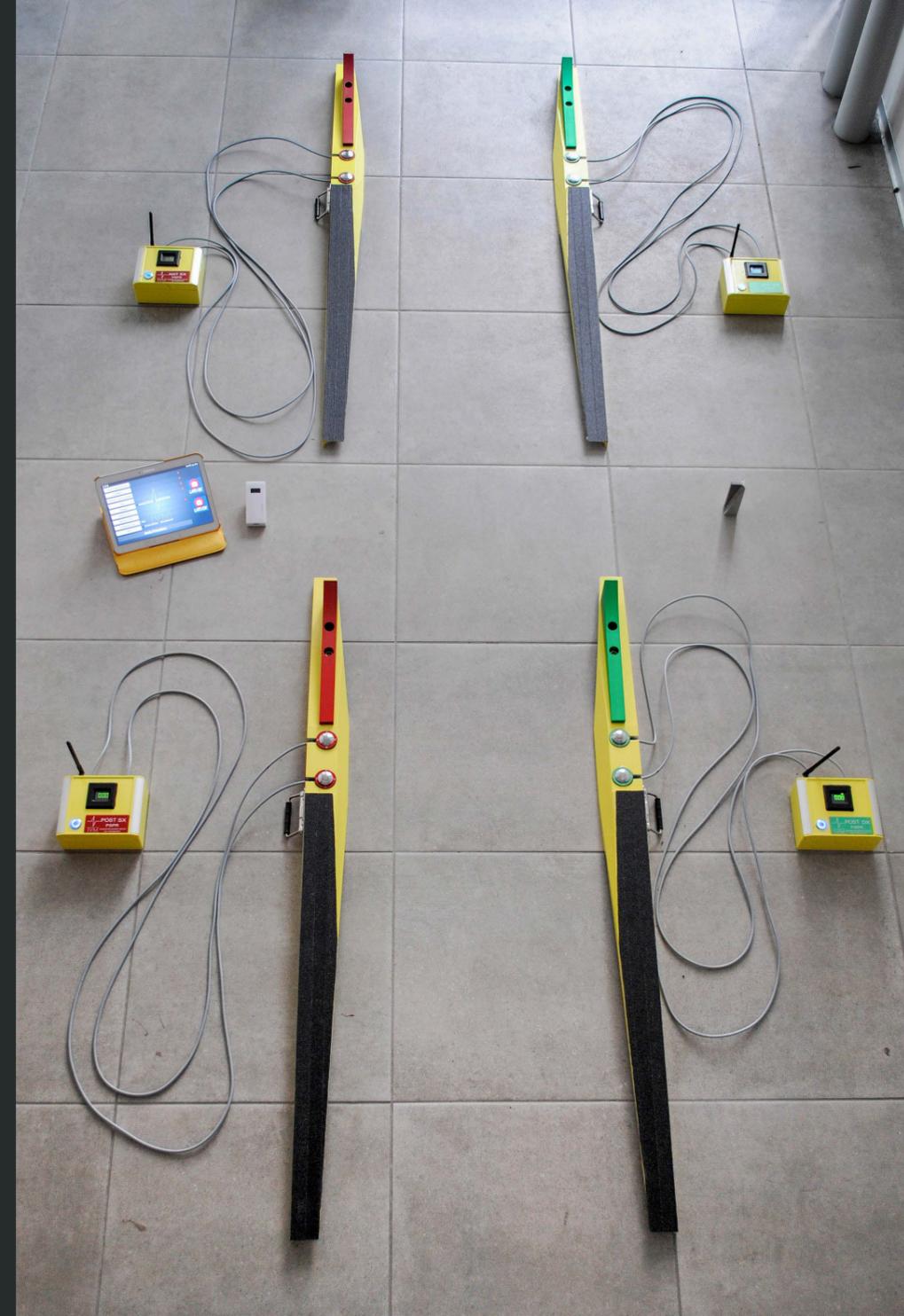
POWERVE

POWERVE uses a set of **ramps** to position the wheels into the **measuring zone**.

This ad-hoc mechanical supports are leant on the rails and are used to rise a wheelset (or a bogie) by positioning each wheel on a pair of specifically crafted load cells.

The load cells create a “**cradle**” in which each wheel is **self-centered in a stable equilibrium** condition.

This particular design allows the rolling stock to stay still without the application of external constraint or forces. Therefore, the weight is not affected by tensions due to the braking forces.



SIMPLE PROCEDURE

POWERVE measures the overall weight of a rolling stock by measuring **one wheelset (bogie) at time**. The measurement procedure for each wheelset (or bogie) is really simple and guided by an intuitive **Tablet application**. The app will guide the operators in each step of the measurement.

The measurement is carried out by using a **shunting machine or a locomotive** to **pull the rolling stock** so as to rise it on the ramps and let it sit in the measuring zone.

Once on the load cells, the application automatically saves the measures and then asks to move the rolling stock down the ramps. To ensure a good result **the measurement is repeated 4 times per wheelset (bogie)**. Once a wheelset (bogie) has been measured the system asks to move to the next in order to measure the whole rolling stock.

INNOVATIVE

POWERVE is a new high tech product for weighing trains. It uses cutting edge technologies in order to offer to the users a **simplified approach** to this kind of measurement.

We **specifically designed**: the shape for the loading cells so as to minimize the errors deriving from the use in field, the shape for the ramps to safely place the wheels on the measuring zones and the hw/sw systems capable of working in perfect synergy to control and guide the measurement.

1

EACH WHEEL

The system provides an accurate result for the **weight of each wheel** as well as the weight of the entire rolling stock. The measurement report provides useful information about the **distribution of weights**, those data can be used to balance the train weight distribution improving rolling stock safety.

2

REAL DISTRIBUTION ON TRACK

POWERVE weighs the train in the real **running order conditions on the track**. The measurement is carried out directly on track and this does not modify the **train balance**. Other systems rise the rolling stock and place it on a scale, in this way the primary and secondary **suspensions** are unloaded and then compressed again; this alters the load distribution.

3

PORTABLE

The system is very light, it is less than **50 Kg** and is organized into 4 cases for an easy movement by **2 people**.

MEASURE ON THE WHEEL TYRE (ROLLING CIRCLE SURFACE)

The way in which the system is interposed **between the rail and the wheel** ensures that the measuring point is the real point of contact between these two elements.

The wheels' points of contact are the same that the train has during his standard running on track.

The fact that POWERVE touches the wheels only on the rolling circle ensures that the **measure takes into account the actual wear of the wheels' diameters**

(there could be a significant difference between new and worn wheel diameters that could alter the load distribution) - the sensitive elements are interposed between the wheel rolling circle diameter and the top of the rail taking the wear into account.

In this way it weights the real load of each wheel and **overcomes the limitations of other systems** that measure on the wheel flange.

EASY INSTALLATION

The simplified in field installation makes it ready to use in less than 10 minutes and only requires 2 people to install it.

You just need to lean the ramps on the rails and place the load cells in their housings, then you are ready to go!



EXTERNAL FORCES

POWERVE design has been engineered so as to remove the necessity of external forces to stop the rolling stock on the measuring zone.

The cradle shape of the ramps in conjunction with the shape of the load cells ensures that the wheel places itself in the measurement zone and stay still in a static equilibrium condition without the need of brake or tension forces. In this way only the real force loaded by the rolling stock on track is measured.



THE COUPLER IS LOOSE

1%

ACCURATE AND REPEATABLE

The system has been certified by an **independent third party Notified Body** to provide an **in field accuracy of <1%** for the total weight of the rolling stock and of <2% for the weight of each wheel. The system also offers a really high repeatability; thus it is a precise instrument. The fact that POWERVE has been certified in field gives a real guarantee about its performance in real working conditions.

DEMO VIDEO

Use Adobe Reader to open this file in order to play the videos. Move the mouse over a video to show the controls and click Play.



RAMPS PLACEMENT

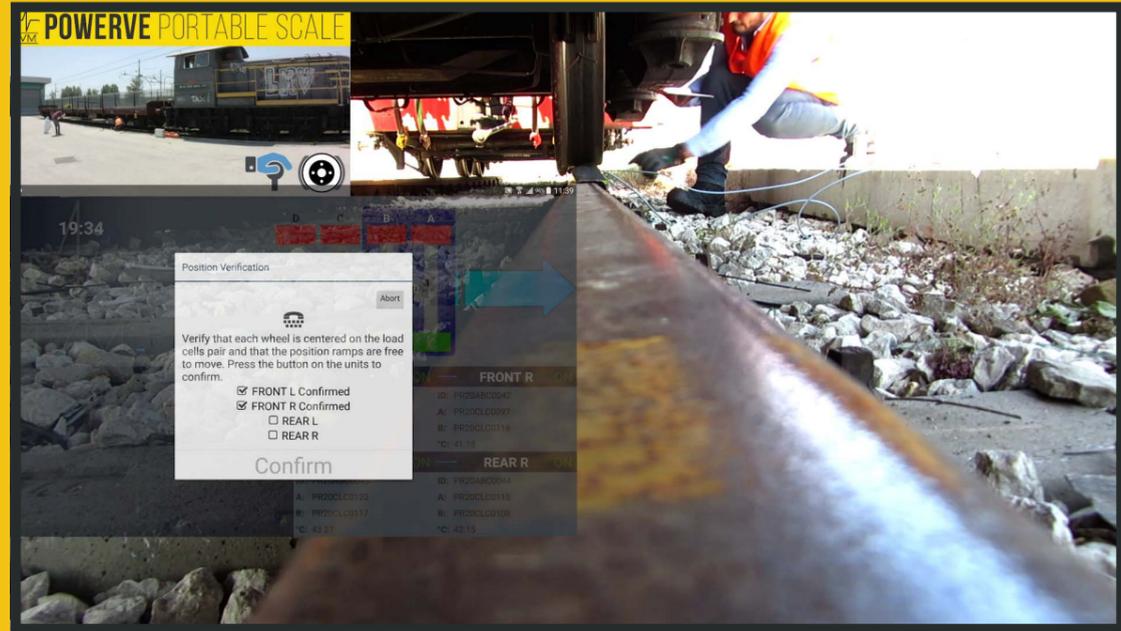
WHEEL CENTERING IN THE MEASURING ZONE



ROLLING STOCK
TOW ONTO THE RAMPS

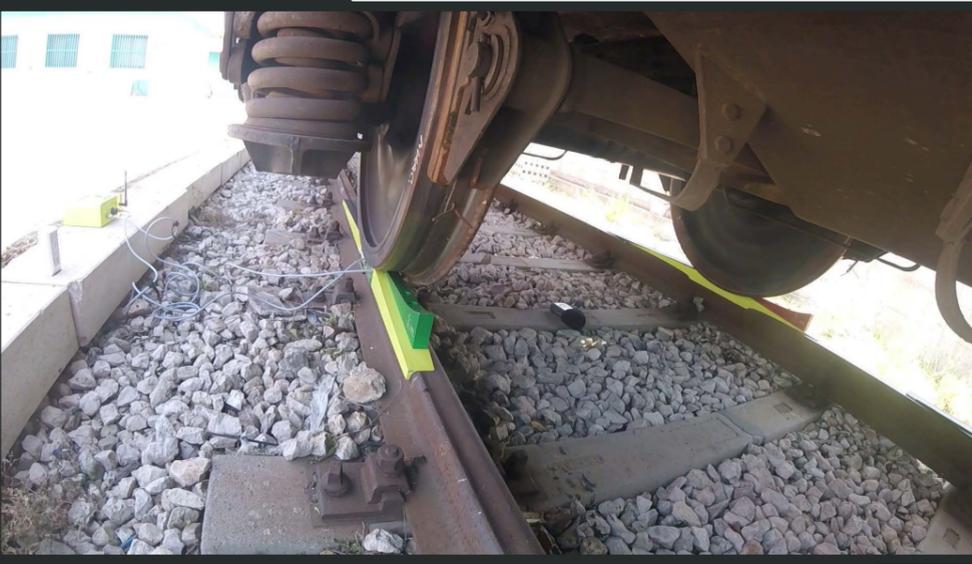


CHECK THE CORRECT POSITION ON THE LOAD CELLS



If the ramp can move the wheel is only touching the load cells!

RAIL POINT OF VIEW



TOP POINT OF VIEW

MEASUREMENT WIZARD

POWERVE is equipped with a built-in software to manage in real-time the system through a Tablet which wirelessly receives the measured data from the acquisition systems.

It is designed to support the operator during the procedure, providing guidance on the necessary actions to perform during the whole measurement

cycle. It is also equipped with control and visualization systems (both HW and SW) to control the measurement process, to display the results, to process data and to store them.

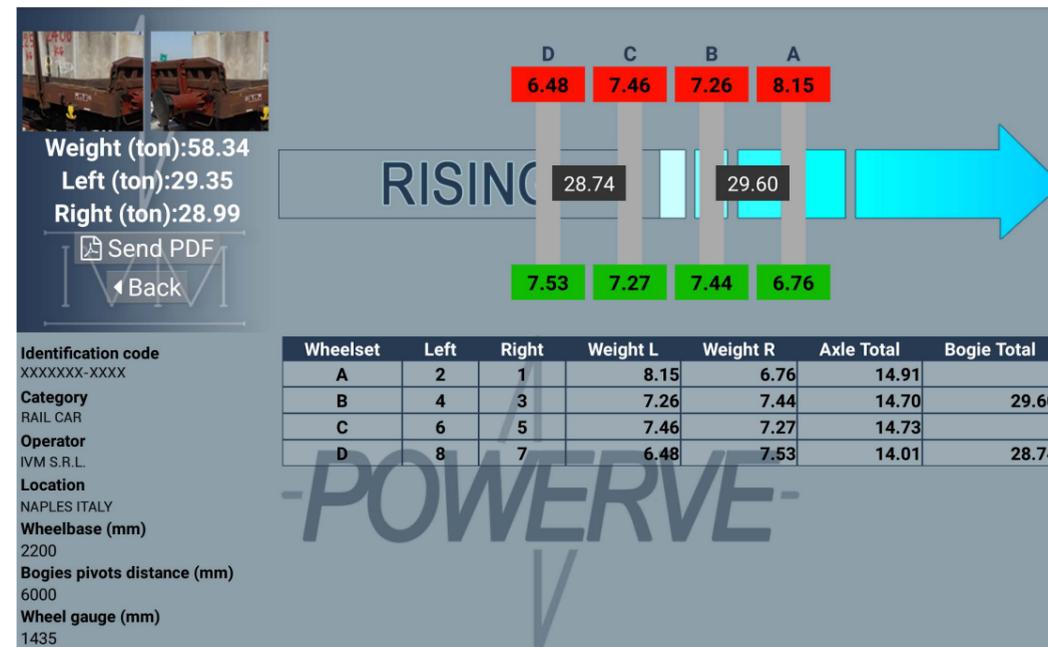
These features are aimed at limiting human errors and to guide the operator throughout the measurement process.

ELECTRONIC REPORTS

POWERVE, at the end of each measurement, automatically outputs the results in a digital PDF format ready to be shared by Email, Bluetooth and other means for data exchange.

The automated data flow ensures that it is free of human transcription mistakes.

The report also contains photos of the left and right side of the rolling stock which has been measured.



WIRELESS

All the electronic components of POWERVE are connected through wireless technology.

This allows an easy installation and a compact design.

CERTIFICATION AND REGULATIONS

POWERVE in field performance (overall accuracy <1%) have been certified by an independent railway Notified Body working in compliance with UNI CEI EN 17065. POWERVE specification, design, metrological aspects and working procedure have been created following the most demanding European and Global regulations:

- France NF F 00-701

Measurement of the static loads of wheels;

- Europe EN 50215:2011

Section regarding the Weight Measurement for vehicles' Acceptance Tests;

- Europe EN 14363:2016

Section regarding the Static load per wheel for the Dynamic and Static behavior of the vehicle;

- Japan JIS E 4011:1989

Methods for the measurement of rolling stock's mass.



Moreover, POWERVE is compliant with the EMC, CE directives for electromagnetic compatibility.

The load cells themselves have been certified Class II Load Cells (UNI EN ISO 376:2011) and tested by ACCREDIA laboratories, in compliance with UNI CEI EN 17025.

AUTO QUALITY CHECKS

The system automatically checks if all the measurements are statistically similar to each other, in case the measures are not consistent the Tablet application will ask to perform additional measurements.



POWERVE KITS

POWERVE is available in two different kit versions complete of transporting cases:

POWERVE POW2X: This version offers 4 measuring points and is composed of 4 position ramps, 8 load cells, 4 acquisition boards, 1 Tablet PC (software included), 1 wireless router and 1 positioning ramp spacer.

POWERVE POW3X: This version offers 6 measuring points and is composed of 6 position ramps, 12 load cells, 6 acquisition boards, 1 Tablet PC (software included), 1 wireless router and 1 positioning ramp spacer.

MEASURABLE ROLLING STOCKS

POWERVE allows to measure rolling stock composed of bogies with one, two or three axles.

By following our certified procedure **POWERVE POW2X** can weigh in two steps, first an axle (or bogie) and then the other, the following types of rolling stock:

- A-A (2 single axles) and
- B-B (2 bogies with 2 axles each).

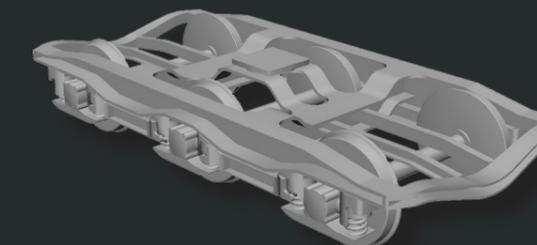
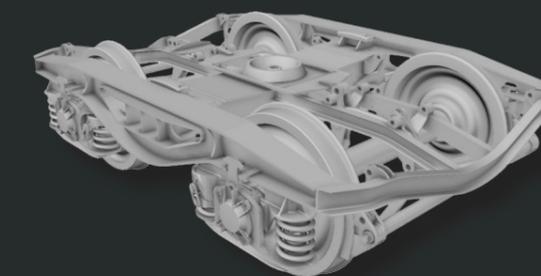
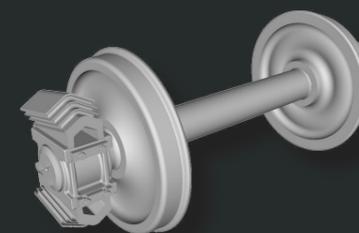
In the same way, **POWERVE POW3X** allows to measure the following wheelsets arrangements:

- A-A (2 single axles),
- B-B (2 bogies with 2 axles each) and
- C-C (2 bogies with 3 axles each).

POWERVE can be used with wheels' diameters from 750mm up to 1250mm (different wheel's diameters are available upon request).

The minimum axle distance is 1800 mm. The minimum bogie center pivots distance is 3000 mm.

It is also possible to measure bogies interposed between two railcars.



POW2X

POW3X

MAXIMUM WEIGHT

The maximum weight that can be measured is **15 tons per each wheel** (different weight ranges are available upon request). The system can resist a **200% of overweight** per each wheel.

TYPE OF RAILS

The system can be used on every UNI50 and UNI60 rails (different rail profiles are available upon request). It can also be used with ground level rails; in this case it is required to remove a small portion of concrete around the rail in order to place the ramps correctly.

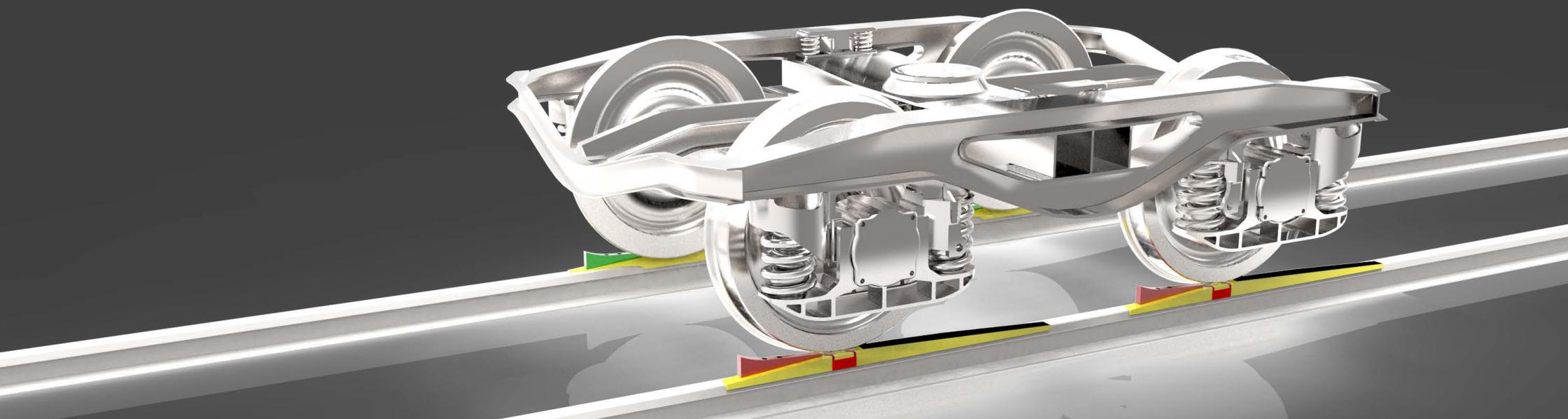
MEASURING ON A TRACK NOT PERFECTLY LEVELLED

The system can work properly on every straight and stabilized track that has been built to be in compliance with the maximum slope of 3‰ for rail yards.

EFFECTS OF MEASURING ONE WHEELSET AT THE TIME

The design of the load cells and their compact height ensures that the rolling stock is inclined of an insignificant amount. The fact the bogie center pivot distance is greater than the load cell' height by orders of magnitude, ensures that the effects caused by measuring one wheelset at the time is negligible and does not affect the results.





IVM S.r.l. - Innovative Vibration Monitoring

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