RMD's Load Weight Sensors Digitize an Analog Railway

RMD's load weight sensors have been installed on a four-axle Sgnss wagon for testing. Results showed high reliability both in terms of data communication and in detecting even small deviations in weight. Combined with RMD's shunting tool, the load weight sensor becomes a key component in ATD – Automatic Train Departures – where processes such as wagon declaration and train composition can be automated and reported directly to the Swedish Transport Administration (Trafikverket).

Load Weight Sensor and ATD
The load weight sensor is an integral part of ATD – Automatic Train Departures.
When a freight train is set to depart, a wagon declaration must be prepared. This includes details such as wagon type, weight, and placement within the train, known as the "train composition" or "train consist". The information is then reported to the Swedish Transport Administration via the Topas system.

With RMD's load weight sensor and shunting tool, several of these steps can be automated.
The shunting tool collects information about wagons in a single interface, regardless of source. The AI support can even interpret handwritten documents. Weight is automatically registered by the sensor, and with drag-and-drop functionality, the train is digitally assembled. The data can then be sent directly from the system to Topas or to other solutions used by the operator.

This ensures that each train set has a correct declaration, track access charges are accurate from the outset, and shunting operations can be carried out far more efficiently. The result is cost savings, less manual work, and elimination of human error. More efficient use of resources also means that more freight trains can be put into service within shorter timeframes.

Why Is It Important?
Uneven weight distribution in freight wagons creates forces that place heavy loads on rails, wheels, and axles and may lead to derailments. A wagon with an imbalanced load has a shifted center of gravity, which increases lateral forces on the track and may cause wheelsets to move irregularly sideways. Over time, this leads to significantly increased wear on both wheels and rails. An imbalanced load also increases the risk of oscillations, further reducing running stability, particularly at higher speeds.

An unbalanced load also impairs the suspension response of the bogie. Each axle on a freight wagon is designed to carry loads within certain limits. Uneven weight distribution – either due to incorrect loading or load shifts during transport – causes the suspension to be strained unevenly. The result is reduced suspension travel, which significantly impairs stability during operation.

Successful Tests
RMD's new load weight sensor has now undergone extensive testing under real-world conditions. The sensor demonstrated high sensitivity, detecting weight shifts as small as 100 kilos across the wagon's four wheelsets. The empty wagon weighs about 20 tons, and during testing it was loaded to its maximum capacity of about 66 tons (22.5 tons per axle).

Radio range to the PMU connected to the sensor's control unit also performed satisfactorily. This was achieved despite using only one PMU, instead of one per side as recommended.

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Cost-Efficient and Safety-Enhancing
With the load weight sensor, it is possible to monitor the loading process itself and have the system warn both of careless handling and of imbalanced loading. Communication in RMD's systems is always wireless and in real time – and with the visual support in the MyTrain app, wagons can be loaded both quickly and evenly, resulting in cost savings.

The load weight sensor also acts as a powerful safety system, as it monitors changes in the wagon's center of gravity during operation. If something is wrong, the driver receives an alert and can quickly take action to prevent an accident. Real-time information about sudden load shifts is highly valuable, especially when transporting heavy material that may damage wagons, or dangerous goods that may cause fires or environmental harm.

Industry-Wide Benefits
In 2025, the insurance partner of the Swedish association "Tågföretagen" initiated a revision of the "Risk Management Program" that has been in place since 2007. The aim is to offer lower premiums to members implementing risk-preventive technology, as fewer incidents and damages benefit the entire industry. Reduced risk costs could also serve as an incentive driving further digitalization of Sweden's railways.

With the load weight sensor, RMD adds another system to its portfolio of safety-enhancing products, effectively addressing the derailment risks caused by imbalanced wagons.

Available for Sale
The load weight sensor and associated system will be available for sale from Q4 2025, with deliveries starting in Q2 2026. Each installation consists of the load weight sensor with control unit, a PMU handling data communication, and the MyTrain app with an interface for visualizing the data. The sensor can be installed on all types of European wagons.

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