# Accuracy and Calibration

## Accuracy

Typically, the main errior in train weighing applications is from track and rolling stock conditions. Our research has shown that in-situ components of weighbridges error can range from 0.1% to 0.5%. The Trackweigh loadcells have an accuracy of better than +/-1%.

### Best site conditions can achieve:

Class 0.2 train weighing
Class 0.5 wagon weighing

### Typical site conditions achieve:

Class 0.5 train weighing
Class 2.0 wagon weighing

### Worst site conditions achieve:

Class 1.0 or 2.0 train weighing
No wagon accuracy class rating (typically due to poor wagon coupling)

## Calibration

There are Several methods of calibrating the Trackweigh system

### Static Calibration

A static calibration frame and associated instruments are provided with some systems. The static calibration does not include the dynamic effects associated with weighing a train in-motion.

### Test Train Calibration

The method is required for trade approved systems and involves using a test train with known wagon weights as a reference. It is the most accurate method of calibration , and can achieve an accuracy of +/- 0.2%.

### Cross-reference

This method involves comparison of the system output with other weighbridges, weightometers, bin systems etc.

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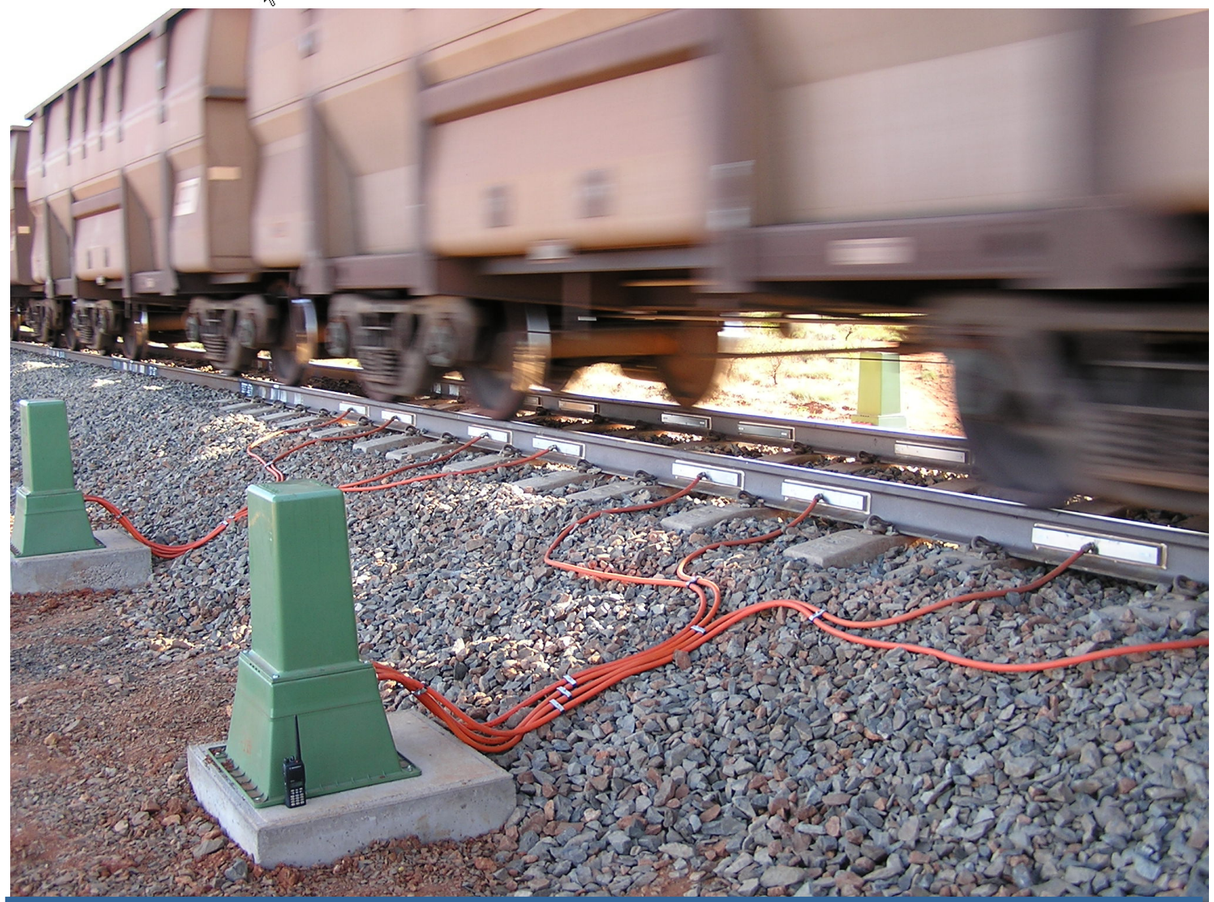
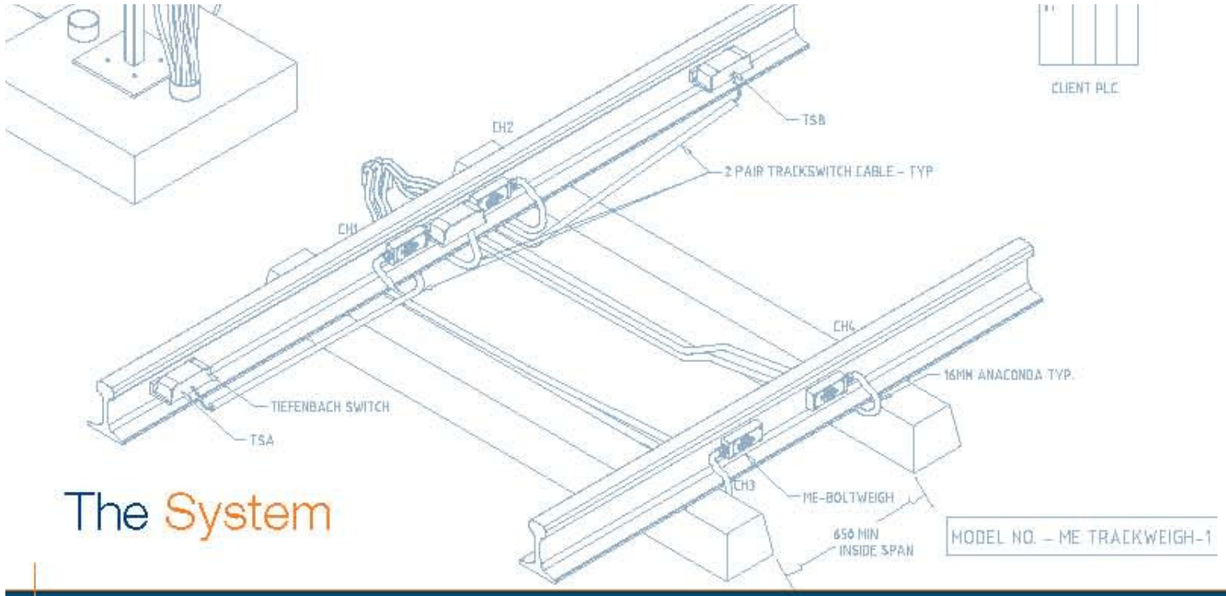
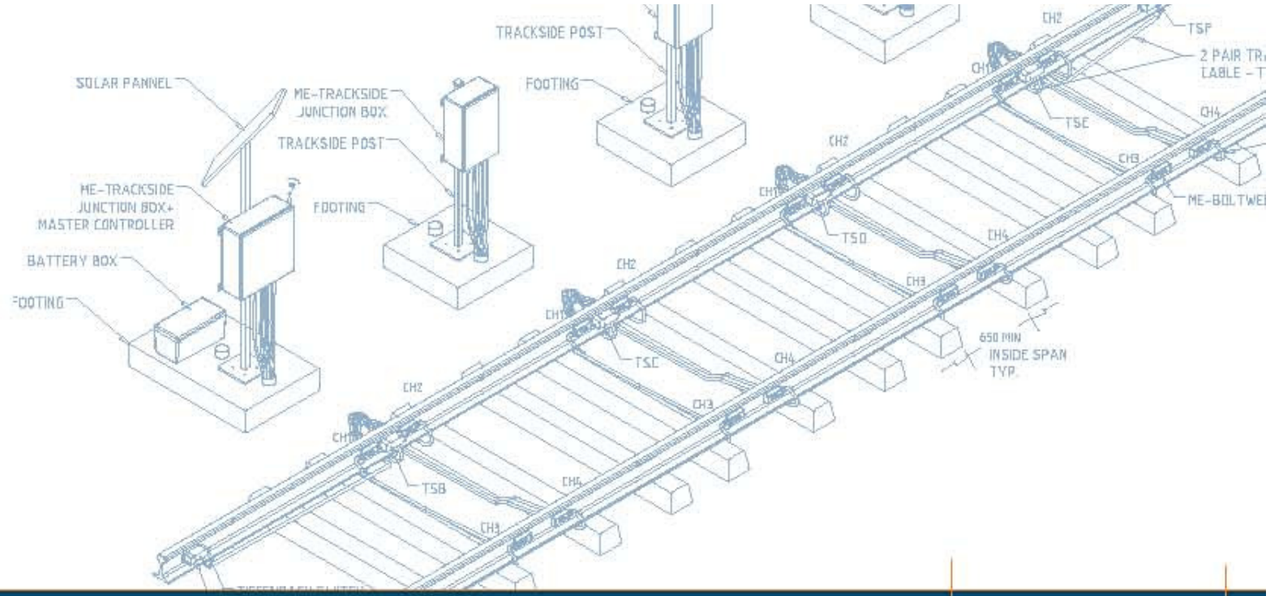


# In-Motion Train Weighing – Product Information




# The System

The Trackweigh system hardware is digitally connected to an interface computer which performs data processing and data transfer.

Trackweigh hardware consists of:

- ME-Boltweigh transducer modules incorporating the load cells and temperature sensors
- Meridian microcontroller (ME-CANAMP-R004 module)
- Track switches (non contact type)
- Trackside Junction Box
- Interface Computer
- Communication Hardware

The ME-Boltweigh transducer modules are bolted directly to the webs of the rails. The modules are enclosed by stainless steel covers and encapsulated with a silicone rubber covering system ensuring the system will continue to operate even if the rail is submersed in water.

Each ME-Boltweigh loadcell is terminated in the "ME-CANAMP-R004" which amplifies the strain signal, digitises and encodes the signal into a data packet. Each data packet on the CANbus includes the digitised load cell module output and temperature value. It also includes the device number from which each packet of information originated and additional digital data.

The ME-CANAMP-R004 is a special purpose four channel strain amplifier developed by Meridian Engineers that digitises the analogue data and places it on both the CANbus and RS232/422 networks.

Track switches are installed on the rail for sensing wheel position and for determining the direction and speed of train travel. Their spacing and number along the rail depend on the specific site requirements.

A trackside junction box is used to house the ME-CANAMP-R004 and allow easy wiring terminations.

The interface computer can be any standard PC running Windows XP or later. The only requirement is that it includes either CAN ports, RS232/422 ports or a WLAN Card (wireless) for communication with the ME-CANAMP-R004. For systems requiring direct interface to a client PLC system, an optional industrial controller can be supplied instead of a standard PC system.

The Meridian RailMaster software installed on the interface computer takes the digital data from the ME-CANAMP-R004 and calculates wheel, axle, bogey and wagon weights and provides reports tailored to suit client requirements.

Depending on the installation, the system may be set up to be fully-automatic, semi-automatic or manual operation. In fully-automatic mode, the system needs no operator intervention to compile a complete train weight report. In semi-automatic mode the system typically needs minimal operator input to compile a completed train report (e.g. start and stop weighing signals). In manual mode the operator is required to enter details of the train to be weighed prior to initiating a start weigh command.

## High Speed Systems

Trackweigh has been tested for train speeds from 0 to 100kph. Low speed systems are restricted from 0 to 10 kph. Above 10 kph, the weighbridge is referred to as high speed. High speed systems generally have multiple sets of loadcells installed on the rails. The number depends on the site conditions and overall accuracy required.

## System Software

The 'RailMaster' software for the Trackweigh system has been developed by Meridian Engineers. The software can handle fully-automatic weighing of trains, ignore maintenance vehicles, support re-weighing of wagons and dual direction train weighing. It can also store wagon weights from weighing the empty train and then compare them with the weights from the loaded train weighing to give the product weights. The software can automatically generate weighbridge reports (both email and hardcopy print) which can include wagon, bogie, axle and wheel weight data as well as train speed and rail temperature. Both Modbus and Profibus protocols are supported. The client only pays for the features that are required for the site.

The system can be used in a number of ways, some of which are described below:

- Operator presses a start button before weighing a train and end button when finished. The system will then print out a train weight report. If configured, the system can also e-mail the train weigh reports automatically to designated personnel.
- If the operator requires to see the progress of the train weighing, a standard computer screen can be connected to the system for display purposes.
- The system can be operated by remote control by accepting start and end weigh signals from other systems (e.g. Citect systems, other plant relay switches, internet control etc).
- The system can be operated in fully-automatic mode by the addition of track switches and/or RFID readers.

## Other Advantages

The Trackweigh system does not require expensive ballast stabilisation under any section of the rail. Trackweigh has few components and is extremely reliable in all environmental conditions including complete submersion of the loadcells. Installation requires little production down-time.