

Measure & Detect

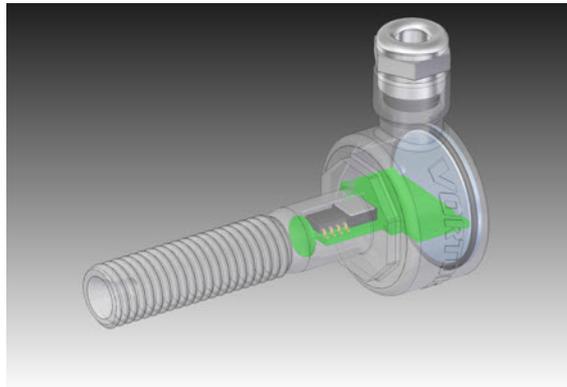
Embedded Smart Track Sensing

Vortok are developing a range of products around a new patented sensor known as the Vortok Measure & Detect Sensor, a multi purpose embedded track sensing device. The sensor has a wide range of functions allowing Vortok to develop a number of innovative and cost saving products.

Each Tracker sensor is embedded in the rail on the neutral axis, taking typically 5 minutes to install.

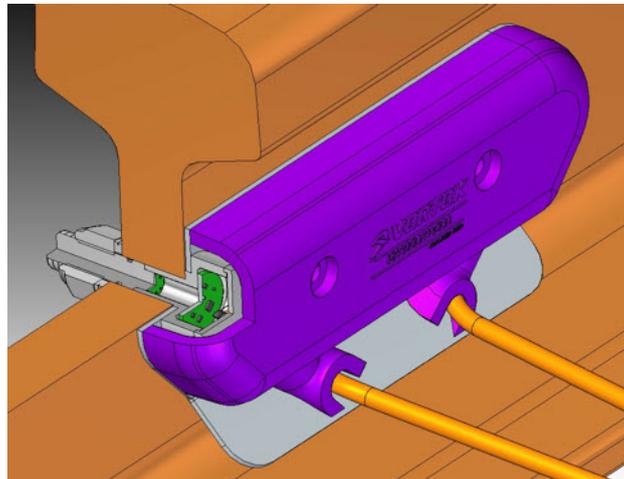
Functions from a single sensor include:-

- Rail Temperature
- Rail Strain
- Horizontal Load
- Vertical Load
- Vibration / Acceleration
- Wi-fi capability



Unique to the Measure & Detect sensor, this suite of functions allows Vortok to manufacture a range of products and modular systems.

- Stress Free Temperature
- Train Weight (Various accuracy levels)
- Wheel Flat Detection
- Bogie Hunting
- Axle Counting
- Train Speed & Direction



The table overleaf details many of the possible product combinations along with the number of sensors required for each. One of the most exciting developments will be a smart beam that can communicate with a passing train using existing data protocols.

Using the Vortok Balise mounting beam allows us to add numerous other devices including methods of local power generation, charging and wireless communications.

Vortok Measure and Detect - Usage Guide

Embedded Smart Track Sensing

No of Sensors	Use	Notes
1	Basic measurements of:- Rail Temperature Horizontal rail stress Vibration Or as above with vertical rather than horizontal stress	Sensor for sale to other system builders Horizontal and vertical stress not possible in same sensor but can be done with two sensors in one hole.
2	Real time horizontal stress measurement for monitoring neutral temperature shifts.	Use in combination with Verse or initial rail stressing to provide ongoing reporting of rail stress. Data can be stored in sensor or transmitted wirelessly.
1	Rail Break Detector	Possible use of sensor to determine rapid loss of rail stress.
2	Axle Counting	Uses sensor in vertical shear mode to record changes in vertical load on rail. Potential to use acceleration (Vibration) for increased factor of safety.
4	Train Weighing	Sensors positioned in rail inboard of sleepers. Used for tonnage counting and billing of freight operators. Possible uses for counting passenger loads on trains.
Multiples of 4	Higher accuracy train weighing.	Four sensors per sleeper bay. Commercial grade weighing in Australia and other countries requires 1% accuracy.
32 Sensors per track	Wheel Flat Monitoring. (Traditional technique)	WILD, WheelChex and others require 32 sensors per track minimum to provide coverage of full wheel circumference to detect wheel damage with acceptable probability. Four sensors per sleeper bay.
Reduced to 16 Further development as low as 4	Improved wheel flat detection using both vertical load and vibration sensing.	Potential competitor for WILD and Wheel Chex etc. Cheaper installation (less sensors) and probable higher quality data - wheel damage, shape, type.
Any	Combination of sensor with Balise mount beam for simplified installations.	Use Balise beam to provide simple cable routing and "home" for computing and wireless electronics. Add other devices to an overall smart beam and use RFID technology to transfer data using existing protocols.