

Product Marketing Sheet – VERSE (Vertical Rail Stressing Equipment)

Description

VERSE is a non-destructive method of measuring the Stress Free Temperature (SFT) of Continuous Welded Rail (CWR). VERSE uses the long established Hooke's Law (extension is directly proportional to the load) to calculate SFT.

VERSE has been designed for ease of use. VERSE is a combined mechanical/software system that will produce initial results trackside from a hand held computer (supplied). Uniquely VERSE measures SFT directly

VERSE is supplied complete with both handheld and PC software, the later incorporating a PC data base that can hold comprehensive data results for a whole rail network.

A VERSE measurement entails lifting the rail to 10 kN (monitored by load transducer) and logging the load and displacement (monitored by a displacement transducer) at regular increments throughout the lifting cycle. The outputs from both the transducers are routed via a dedicated signal condition system to the hand held computer. Along with some other data such as ambient rail temperature, rail profile (a simple selection from the software menu) and height of the rail, the handheld software produces the SFT result. The height of the rail is included to take account of rail wear/grinding which will naturally affect the stiffness of the rail.

Key Requirements for use:

The rail needs only to be unclipped (approximately 30m), lifted with a rail jack and supported 10m either side of the VERSE equipment

Rail ambient temperature needs to be below SFT, i.e. rail needs to be cool, best time to perform measurements early morning late evening/night so that special track possessions are not required. See VERSE manual for further preparation and operation details.

Target

Vortok has undertaken a two-pronged approach to marketing VERSE approaching both the infrastructure owner to gain their approval and the sub-contractors who undertake stressing/stress management operations

Key Benefits and Business Case

- **Non-destructive** – In UK over 50 units are in service and many unnecessary re-stressing operations have been avoided. Eliminates an unnecessary weld when re-stressing not required. Additionally, VERSE is ideal for checking that newly installed/commissioned track has been set to the specified SFT, due to the fact that it is non-destructive.
- **Accurate** – Demonstrated to be within ± 0.2 °C with a standard deviation of 1.3 °C when compared to strain gauges. Validation of VERSE technique has been carried out by BR Research (now DeltaRail) during the research phase of perfecting the technique. Other organisations have conducted further validations. Most recently the Railway Institute - Prague has conducted tests comparing VERSE to Strain gauges. See Technical Information pack for further details.
- **Portable** – The framework folds to aid storage when not in use. Supplied in purpose made roller case that provides safe secure storage for all VERSE equipment. The roller case can fit in a small estate car or medium hatchback, so it can be easily deployed on site
- **Cost effective** – due to the time saving of obtaining SFT values and the elimination of unnecessary re-stressing operations when using VERSE, the cost is estimated to be less than 5% of traditional methods, all of which rely on cutting and re-welding the rail. The payback for the unit would be realised once 3 to 4 re-stressing operations have been avoided with VERSE.
- **Speed of operation** – Typical procedure time 20 to 30 minutes (using 4 men) for both rails, including the unclipping and reinstating of rail. Significantly quicker than traditional methods.

- **Improved safety** – VERSE provides fast, accurate, non-destructive SFT measurements, which enable rigorous, pro-active neutral temperature management. This strategy can bring real benefits of reduced dangerous incidents, increased track availability, improved understanding of the behaviour of the track, better maintenance planning, reduced risk of litigation and better maintenance expenditure. These are all powerful motivators in making the railway more competitive and cost effective and above all, safer.

Common Questions and Objections

Cost There are significant cost savings when using VERSE to determine the SFT of CWR. Track procession times reduced (by up to 1 - 3 hours compared to cut and re-weld). VERSE also enables infrastructure owners to manage the SFT of their rail network, which is a legal obligation in some countries. The cost of not adhering to legislation along with possible litigation and track closure time for a major rail break/buckle due to incorrect SFT can be significant.

How much quicker is VERSE to use? Typically 20 to 30 minutes (4 men), compared to 2 – 4 hours (with more than twice on track personnel) for traditional cut and re-weld technique.

Is it approved? Yes, see references below

How long has the system been in use? Railtrack acceptance granted in February 1999. Product also used in Canada, USA, Italy, Germany, France, Sweden, Norway, Finland, Australia, Brazil, China, Ireland, Eire, Bosnia and Mexico. Over 120 units in operation worldwide.

Can VERSE be used on curved track? Yes, curvature radii of between 750m and 350m use versine measurement (based on 20m chord length) before unclipping (initial versine) and after unclipping and lifting rail (final versine). Software within supplied hand held computer will automatically compensate the SFT once the initial and final versine measurements are entered. See technical pack for further details.

Competing Products or Technologies

Traditional cut and re-weld method

Prior to VERSE this was the only approved way of measuring the SFT of CWR. The rail is cut, measurement made of the stress change and then the rail is re-stressed. Many companies have relied on measuring the relaxation distances of the cut rail ends but this is known to be at risk of large errors. 15 °C errors have been seen, especially where the movements of the sleepers still attached to the fixed end of the rail are not measured as well. For an accurate measurement, the fitment of strain gauges is necessary and this requires specialist technicians, preparation and equipment.

Magnetic Field (Barkhausen noise) – RailScan best known system

This method measures a phenomenon called Barkhausen noise. This noise is generated in a stressed body on the decay of a magnetic field. Numerous studies have been made into this approach, it has been found that the accuracy is adversely affected by the residual stresses in the rail from manufacture (rolling mill)

- Has not been adopted by any infrastructure owner

Ultrasonic/sonic methods

These approaches have also been found to be adversely affected by residual stresses within the rail.

- Has not been adopted by any infrastructure owner

References

Network Rail Acceptance PA05/901. See Technical information pack for additional references

What is required for Vortok

We need to know rail sections that will be tested to ensure they can be selected from software menu. Operating language for documentation and software.