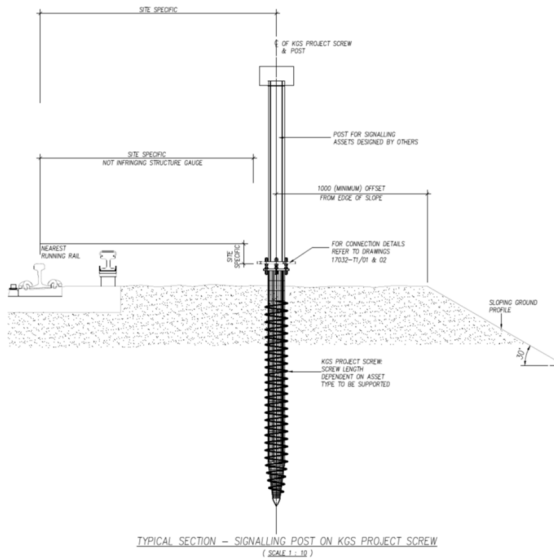


# TRACK SCREW LTD

## Case Study – 4LM, Single Screw Solution for Trackside Assets



### Project Summary

As part of the LUL 4LM (4 Line Modernisation) project, Thales Ground Transportation Systems UK Ltd are installing a new signalling system to compliment the new trains that will be introduced within the project specification.

This new Signalling System requires a large number of smaller trackside assets installed in the over ground sections, these include both sighted and non-sighted assets. Low level signals, fibre optic and power cable junction and splicing enclosures all required in trackside or 10-ft locations.

It was identified that due to the size of concrete foundation needed to support these small assets and the time required to install these foundations, a new, faster foundation solution was needed to maintain the tight project timeline.

Following a concerted effort by Track Screw Ltd directly to LUL, our product was included as a specified foundation support option on the 4LM contract tender that was ultimately awarded to Thales.

Track Screw have been working closely with Thales since 2016 to complete designs and gain all required approvals for deployment of both individual Track Screws to support trackside assets up to 2.0m high and groups of Track Screws with transfer frames to support assets from 2.0m up to the 4.5m DCS antenna masts.

We began the process based on the standard Krinner screw products, but it became clear early on that to achieve all the requirements of LUL that there would need to be some modifications to the product.

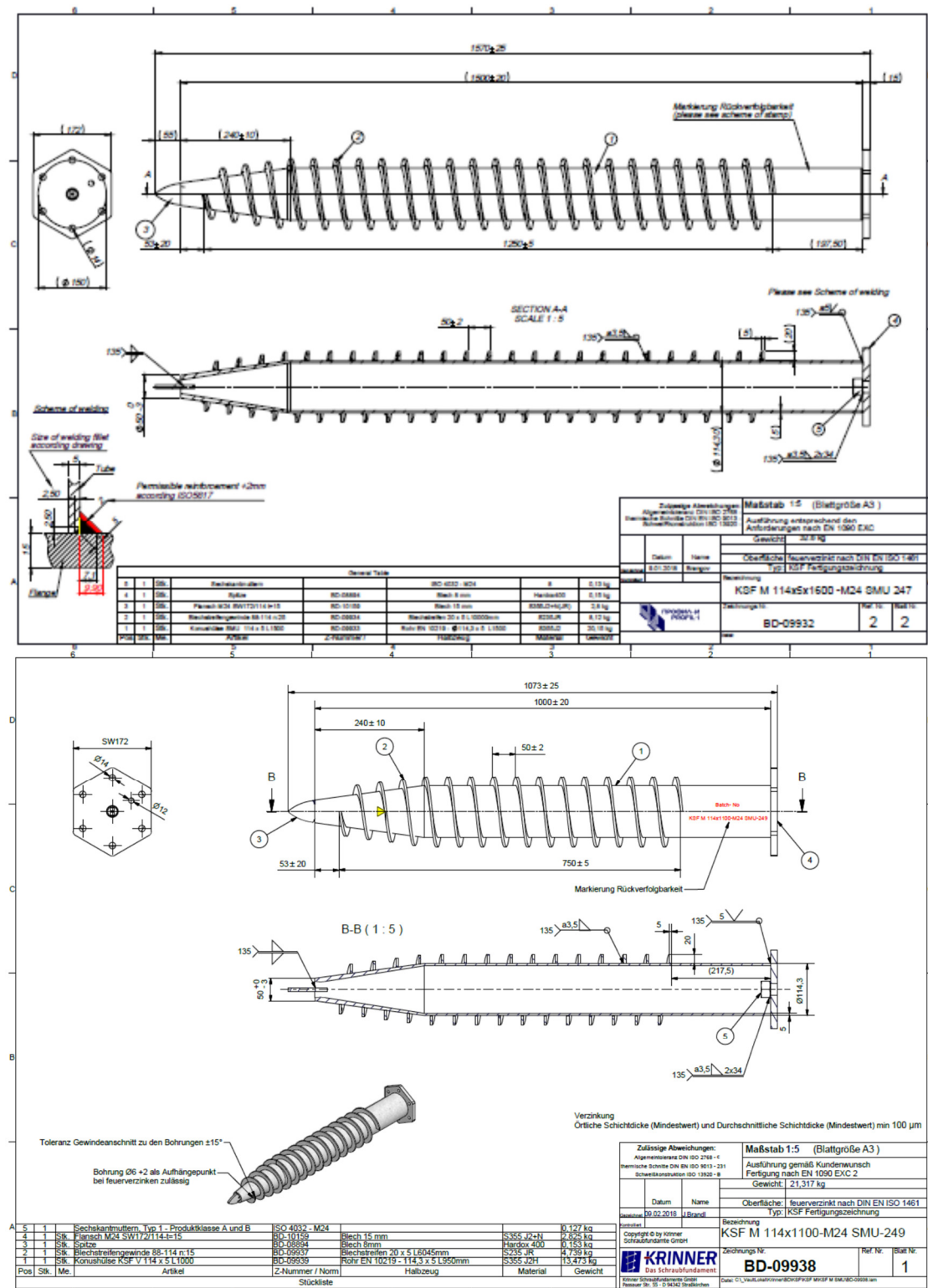
Krinner worked with Track Screw to meet all the end clients' needs and what has been produced is an LUL specific product.



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# TRACK SCREW LTD

## Screw Information Technical Information – Krinner KSF M SMU 247 – Project specific Track Screw (Krinner GmbH)



# TRACK SCREW LTD

## Design Process & Testing

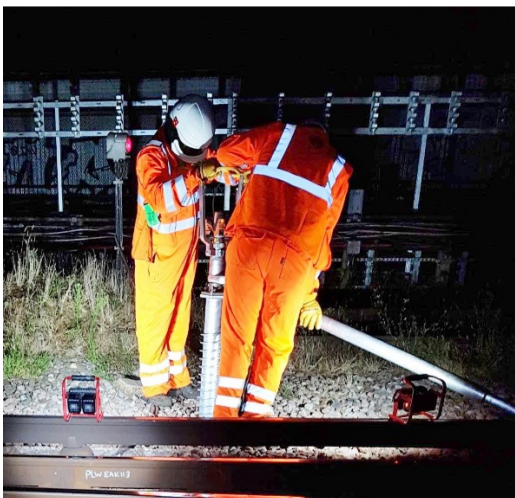
This was a 2-year journey working in collaboration with both Thales and LUL. Following several revisions to the specification we worked up final designs that were submitted for approval in CDS documents.

Initial comments were received requesting a full spectrum of testing to be completed. LUL provided access to sites with known poor ground and a full suite of tests were completed, over 40 screws installed and tested to provide a library of results.

From this information a minimum capacity was calculated, meeting all required factors of safety. This information was updated in the CDS that was submitted for CATIII checking. Once this checking was complete the CDS was reissued to LUL and approval received.

The first of type installation was completed during August 2018.

## Installation



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The installation of the single Track Screw for these trackside assets is completed by a 2-man team and based on asset locations multiple screws can be installed in a single engineering hours shift. On the 4LM project, all installations are currently being completed by Data Techniques who have a large number of Track Screw trained teams. The tooling used was the 18V battery powered TSL-DA1 driving tool capable of producing 5400Nm of torque.

To meet the requirements of LUL Health & Safety, the operatives using the tooling wear full Level 2 Arc Flash PPE during the installation of the screws, which takes place within a 5m exclusion zone.

## Cost Comparison to Traditional Construction

On previous projects where small foundations were required on LUL, the method of work has been to manually carry a 100kg pre-cast concrete block to the work place, excavate the ballast to place the block with sufficient space to add a further 8-10 No 20kg bags of ready-mix concrete and then remove all the spoil created from the site. The team could then drill the block for the asset post and if the remaining engineering hours allowed, fit the asset. This process required a working site team of 6-men, to place one foundation and asset post would take a minimum of one engineering hours shift, potentially two shifts depending on the distance from the nearest access. Added to this is the return visit, once the ready-mix concrete has cured to drill the block and mount the post.

This method is extremely high risk in terms of manual handling and extremely low in terms of productivity. Based on this level of manpower and material this traditional construction method has a minimum cost from the build contractor in the region of £2,800.00 for the initial shift and a further £800.00 for the return visit.

Depending on the proximity of asset positions to one another, it is possible for a 4-man team to install up to 4 No Track Screw anchors in a single engineering hour shift. This massive increase in productivity reduces the cost per foundation to under £500.00 each.

At this potential productivity rate this equates to a **cost saving per foundation of 86% and a labour saving of 87%.**

However, even if only a single Track Screw is installed in a shift, because there is no requirement for curing time, the asset can be installed in the same shift preventing the need for a return visit meaning minimum savings of over 60% on labour.



# TRACK SCREW LTD

## Summary of the Benefits of Track Screw Over Concrete Foundations

Quicker & Safer – **Up to 90%+ savings in Labour**

Lighter Installation Equipment & Lighter Materials – **Nothing over 25kg in weight**

Less Manpower Required

No Excavation, No Spoil, No Wet Trades, No Curing Time

Quieter, No Generator, No Fumes, No Fuel, No Vibration

Environmental Savings, 1m<sup>3</sup> of Concrete = 250kg of CO<sub>2</sub>, 1 Track Screw = 20kg CO<sub>2</sub> – **Up to 85% less CO<sub>2</sub>**

- **Survey Requirements**

- Traditional ground survey, e.g. bore holes, cost £1k+, require heavy plant & take 1-week+ to book
- For Track Screw, you only need soil density numbers & soil classification to 1.5m depth. This can be taken on the day of install using a hand held CBR probe and hand auger

- **Speed & Manpower**

- 1m<sup>3</sup> concrete pad will take a 4-man team a day to construct and 1-week to cure
- One Track Screw can give same capacity, be installed in 10-mins by 2-men & loaded immediately
- 5m<sup>3</sup> concrete pad will take a 6-man team 3-days to construct and 1-week to cure
- 4 No Track Screws with a transfer grillage installed by a 4-man team in 2-hrs & loaded immediately

- **Tooling**

- Installation contractors can hire TSL's unique 18V Lithium Ion battery powered screw installation tool, the kit includes all parts required to install screws from 600mm to 1800mm long in to any ground conditions
- Even installing the longest screws into the hardest ground, the tool will complete multiple screws with a single battery, shorter screws into softer ground will allow significantly more installs per battery, each tool is hired out with 4-batteries & a charger, each battery weighs less than 1kg
- The tool itself weighs less than 20kg in its transport box. All other elements of the installation kit weigh less than 18kg and so can be easily carried & handled
- TSL have exclusive licence from the global patent holder of the tooling for the UK rail sector
- TSL offer a full training course for installers and a technical assistance team to provide installation advice

- **Track Screw Anchors**

- Single piece screws, lengths from 600mm to 2100mm, final diameters from ø60.3 to ø139.7
- Maximum capacities from single screw 45kN tension & compression, 20kN shear & 15kNm moment
- Rail Spec screws have 110µm galv coating giving assumed service life of 40-years, 25-year warranty
- TSL can also offer screws made from 304 Stainless Steel giving 70+ year lifespan
- TSL offer a fully technically assured service, calcs & warranties
- TSL can offer on-site testing of installed screws or train operatives to complete testing
- TSL have exclusive licence from 2 largest manufactures for screw supply for the UK rail sector

- **Savings**

- Recent install of 56 screws in place of concrete showed 94% saving in labour & 85% saving in CO<sub>2</sub>

