



TRACK SCREW LTD

Project Summary

As part of the LUL 4LM (4 Line Modernisation) project, Thales Transportation 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 antenna masts for the over ground sections. From the outset of the project, it was identified that due to the size of concrete foundation to support the masts and the time to install these foundations, a new, faster foundation solution was needed to maintain the tight project timeline.

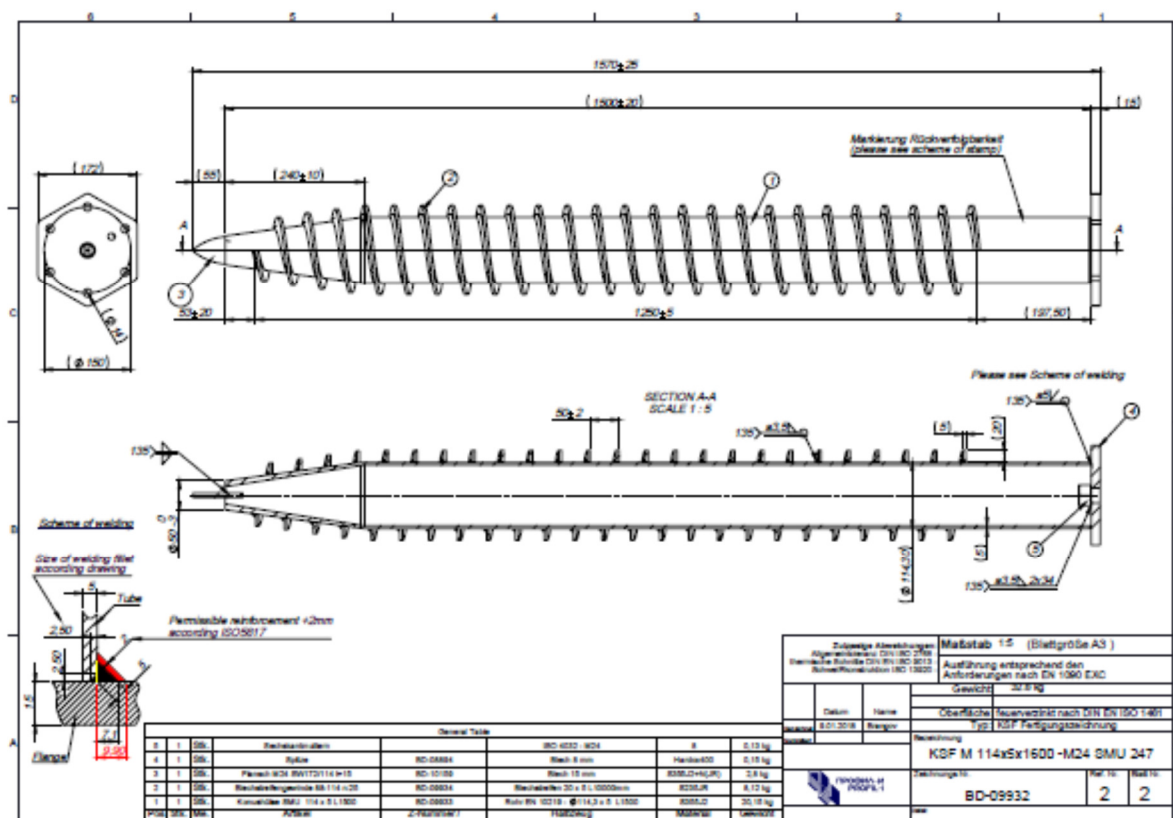
Following a concerted effort by Track Screw Ltd directly to LUL, our product was included as a specified foundation support option on the 4LM contract tender that was ultimately awarded to Thales.

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.

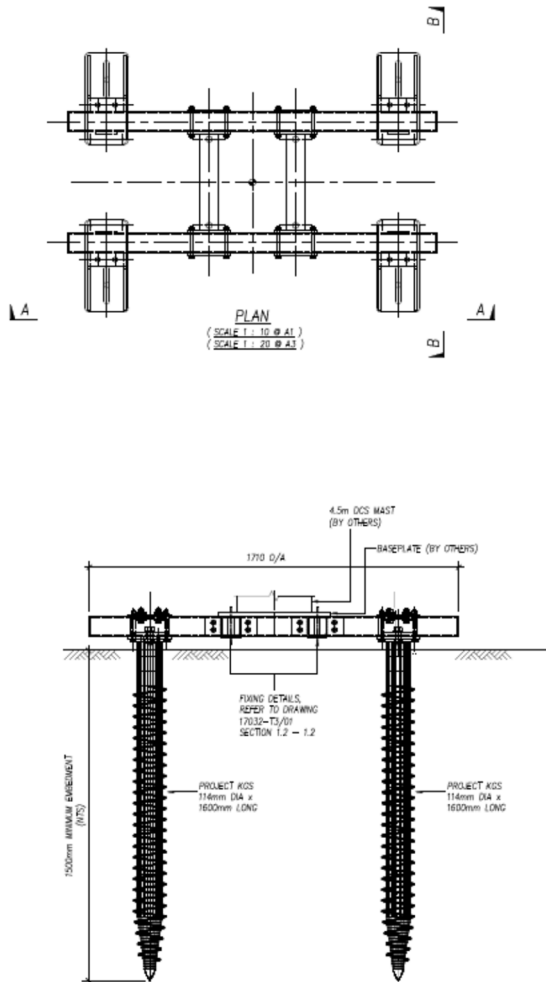
Screw Information Technical Information – Krinner KSF M SMU 247 – Project specific Track Screw (Krinner GmbH)



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DCS Mast Base Frame



There was a specific requirement that the frame to support the DCS Mast must have flexibility to allow for tolerance in final position of screws.

The frame should have minimal deflection so as not to increase the masts serviceable deflection criteria.

It must be modular, allowing it to be broken down in to small parts that can be manually carried from the access point to the work site.

It must have the ability to be levelled, taking allowance for any screw misalignment, to ensure that the mast can installed vertically.

The final design produced and manufactured met all these requirements and was also trialled and tested before the first of type installation.

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 at the end of August 2018.



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Installation

The installation of the Track Screws, assembly and installation of the modular DCS Mast frame was completed over two LUL engineering hours shifts by a 4-man team. This installation was 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

Data Techniques who completed the Track Screw and DCS Mast frame installation were asked to produce an estimate for the cost to complete this project using traditional construction methods.

Including all labour and materials this would have totalled in excess of £18,000.00 and taken approximately 40-man shifts to complete over a 2-week period, allowing for concrete curing time.

The Track Screw installation, including all materials cost a total of £6,972.60 and was completed using only 8-man shifts. **This is a cost saving of 61% and a labour saving of 80%.**



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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, 1m³ of Concrete = 250kg of CO₂, 1 Track Screw = 20kg CO₂ – **Up to 85% less CO₂**

- **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** (Dependent on Operational Hours Available)

- 1m³ 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
- 5m³ 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 Screws (Kriner GmbH)**

- 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 45-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 CO₂

