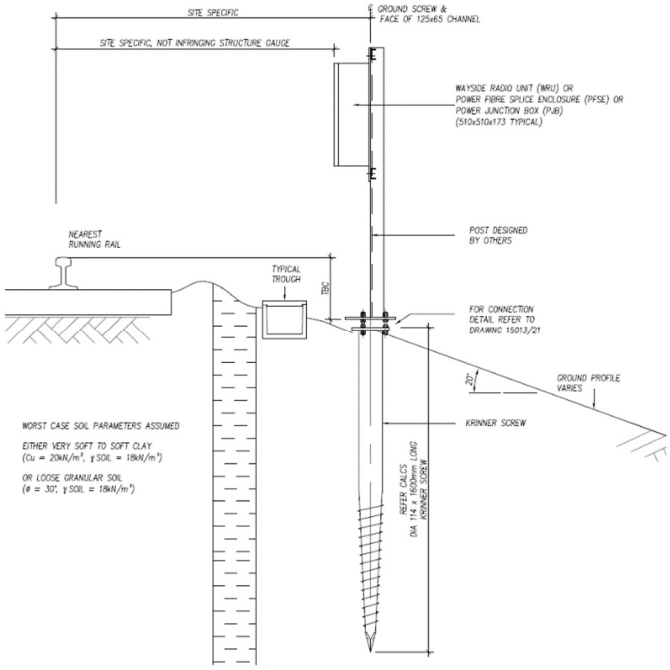
TRACK SCREW LTD

Case Study – Old Dalby Test Track, Single Screw Solution for Trackside Assets



Brief Project Summary

As part of a trial of the new signalling system proposed by Thales Ground Transportation Systems UK Ltd to LUL, Data Techniques (DT) were contracted by Thales to install 56 No Wayside Radio Unit (WRU) / Power Fibre Splice Enclosure (PFSE) / Power Junction Box (PJB) foundations at the Old Dalby test track in Leicestershire, these locations were spread over 4km of track.

Based on the partnership between Track Screw Ltd (TSL) & DT, it was agreed that DT as the contracted installation company would lead this project. TSL provided technical assistance, supply of Track Screw Anchors, to be installed using the battery powered installation tooling.

Design Process

Thales provided DT with several geotechnical results for the Old Dalby test track but not for the specific asset positions. To gain the required location specific geotechnical data DT & TSL found a ground probe system similarly innovative to the Track Screw and battery powered installation tool. This was a hand operated digitally recording CBR probe unit called a PANDA2. This tool allows a single operative to take soil density readings at exact asset locations providing TSL with sufficient information to produce site specific calculations to verify that the Track Screws supplied with meet with the customers' equipment loading.

The geotechnical information was gathered over a 2-day visit by a 3-man team, this was a further reduction in the overall cost and timescale for the project, as using a more traditional geological investigation method, such as a borehole survey, would have taken at least 2-weeks to cover all 56 locations.

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The calculations were produced and issued to Thales over a 2-week period, these calculations confirmed the screw types that would be used and established the expected capacity of the installed screws. These were accepted by the Client (LUL and Network Rail who own the test track site).

The geotechnical information had shown that in 12 of the 56 locations there was particularly hard ground, these hard ground locations were spread over the full 4km of track where the installations were to take place.

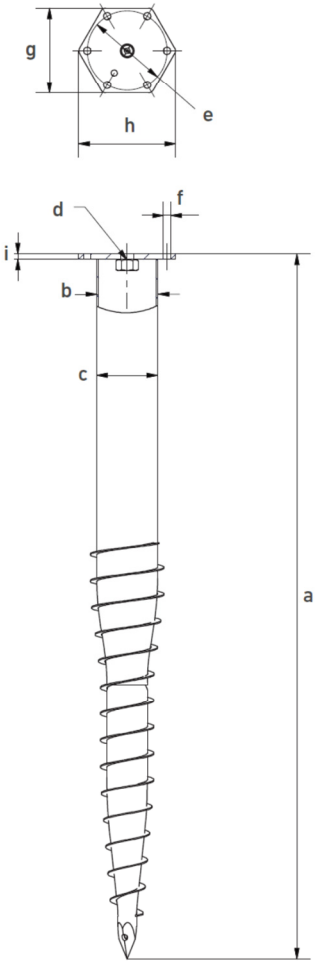
After initial discussions and review of predicted loading Track Screw issued DT's Designers product details on the Krinner KSF M series screw. The final screw selected was the KSF M 114x1600-M24.

Screw Information Technical Information – Krinner KSF M

KRINNER
The Ground Screw

Technical Data

	KSF M 140x2100-M24	KSF M 114x2100-M24	KSF M 114x1600-M24	KSF M 114x1300-M24
a	Length (mm) (±25 mm)			
	2070	2075	1575	1325
b	Shaft outer diameter (mm)			
	139.70	114.30	114.30	114.30
c	Inner diameter (mm)			
	132.50	107.10	107.10	107.10
d	Thread			
	M24	M24	M24	M24
e	Pitch circle diameter (mm)			
	180	150	150	150
f	Pitch circle holes (mm)			
	6 x ∅ 14	6 x ∅ 14	6 x ∅ 14	6 x ∅ 14
g	Flange wrench size (mm)			
	200	160	160	160
h	Flange outer diameter (mm)			
	225	182	182	182
i	Flange thickness (mm)			
	10	10	10	10



Online Service

KSF M 140x2100-M24	KSF M 114x2100-M24	KSF M 114x1600-M24	KSF M 114x1300-M24

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Installation

On DT's first visit to site these hard ground locations were targeted as they could have been potentially more time consuming, a 4-man installation team took a single 8-hour shift to install all 12 locations including safely moving men, materials and tooling the entire 4km length of the test track area.

On the second visit to site two 4-man teams were deployed and the remaining 44 locations were completed over a 2-day period.

The Clients representatives who accompanied DT's site teams were amazed by the speed and accuracy of the installations.

DT & TSL believe that if these installations been completed using traditional survey and construction methods it would have taken just under 2,000-man hours and had a minimum carbon footprint in the region of 6,000kg of CO_2 (based on borehole surveys and 56 No 0.5m³ concrete foundations taking a 4-man team 4-hours each to complete).

By deploying Track Screw Anchors, the total man hours used for the installations was only 144 hours with no manual handling issues or incidents and the maximum carbon footprint of the job was 900kg of CO_2 for the material used.

Comparison to Traditional Construction

By using Track Screws in place of traditional construction methods for these 56 No small trackside assets there was a 94% saving in man hours, which must also be seen as a representative reduction in the potential of a safety incident, and 85% saving in CO2.

By chance, during the final 2-day visit to the site there was other work going on at the same time. As a direct comparison, a 4-man team from another contractor had been deployed to construct some small concrete foundations, approximately 3m³ in size. In the same time period in which DT completed the installation of 44 No Track Screws this other team only completed 2 foundations and were part way through a third, and these foundations had to be left to cure and would not have assets mounted on them for a further 7-days.

Another significant benefit of Track Screws came when Thales found that some of the cables that were installed (by others) did not reach the asset locations, so DT were asked to return to site to relocate several Track Screws to suit the cable positions.

A 3-man DT team returned to site and were able to dismount the assets, "unscrew" three Track Screws, re-install them at more suitable locations for the installed cabling, and re-mount the assets, ALL WITHIN 2 HOURS.

Had traditional concrete foundations been used, these three new locations would have required a minimum of 2-days work for a 4-man team just to excavate and pour concrete, followed by a 7-day curing period prior to any assets being mounted.

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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 CO_2, 1 Track Screw = 20kg CO_2 – **Up to 85% less CO_2**

- **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 had held CBR probe and hand auger

- **Speed & Manpower**
  - 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 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 110mµ 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_2

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