

Life extending insulation
system for traction motors



Houghton International
Electro mechanical innovation

Traction motors, although relied upon in the rail industry for their durability in variable and sometimes uncompromisable operating environments, can be surprisingly delicate. This document will examine the common problems that traction motors suffer and how using the proven HiTRAX™ insulation system as part of a traction motor maintenance programme can help extend the life of DC and AC traction motors and reduce in service failure.



Traction motors

Traction motors play one of the most vital roles in the rail industry. They are subject to frequent high torque loads which can affect its components, meaning it is essential they are well maintained and kept in good working order. Failure to do this can lead to underperformance of the motor, unexpected breakdowns and reduced life of the motor.

Common problems

Traction motors require special attention as they operate in unique conditions that expose them to heavy ingress of moisture and often corrosive dirt. Ambient running temperatures can range from -40°C to +50°C, and in humidity greater than 95%, providing maintenance issues to train owners and operators. Air intakes are often open to the elements, meaning snow and ice cause problems in winter periods, as do the leaves in the autumn. All contribute to the deterioration of a motor windings dielectric integrity.

Not keeping a traction motor in good working order can reduce its lifespan, however an upgrading of the insulation system as part of a wider overhaul can help with the longevity of the motor. Over time, and due to the age and operating conditions of the traction motor, insulation on all the main field and interpole coils can become extremely porous allowing moisture to ingress. The armature bands can also suffer from cracking which could allow carbon and moisture to ingress within the armature winding.



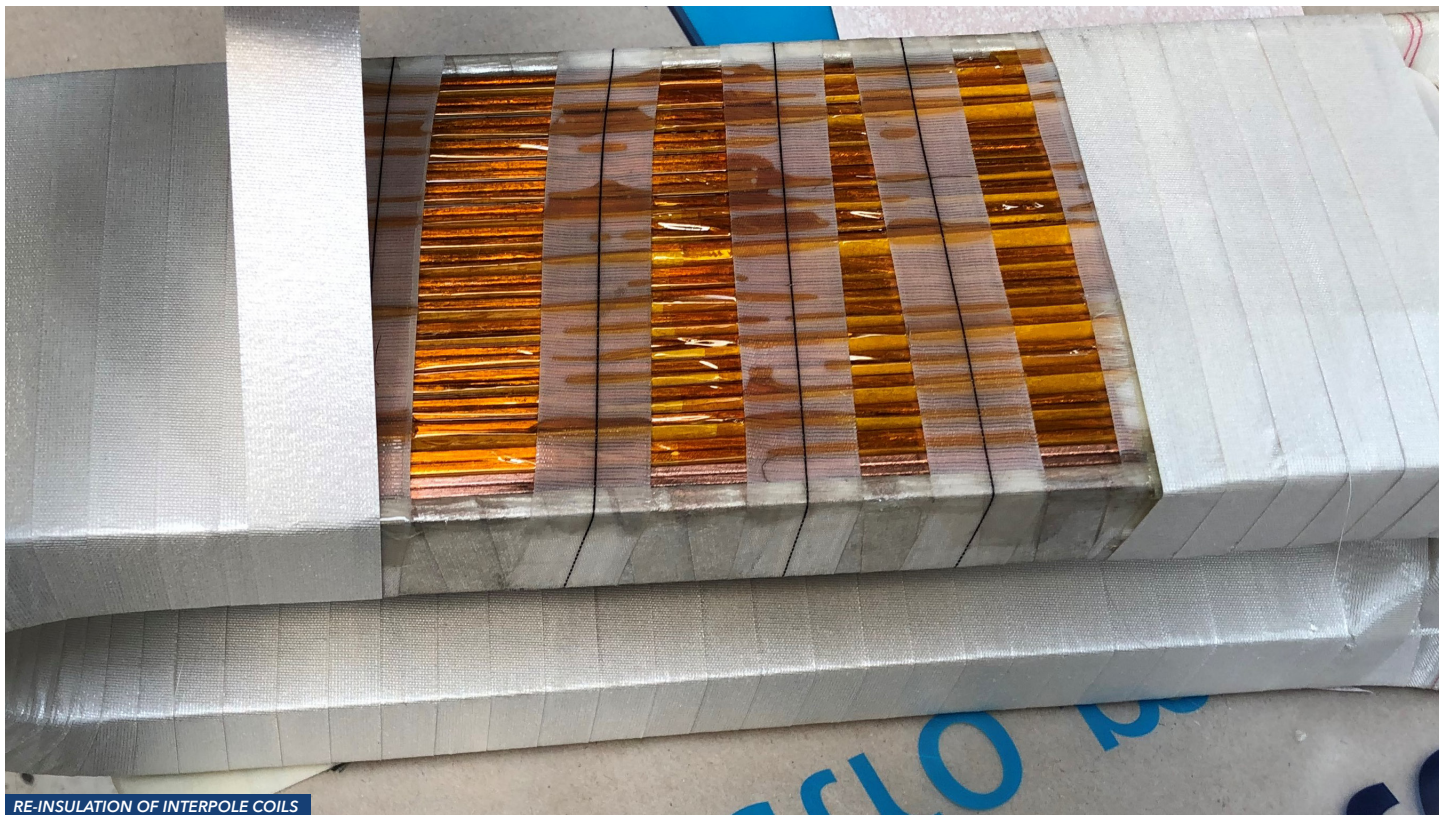
A better solution

Developed in house by our specialist engineers to address the issues detailed, HiTRAX™ is a unique insulation system by Houghton International proven to extend the life of DC and AC traction motors and reduce in service failure.

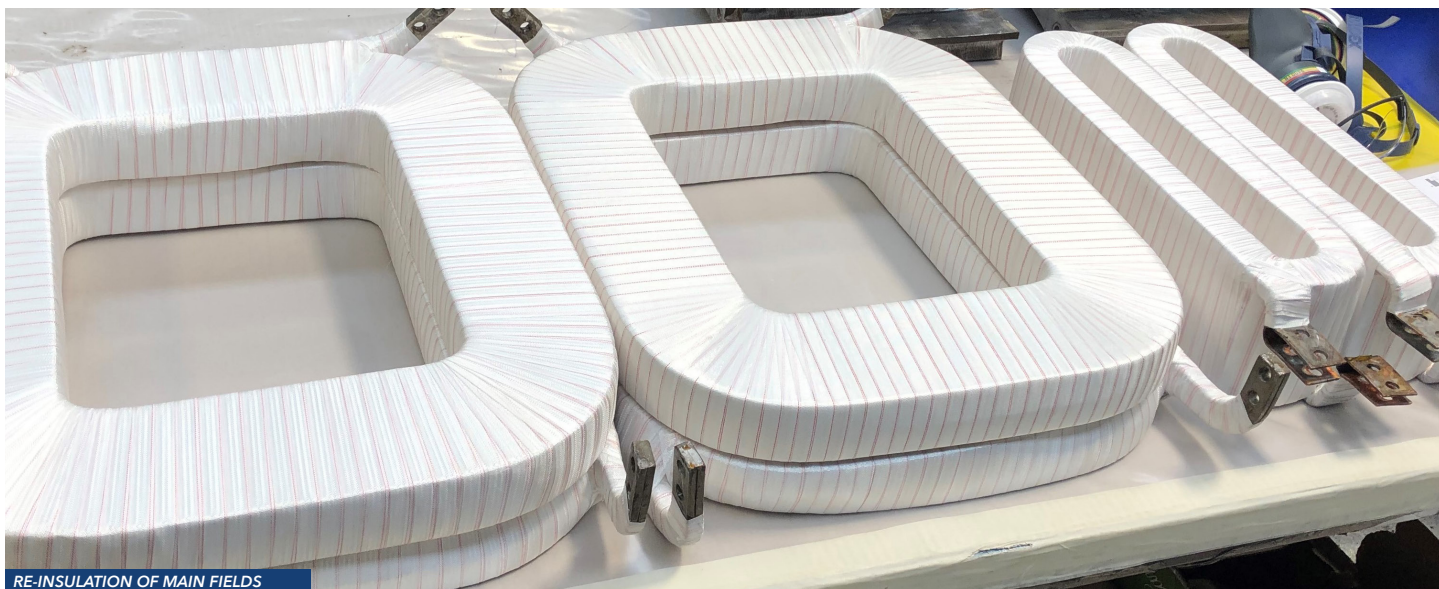
HiTRAX™ combines insulation materials that have the greatest dielectric durability throughout the wide temperature range traction motors are exposed to in their life cycle, with the highest specification VPI resins and stringent process control, tested to extremes.

HiTRAX™ is proven to work in conjunction with both epoxy (for DC motors) and silicone (for AC motors) VPI resins, although we believe epoxy provides the absolute superior lasting protection. It is an engineering solution that combines both our traction motor and high voltage coil expertise applied to solve the problem of deteriorating dielectric capability of problematic motors.

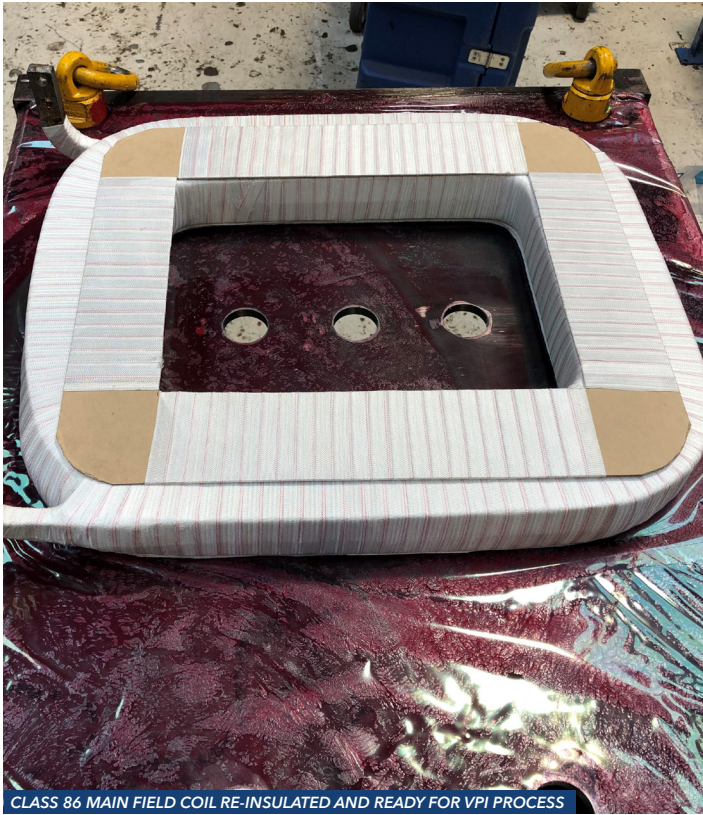
Specifically designed for optimum performance in rail operating conditions, HiTRAX™ offers customers a reliable and proven solution for the repair, maintenance and life extension of their traction motors.



RE-INSULATION OF INTERPOLE COILS



RE-INSULATION OF MAIN FIELDS



CLASS 86 MAIN FIELD COIL RE-INSULATED AND READY FOR VPI PROCESS

Re-insulation process

Our main field and interpole re-insulation process ensures that there are excellent electrical properties with a high degree of stability.

Once the main field and interpole coils are disconnected and removed from the frame, the coil is then removed from its pole brick, ensuring that the coils turns are not disturbed. The existing outer earth insulation is removed, and the surface of the copper is cleaned in preparation for re-insulation along with the pole bricks.

A visual inspection of the coil and electrical checks on each turn of the coil is then carried out.

The coils are then fitted to a jig so the Vacuum Pressure Impregnation (VPI) process can begin.

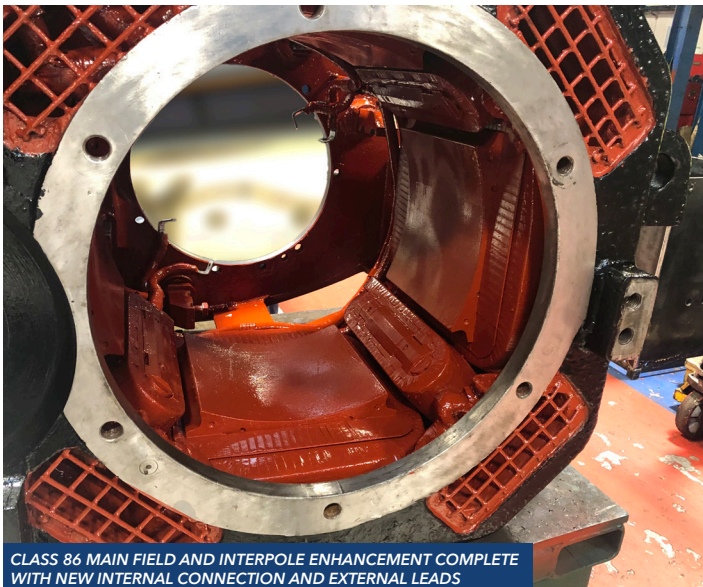
All main field and interpole coils are Vacuum Pressure Impregnated with epoxy resin and stoved to cure off.

HiTRAX™ resin is a solvent-less, single component, epoxy impregnating resin, which gives 100% filled windings exceptional high bond strengths at all operating temperatures up to Class H (180°C).

The system is designed to give excellent penetration and retention in taped windings. The cured product exhibits exceptional mechanical and electrical properties throughout its working temperature range together with a high level of performance in its resistance to chemicals and moisture.

Other benefits featured are good heat transfer characteristics.

Once the VPI process is completed, the terminals are cleaned, the completed coil is inspected and tested, and the coil/pole assemblies are refitted into the frame. Completing the re-insulation process, the internal connections are connected, final tests are carried out as a full circuit and the internal shell is sprayed with insulation paint.



CLASS 86 MAIN FIELD AND INTERPOLE ENHANCEMENT COMPLETE WITH NEW INTERNAL CONNECTION AND EXTERNAL LEADS



An important choice

HiTRAX™ is proven because it has been running across the UK's rail system for 18 years without failure. However, it is imperative that all elements within our total quality system are followed throughout the manufacturing, rewinding and VPI process for it to be absolutely effective. To date, Houghton International have never experienced a motor failure following the implementation of the HiTRAX™ insulation system.

Using the HiTRAX™ insulation system we have worked on a wide variety of AC and DC traction motors covering rolling stock fleets across the UK, Scandinavia and Asia. We have serviced and repaired over 7,000 individual traction motors to help our customers keep their trains on the tracks for longer.

For more information on the services we provide to the Rail industry, visit www.houghton-international.com.

Specific examples of the HiTRAX™ insulation system being implemented include:



Merseyrail

G310 traction motors

We have been repairing and overhauling G310 traction motors for Merseyrail since 2005. Merseyrail was the worst performing TOC in the UK experiencing in service failures of >20%, however following improvements to the maintenance and repair programme and making small initial changes to the specification and introducing the HiTRAX™ coil insulation system, we helped reduce this to <0.02%.



Tyne and Wear Metro

Siemens IKB2021 traction motors

The initial contract for the repair and overhaul of the IKB2021 traction motors started in 2007 and has been extended three times. Working with Tyne and Wear Metro, we have life extended these traction motors using our HiTRAX™ insulation system and made other improvements to enable Tyne and Wear Metro to delay the purchase of new rolling stock whilst maintaining the performance of their existing fleet.

Houghton International

Riverside Court, Fisher Street
Newcastle upon Tyne NE6 4LT
United Kingdom

T: +44 (0)191 234 3000

E: info@houghton-international.com

W: www.houghton-international.com



Certificate Number OH5582484



Certificate Number Q06046



Certificate Number 582483



Houghton International
Electro mechanical innovation