



Keeping Control of Compatibility

Strategies for Managing EMC

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Keeping Control of Compatibility – Strategies for managing EMC

EMC (Electromagnetic Compatibility) is an important part of any Rail Project, be it recommissioning or refurbishing Rolling Stock, managing the updates or new builds of Depots and Stabling facilities, or electrifying, upgrading or re-signalling open rail routes.



Having control over the EMC throughout the project from conception to completion is a small but vital part of whole project management; it helps to avoid getting EMC tangled up in the commissioning scramble at the end of a project.

Eurofins York (formerly York EMC Services) has been operating in the rail environment for over 20 years, providing all manner of assistance from bespoke training courses, on-site testing and measurements, unique solutions to existing and upcoming EMC problems to day-to-day EMC management and control. Our highly qualified and experienced team of EMC engineers have seen most EMC issues throughout their careers and are well placed to advise on any aspect of EMC. Eurofins York key skills are in our adaptability and experience that can be applied to any project, in particular in EMC management and control for large railway projects.

The over-arching legislation that covers EMC is the EMC Directive 2014/30/EU. It is a requirement of 2014/30/EU that the “Essential Requirements” of the directive are met. For Apparatus, this is

normally achieved thorough the route of Harmonised Standards and the application of the CE Mark. The EMC Directive also considers Fixed Installations, separately from Apparatus, and with a requirement for some form of management to ensure that the Essential Requirements are achieved. Almost all large railway projects fall under the Fixed Installation banner when considering the EMC Directive.

The EMC directive requires that a Fixed Installation be suitably (non-) emissive for its environment, and that it is suitably immune for its purpose. The FI must also be installed using good engineering practices and respecting the information on the intended use of its components, plus it must be ensured that good engineering practices are documented. Documentation must be held at the disposal of the relevant national authorities for inspection for as long as the installation is in operation. In 2014/30/EU, the documentation requirements for installations are as binding as the documentation requirements for apparatus – this is implemented in UK law using Statutory Instrument No:1091.



A railway is a complex set of interdependent systems with widely disparate requirements; they are often forced to operate in long, narrow strips of land and all of these systems are expected to work together safely, reliably and effectively. A mainline locomotive might draw several hundred amps from

the overhead while simultaneously inducing tens of volts into line-side cabling, cabling which may be connected to safety-critical signalling assets or carrying low-level telecommunications. DC electrification, while protected from those effects attributable to AC induction, has a different set of issues. These mainly surround stray current, however the rectification process for traction power often causes ripple currents at 600 or 1200 Hz, which can severely perturb baseband audio signals (for PA or remote help systems). Without proactive management and control of compatibility from the very beginning of the project, EMC issues are simply being left until commissioning; this often results in a challenging set of issues to resolve in the final few weeks of a project.

Documentation requirements in order to control EMC are not comprehensively set out in the EMC Directive, and differing interpretations from various stakeholders (e.g. Network Rail and London Underground), and differing on-the-ground requirements for each particular project mean that there isn't a simple, template that can be used to extrude uniform EMC documentation for each project. Unfortunately, this occasionally means that EMC is ignored, postponed or forgotten until a few weeks before, or (in extreme cases) after, commissioning.

Controlling EMC for a Railway Project

The latest Network Rail philosophy for managing EMC prefers explicit input from the early stages (GRIP 2 or 3), while there is still a level of fluidity about how the project will be successfully achieved. Network Rail have now included an EMC Strategy as a gated activity at GRIP 3. If involved, at this stage a Eurofins York EMC engineer will be involved with setting and assessing EMC hazards in the risk register. An EMC strategy can set overall goals, constraints and direction at this stage.

At or around GRIP 4, a multi-disciplinary (or occasionally, for particularly 'interesting' projects, an EMC Specific) hazard identification workshop will re-evaluate the EMC hazards on the risk register, and an EMC Management or Control Plan can specify appropriate standards for both procurement and design, and controls to manage third-party and legacy assets. At this stage, the EMC engineer can provide targeted, specific advice which can still be applied before the design is finalised. EMC procurement specifications can also be set *before* off-the-shelf components are chosen, or contracts with sub-contractors are signed: this means that technical and documentation requirements for EMC evidence from suppliers can be more easily made a contractual matter.



As completion of detailed designs draws near, this should see any design risks closed out, possibly with cable studies to model induced voltages. Ideally, a review of equipment documentation should occur as systems and suppliers are chosen – with possibly the more complex sub-systems having gone through their own EMC management process.

On-site EMC measurements may be required. This depends on whether there are specific risks in the register which are most effectively closed via such measurements. The reasons for performing measurements prior to any works include: Benchmarking the existing emissions so that a comparison may be made with the new installation

(s); identifying any particular EM threats at the location for inclusion in the hazard analysis and the design review; gathering evidence in the case that future claims are made by neighbours or users regarding interference to radio communications services or other equipment. As well as measurements to EN 50121, measurements of induced longitudinal and transverse (including psophometric) voltages may be required on line-side cables. On DC railways, measurements of stray currents may be required. The commissioning phase can be tight for time and personnel, and having the EMC testing requirements specified, agreed, booked and confirmed well in advance has advantages all round.



The final stage of EMC documentation ensures that no issues remain open, but also summarises the activities and the documentation; this helps any EMC lessons to surface, which in turn helps ensure the safety, reliability and effectiveness of the railway.

All of the above applies for a new installation; however another advantage is realised further down the line. Ongoing compliance of assets when modification or upgrades arrive is far easier to achieve with a solid EMC documentation base in place already. Issues often seen by Eurofins York include lack of compliance evidence for installed or legacy systems; this proactive EMC control for new projects will assist in this area as installations are re

-visited, upgraded and modified. If you are upgrading or modifying, be sure to ask for the EMC compliance evidence for the installation.

For more information, advice and/or assistance please contact Rob Armstrong, Consultancy & Training Manager at Eurofins York: Email, rob.armstrong@yorkemc.com; Tel, +44(0)330 430 3456 or visit www.yorkemc.com

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For those needing comprehensive training, our five day “[Fundamentals of EMC in Railways](#)” course is designed to deliver an in-depth study of EMC in the complex railway environment. It provides an understanding of the importance of managing EMC from project concept to completion.

Alternatively, our “[Essentials of Railway EMC](#)” is a one-day course providing an introduction to the essential aspects of EMC in rail projects.

In addition to our scheduled courses, we also offer bespoke training solutions for the rail industry at our premises or a location of your choice.

Eurofins York Consultants and Engineers are specialists in Rail EMC, having worked in the industry for over 20 years providing testing, consultancy and training services. Due to this wealth of experience, we are able to offer specialist, tailored training to help the rail industry achieve and maintain EMC regulatory compliance.

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