

“Past Dependency - The development of electric traction on urban railways and how it affects future development, using London Underground as a case study”.

Introduction

This research is driven by the general perception that the UK railway industry has lost much needed understanding of the past and its affect on the future continuity essential in railway design, technology and process. This loss has occurred partly as a result of the privatisation process, where diverse companies with short term contracts and changing organisational structures have replaced unified national or urban railway organisations but also because of social developments where job security is reduced, the “job for life” culture has disappeared and changes in staff and workplace requirements occur on a regular and frequent basis.

The hypothesis is that a firm understanding of the background, historical development and technical base upon which a mature railway system has developed, is an essential requirement if the future progression of the railway is to be achieved with a fully integrated approach to design, procurement and operation. The research is designed to offer such an understanding using London Underground as a case study.

The use of London Underground as a case study is for a number of reasons:

- It is a large, mature, urban railway with a long history of technical development;
- It suffers from acute overcrowding and needs to develop new technology and ways of handling its traffic without disrupting daily services;
- It has suffered from a number of large-scale and difficult organisational changes in the last 15 years that have reduced its knowledge base;
- A series of recruitment and staffing policy changes have led to a reduction in the understanding by the staff of the railway’s technical base and this has, on occasions, led to serious delays in service;
- New technology is being introduced with insufficient understanding of its effect on existing systems.

In addition, the researcher has a background 25 years employment with London Underground that will assist in widening the understanding of the technical and cultural background that has driven the system to develop in the way that it has.

The author is mindful of a conversation he had in 2008 with the then managing Director of London Underground, Tim O’Toole, who said, “We have significantly improved our customer approach but, in the process, we’ve forgotten how the railway works.” This work and research will help to demonstrate the value of the lost knowledge in determining development in the future.

The research covers three main areas –

- The construction of the deep level tube tunnels and the effects on the development of trains and systems;

- the technical history of the electric rolling stock and equipment as used on London Underground from the time of electrification to the present day;
- the origins of the unique 4-rail traction current system and how it still influences modernisation of the system today.

Deliverables

The results of the research will show the changes in technology, traffic, operation, social circumstances and performance that have taken place to bring the railway to where it is today. By understanding the development of the railway, this work will help to show how to smooth the progress for its development in the future.

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