

The bright people
for the job

Newsletter
January 2006

Editorial



The power supply is an almost invisible link in the service provision to passengers, but it too needs tender loving care...

OUT OF SIGHT, OUT OF MIND?

With the recent hikes in energy prices, and environmental concerns about pollution, **more people in many cities will likely be swapping their cars for public transport, notably rail.** Which is of course good news, and vindicates the policy of backing rail transport. Indeed, for some time, commuters have had increasingly higher expectations for **safety, comfort, and service frequency.** Understandably, for the passenger, the train is the most visible part of the railway, and the showcase for the superior travelling experience, such as higher speed, and air-conditioning. To meet the growing demands, many great cities in the world such as London and Sydney already have in place huge procurement programs for rolling stock.

Almost invisible is the work taking place behind the scenes to ensure that the **ubiquitous power supply remains fully capable of meeting the growing demands.** ENOTRAC has a long history of providing expertise in the field of power system design, notably by the use of its state-of-the-art simulator **FABEL.** **FABEL** accurately simulates the whole track and electrical network, and thus removes considerable uncertainty in the rating of equipment and size of schemes, leading to optimum equipment selection, both technically and economically. On existing systems, it is possible to accurately predict the increases in equipment loadings, enabling intelligent upgrading decisions.

Power equipment capacity is ultimately related to the temperature reached during its operation. Transformers, rectifiers, cables, and overhead conductors all have **thermal limits** beyond which **irreversible damage** can occur. Indeed, in hot weather, the overhead wire temperature could well limit train operations. Again, modelling tools such as ENOTRAC's **EnoTherm** toolkit, help us in confidently assessing the thermal behaviour of assets to achieve the best utilisation. The toolkit comprises **ConTherm** for conductor thermal modelling, which is outlined below, **TranTherm** for transformers, **RecTherm** for rectifiers, and **CableTherm** for cables. The results from **FABEL** simulations, namely current versus time, form realistic inputs to **EnoTherm**, taking guesswork out of design and investment decisions.

Whilst the power supply is nearly out of sight, it is most certainly not out of mind.

I wish you an enjoyable read, and prosperous new year 2006.

Dr. Ziad S Mouneimne
Managing Director
ENOTRAC UK Limited

News

Green light for refurbished D78 stock

Recently, ENOTRAC successfully supported both Intelligent Power and Bombardier Transportation in managing the **EMC safety case** for the newly-refurbished **D78 trains** of Metronet Rail. Metronet Rail is responsible for upgrading, replacing and maintaining two-thirds of London Underground's infrastructure – its trains, stations, signalling, track, tunnels and bridges - under a 30-year Public Private Partnership (PPP) contract which came into operation in April 2003.

The scope of work covered the refitting of saloon interiors and the following new electrical equipment

- Static inverter on trailer cars
- Cab HVAC unit
- Saloon surveillance CCTV system
- Passenger information system
- Saloon temperature controller
- Lighting inverters both DC and 850 Hz types

Bombardier Transportation was the main supplier, overseeing the refurbishment process and its implementation, while Intelligent Power supplied the new static inverter. **ENOTRAC successfully supported both companies to achieve the EMC safety case in time and within budget.**

London Underground Major Power Works (2)

London Underground (LU) has selected ENOTRAC for the independent review of the scope of works proposed by the PFI (private finance initiative) contractor for **power supply upgrades** to provide capacity for **new rolling stock** and **improved timetables.**

ENOTRAC's remit has recently been extended to include (in addition to the DC traction network) the **medium voltage AC network** (MVAC). ENOTRAC is now reviewing MVAC simulation work and scrutinising the proposed scope of work with regard to validity and value for money. Transport for London will invest in significant power upgrades to the London Underground network over the **six years to 2012.**

New partner for the ENOTRAC team



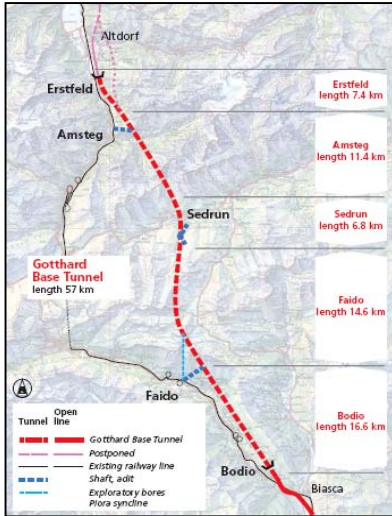
Dave Smith has recently joined ENOTRAC, having completed the EMC and signalling compatibility approvals for the Jubilee Line seventh car project, on behalf of Tube Lines. He has considerable experience of traction, rolling stock, EMC and safety cases.

He is a Chartered Engineer and a Member of the Institute of Electrical Engineers, London. David is also a digital photography enthusiast!

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The new Gotthard Rail Link

Alp Transit Gotthard is creating a flat link for future travel through the Alps. At the heart of the new transalpine rail route is the **world's longest tunnel** – the 57 km Gotthard Base Tunnel. This pioneering achievement of the 21st century will bring **major improvements** to travel and transportation systems in the heart of Europe.



By constructing the New Rail Link through the Alps, Switzerland is integrating itself into the growing European high speed network.

The future rail link will bring the economic centres on both sides of the Alps closer together.

The flat link under the Gotthard opens up new prospects for rail traffic through the Alps.

ENOTRAC has entered into a joint venture, GoTTrazione, with Paul Keller AG. GoTTrazione stands for the AlpTransit Gotthard Project Engineer - Mandate for Traction Power Supply and call for tenders. This contract includes the conception, rating and design of the substations, overhead contact systems in the tunnel and open sections, including switchgear, earthing and bonding, and the control systems. The rating of the equipment requires extensive simulations with ENOTRAC's power supply simulation tools **FABEL** and **SIMNET**. The design forms the basis for cost estimates and production of documents for equipment specification and procurement. Our mandate includes the technical co-ordination with engineers from other disciplines including cabling, track, telecommunications, and civil engineering.



Events

German and Australian trade fairs

In November 2005, ENOTRAC was present at both Rail#Tec, Dortmund and AusRail Plus, Sydney exhibitions.

We would like to thank all of you who came to visit our stands. We hope you found those events as interesting and stimulating as we did.



Tech corner

ConTherm is hot stuff!

The **maximum operating temperature** of overhead wires is an important **design parameter**, impacting on both **safety** and **reliability**. It is therefore most important to predict their temperatures with confidence.

ENOTRAC's program **ConTherm** calculates the variation of temperature in overhead wiring conductors such as contact wires, messenger wires, and earth cables, arising during railway operations.

Input data include:

- The **geometry and physical characteristics** of the individual conductors,
- **Ambient parameters** having an impact on thermal properties (e.g. wind, ambient temperature),
- The **distribution of current** in the individual conductors (as determined with **FABEL** and **SIMNET**).

ConTherm solves the non-linear equations of the heat transfer. The program takes into account the variations of electrical properties (such as resistance) with temperature. The time constant for the heating and cooling of conductors and cables is also dependent on the time of observation within the duty cycle. The following environmental conditions are considered during the simulation:

- Temperature of the ambient air,
- Wind,
- Solar radiation.

ConTherm is part of the **EnoTherm** suite, a member in the family of ENOTRAC power system study tools. It has already been used successfully several times and has been validated against measurements (see diagram below) and with network investigations both for AC and DC current distributions.

