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IRSE – YOUNGER MEMBERS IRSE Examination Workshop

Date: 10/11 May 2014

Venue: Signet Solutions Training Centre, Derby, DE24 8UP



The IRSE Younger Members are pleased to announce that that once again Signet Solutions has kindly volunteered to host an event to assist students aiming for the IRSE exam. This year we have chosen an earlier date than usual, so that we can help people earlier in their preparations, or possibly only considering attempting modules in future years.

The two-day event will include the opportunity to become more familiar with equipment hardware (panels, interlockings, points, tracks signals) through practical demonstration, as well as classroom sessions more focussed on attempts at specific exam questions in modules 2, 3 and 5. In order to maximise the value obtained from the workshop, prospective 2014 exam candidates are invited to submit their attempts at questions from the 2013 exam (download from: <http://www.irse.org/membership/public/irseexam.aspx>) by 30 April for feedback during the event.

We aim to offer a number of parallel sessions throughout both days, thus enabling participants to select which of the simultaneous options for any session best suits their needs and interests. However you will be asked when registering to identify your prime interests and note any specific issues you would like covered during the weekend; this will assist us prepare for the event and ensure that we offer a suitable selection from which you can make your choice at the event itself.

Signet Solutions is making no charge and will also supply refreshments during both days. Attendees should arrange their own travel (event times: Saturday 09:30 for 10:30 until 17:30; Sunday 09:30 for 10:00 until 15:30) and any necessary accommodation locally.

After the Saturday session we traditionally end up at the Brunswick Arms for a drink and typically many decide to share a meal at a local restaurant later in the evening; this gives a networking opportunity to meet peers in other companies or discuss with more senior members in a relaxed atmosphere.

Places at this event are limited; therefore register your interest by sending an e-mail as soon as possible to younger.members@irse.org.

Details re finding the venue: <http://www.signet-solutions.com/sites/default/files/colmap.pdf>.

If you do not already receive emails from the YM and would like to be added to our mailing list it please email younger.members@irse.org

The Institution and the administrations whose sites will be visited during the seminar cannot accept any responsibility whatsoever for injury, damage or other difficulty which may arise during the event. Participants are therefore advised to ensure that their own insurance covers all appropriate eventualities.

Front Cover: The unique St Andrews Cross marker boards at Bristol Temple Meads Station in the United Kingdom will disappear in early 2016 when the area is re-controlled to the Thames Valley Signalling Centre at Didcot in Oxfordshire, as part of the Bristol Area Signalling Renewals and Enhancements project.

Photo: Ian James Allison



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Editor

Ian J Allison

102 Beacon Road, Loughborough, LE11 2BH, UK
Tel: +44 (0) 7794 879286
e-mail: irsenews@irse.org

Deputy Editor

Tony Rowbotham

36 Burston Drive, Park Street, St Albans, AL2 2HP, UK
e-mail: irsenews@aol.com

Assistant Editors

Harry Ostrofsky (Africa)

e-mail: thehzos@icon.co.za

Tony Howker (Australasia)

e-mail: ahowker@bigpond.com

David Thurston (N. America)

e-mail: david.thurston@parsons.com

Buddhadev Dutta Chowdhury (Asia)

e-mail: bduttac@gmail.com

Wim Coenraad (Europe)

e-mail: wimcoenraad@me.com

Priyank Patel (Younger Members)

e-mail: PriyankPatel@tfl.gov.uk

Contributions

Articles of a newsworthy or technical nature are always welcome for IRSE NEWS. Members should forward their contributions to one of the Editors listed above.

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Andrew Walker at DVV Media

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London Office

IRSE, 4th Floor, 1 Birdcage Walk, Westminster, London, SW1H 9JJ, United Kingdom

Enquiries

MEMBERSHIP OR OF A GENERAL NATURE

Tel: +44 (0)20 7808 1180

Fax: +44 (0)20 7808 1196 e-mail: hq@irse.org

PROFESSIONAL DEVELOPMENT

Tel: +44 (0)20 7808 1186 e-mail: training@irse.org

LICENSING

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It seems to be more and more difficult to hire the services of good quality testing staff these days in the UK. Whilst a number of the large signalling companies have introduced fast track training schemes and conversion courses, there never seems to be enough testing staff available at the right time with the right competencies to go around the various planned signalling schemes.

With the volume of signalling scheme renewals planned by many infrastructure companies around the world in the forthcoming years, the issue of having good quality testing staff available at the right time with the right competencies for the right price has to be addressed by the signalling and telecommunications industry now, or else the cost of the existing testing staff will naturally increase.

And it is not all about getting bums on seats and someone just to fill out testing forms! The up and coming generation of testing staff needs to understand the circuits they are testing and be able to undertake fault finding to a reasonable level in order to fulfil what is expected from them as testers, both functional and principles. Data testing is also a particular area where there are only so many testers with the experience of a particular type of system and/or manufacturer which is causing problems in the industry.

As an industry, we need to be acting now, so IRSE NEWS is particularly interested in suggestions and examples of how this can be achieved going forward in order to share as best practice. The IRSE NEWS looks forward to your feedback regarding this important issue.

And finally....

This magazine continues to progress and move forward as a result of the contributions from its members and the signalling and telecommunications industry world-wide. The editorial team around the world would welcome your contributions, feedback and pictures for our two hundredth issue, so please ensure you send your contributions to one of the editors by 05/04/14.

The Editor

IN THIS ISSUE

	Page
The Philosophy of Automation <i>Priyank Patel</i>	2
Industry News	4
Recruitment	5
Engineering Council	6
Cable Theft – an international perspective <i>Ian Mitchell on behalf of the IRSE International Technical Committee</i>	7
IRSE Matters	10
How the IRSE works: The Membership Committee	10
Announcements: <i>Chief Executive and General Secretary Appointment</i>	10
<i>IRSE Survey</i>	10
Younger Members: <i>New YM Chair: Firas Al-Tahan</i>	11
Midland & North Western Section: <i>Western Projects</i>	12
York Section: <i>Signalling Control Centre Developments</i>	12
Swiss Section: <i>Rollout of ETCS L1 Limited Supervision on SBB</i>	13
Indian Section Younger Members Chapter: <i>Workshop and Technical Visit</i>	15
Minor Railways Section: <i>Cable Maintenance and Testing Course</i>	18
Feedback	20
Membership Matters	21
including E-Subscription renewal and Registration for the 2014 IRSE Exam	



The Philosophy of Automation

By Priyank Patel MEng CEng MIET MIRSE

A BRIEF HISTORY

René Descartes (1596-1650) may be considered the father of modern philosophy. His most famous hypothesis was *Cogito ergo sum* or "I think therefore I am". He held many other views, most controversial of which, he considered animals to be a kind of mechanical automation. A bizarre, yet relevant point, certainly when considering the history of transport: because it all started with the donkey.

Man's need to get from A to B, rather than using his own effort, exploited a tame animal and perhaps took advantage of the animal's strength by attaching some load on its back (freight). In many communities around the world this method of transport is still used. But the donkey must be fed and kept in good health, which equates to a high maintenance requirement and consequently an uneconomical long term solution. The donkey also required a rider or attendant, but that goes without saying does it not?

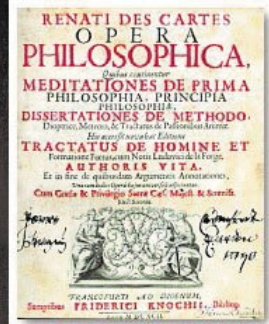
Through time the donkey's limitations became evident; for example it could only carry a small number of passengers on its back. On the positive side, it could pull far more than it could carry, so the donkey-drawn carriage or travois was developed. Further inefficiencies were cut out; the 'road' that the donkey and carriage traverses was converted to low friction guided tracks. The donkey was replaced with a mechanical engine, which had more pulling power and allowed for more carriages to be attached. The modern day train had arrived and railways became crucial to a country's growth.



"Donkey and Cart" - Vincent van Gogh.
The history of the standard rail gauge used today may be traced back to the gauge of standard Roman and Ancient Greek chariots

As the train numbers increased for any given line of track, so did the requirement and specification of the controlling system for the safe movement of trains. Freight and passenger numbers soared; the profitability increased exponentially. Train tickets allowed for revenue protection by proving passengers had paid. Smartcards gradually replaced paper tickets. The process for checking fare evasion was automated completely, especially with the introduction of entrance/exit gates.

From the donkey to the all-in-one travel smartcard, this crude set of examples represents the evolutionary changes to transport. Descartes would have called it the "advancement of automation". But man's ingenuity, perhaps his greatest tool, can be seen in these small yet visionary steps of progress. Indeed if the next advancement in the transport story is to be realised, this should be the most treasured quality to be nurtured in engineers. From donkey attendants, to train drivers, to train captains and finally to unattended trains, the new era of transport is changing the world.



MODERN AUTOMATION

Automation is not new, but the automation of the present day could and should be redefined to include artificial intelligence. Railway systems are currently geared towards completing a set of tasks for a given (human) input. The train time table, train describer and automatic route setting all deliver seamless railway operations.

Through all this automation, an important human element has been left untouched in the system design. The ability that a human being has to analyse a large set of variables that may impact performance-related decisions, such as an operator's decision to manually vary the station dwell time, impose a train cancellation or any other form of train regulation. The automation of these game-changing wins has not been specified or designed into new signalling systems, but more importantly has not been requested by the client's engineers.

Passengers in high density metro systems will not object to their 08:01 train arriving and departing at 08:03, so long as a train is available to them at 08:01 (which may well have been the delayed 07:59 service that was not their preferred departure time anyway). Delayed trains should not be the determining factor of train performance. Delay-minute attribution colleagues may rebuke this comment, but if passenger opinions are taken seriously the main concern should be to provide an economic service responding to the demand. But to intelligently modify the service, a dynamic timetable is required, which may be viewed as a microwave-oven-style power dial setting that automatically changes the throughput for a given line. The required trains per hour (TPH) should be derived from the present and potential demand.



The flow and quantity of passengers accessing and leaving the service should be measured by automatically monitoring:

- CCTV to detect how many passengers there are on the platform (or as is often the case in London, waiting to be let into the station);
- Number of tickets that have been bought in advance and the number of smartcard tap ins/tap outs. Both of these should be supplemented by the use of people counters;
- Local environmental conditions such as expected rush hour traffic or major events such as the Olympic Games.

The signalling control system should take the above as inputs and the train service should respond by adding an 'intelligence' feedback to the operational decisions such as the provision of additional trains, selection of train dwell time or the cancellation of services that may be causing knock on delays.

Moving block systems do provide the best possible theoretical headway. But for maximum performance of a given line, operators say that moving block technology does not play a significant role in improving throughput. Certainly by looking at the maths it would seem that the dwell time and the minimisation thereof would be the critical factor. 33 TPH may be the physical maximum with that restraining factor. 33 TPH is being achieved using conventional signalling by utilising streamlined operating practices. Improving the signalling capability to increase throughput will therefore bear limited fruit.

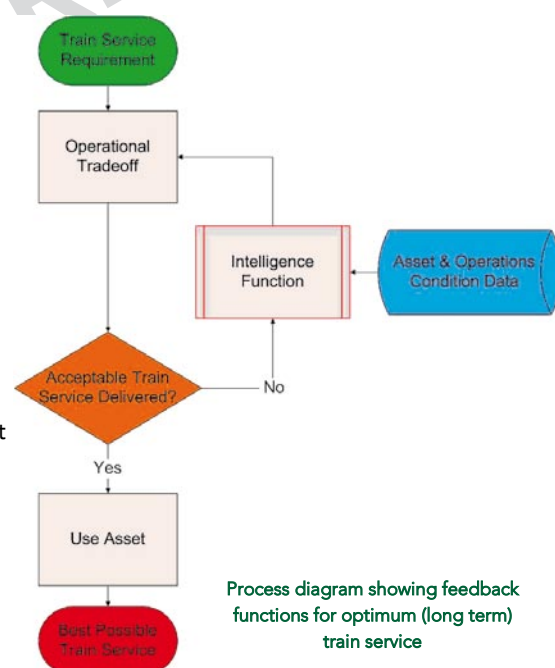
Further clues from operators about moving block technology reveal that where it really outshines existing technology is in its ability to recover from service perturbations. Trains can be spaced metres apart ready for the failure to be resolved and as soon as that happens, the service can be fully recovered in minimal time. But the modern philosophy should be to allow the signalling system to learn what the operator learns through experience and applying it the next time it encounters that or another operating hindrance. For example if this fast train is allowed through before the slow train, the timetable will recover quicker, even if that means delaying or cancelling the service in front. The next generation of signalling system must be capable of making this level of informed decision because the (human) signaller may not always make the best operations decision. The design must provide an automated signalling control and operations system capable of outperforming its human counterpart; it can only do this if intelligence is built in.

Once the design scope is expanded with this modern philosophy, a whole range of computer-game-like proponents can become a possibility. For instance, condition monitoring has become the clichéd design specification. Maintenance, however, is currently planned using a cyclical schedule, which is regularly re-prioritised by the (human) maintenance manager. The manager must consider resource availability as well as the actual condition of infrastructure. This age old ritual requires fresh innovation. Maintenance scheduling should be based on the condition of the assets. The decision on whether to use an asset should also be based on its condition.

When considering the heavily discussed remote condition monitoring of points, the signalling control system should be able to interpret data such as high power alarm criticality and decide for itself what the signaller currently decides: use a different junction and re-coordinate the service from this principle. An automatic route setting system should consider the probability of causing a detrimental impact on the asset (and consequently the train service) should it be used in a below par state. It makes sense that condition monitoring data and remedial actions required are embedded into the signalling control system, whether that means amending the working time table or advising the maintainer of the required planned or reactive maintenance intervention. This is one way to improve the lifecycle cost and performance of the old, ever tiresome donkey of asset management.

If a proportion of the fleet is fitted with track monitoring equipment, when a defect is detected the signalling control system should be able to automatically impose a speed restriction. If a train with a recognised on-board fault can be taken out of service by being routed into the relevant maintenance facility that is on the line, then this should be done automatically. The signalling control system should also raise an alarm to the appropriately competent maintenance team and assign them the activity and details required to resolve the problem for when the train arrives – much like a Formula One pit-stop. If the doors on a train are faulty, the train should be taken out of service in the same way. But why stop there? Before it reaches its depot the signalling control system should tell the train to reduce the operation of the faulty carriage for damage limitation purposes. The customer information system should tell the passengers on the platform and in the train to move to the next set of doors.

On the same platforms, the number of suicides have become a major social concern for railway undertakings. Train dispatch staff that deal with this issue say they can prevent it sometimes. They say they always 'know' when a person is about to jump. Perhaps it is their facial expression, body language or things they say that are the common factors. If these characteristics have been learnt by humans, can a computer detect them? The Centre for Vision, Speech and Signal Processing at the University of Surrey is doing exactly this work. A former classmate was recently awarded a doctorate in this field. Research confirms that this behaviour is detectable and software could be developed for the CCTV system to be fed into the signalling control system which would force an emergency line blocked command. The same technology could be applied to the monitoring of security issues such as suspicious

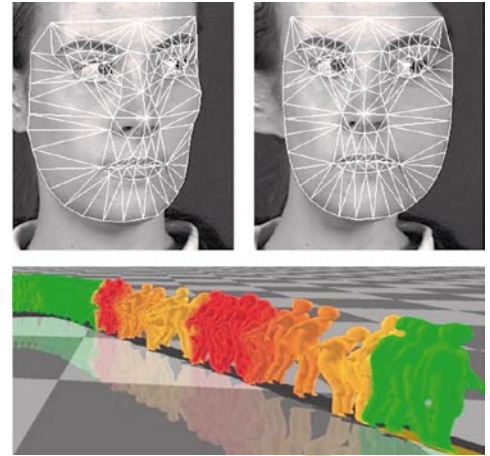


objects or unauthorised access to secure areas. This convergence in differing fields of technology is not currently sought after. But imagine the benefits socially, commercially and to the security of the fare paying passengers.

As was elaborated upon at the start of this paper, technology and science have developed by man's unending quest for finding ultimate truths. The modern engineer must question and endeavour as the philosophers endeavoured, and their thirst should never be quenched. But this mentality is easily forgotten in this increasingly commercialised world of "deliver to the remit". Gone are the "good old days" of British Rail, with its in-house research centre and train manufacturing capability that could implement innovations seamlessly. Those days will probably never return, so the solution lies in the hands of engineers. Engineers must adopt the philosophy and take the oath that seeks to 'enrich' the lives of the end user.

This paper's aim is not to provide the answers to industry issues. Its intention is to draw attention and to re-ask the question that is as old as the hills: how can the industry be driven forward? How much automation is enough (as is the title of the last chapter of O.S. Nock's railway classic "Red for Danger")?

The answer is infinite automation, where $A \rightarrow \infty$. Why is it acceptable that passengers are stood crammed on the train during rush hour when they would no doubt prefer to sit? No-one ever stood on the donkey!



Facial Analysis - The ability to track and analyse facial movements can be exploited in applications that analyse human emotions.

Source: surrey.ac.uk/cvssp/research

INDUSTRY NEWS

India to close unmanned rail crossings

All unmanned railway crossings in India are to be closed under a new proposal in the country's Interim Rail Budget for 2014-15. The removal of unmanned crossings is one of several new safety measures to be introduced in 2014. Around 15 000 people are thought to die crossing rail tracks in India every year.

Presenting the budget, India's Minister of Railways, Shri Mallikarjun Kharge outlined plans to also implement train protection systems and install dead man switches on all trains. Other measures to be introduced this year will include the creation of an independent Rail Tariff Authority, which will advise the government on fares and freight charges, and the introduction of 72 new trains.

A total of Rs 64,305 Crore (€7.6 billion) will be invested in India's railway in the next 12 months, without increasing ticket prices or freight charges.

A series of milestone infrastructure projects will also be completed in 2014, including the commissioning of the Dudhnoi to Mehendipathar line.

Kharge said that work will continue developing plans for a high-speed line between Mumbai-Ahmedabad, with the results of a feasibility study expected to be published in 2015. In the meantime, Indian Railways is looking at cheaper options to increase line speeds to 160-200 km/h.

As well as developing more opportunities for private sector companies through public-private partnership (PPP) schemes, the Indian Government has said it is considering a proposal for Foreign Direct Investment (FDI).

GSM-R Solution in Poland

Poland-based PKP Group's rail track maintenance firm PKP Polskie Linie Kolejowe (PLK) has chosen Nokia Solutions and Network's (NSN) GSM-Railway (GSM-R) communications solution to modernise mobile network on a 440 km stretch of the country's E-20 railway corridor.

Based on Synchronous Digital Hierarchy and Ethernet technology, the GSM-R communications solution will provide a secure digital infrastructure for PLK. The mobile network will cover the railway section between the central city of Lowicz and Terespol, while the deployment is expected to be completed during the fourth quarter of 2015.

NSN will work in association with technology firm Thales, which will build turnkey transmission including fibre-optic cables network. Under the agreement, NSN will deploy its base stations and base station controller, and also provide a network design, project management, network implementation and maintenance services for seamless integration. The deal also includes NSN's NetAct network management system to ensure network efficiency and stability.

NSN railway solutions head Dirk Lewandowski said "This contract marks an important extension of our railways communications projects in Poland after being selected to provide our mobile infrastructure for the strategic Warsaw-Gdynia railway line. By deploying our leading GSM-R technology, data transmission will eliminate the need for external traffic lights along the tracks, using proven automatic signalling technology to the train instead. This will ensure greater safety for trains and passengers while increasing travel speeds and the capacity of railway operations".

NSN has deployed around 30 GSM-R networks in 21 countries.



MENTORS REQUIRED URGENTLY

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Support for Whitby Heritage Scheme

Following the contract award in October 2013, Siemens Rail Automation is now working in close partnership with North Yorkshire Moors Railway (NYMR) to deliver upgrades to Whitby station. Serving the north Yorkshire seaside town, the station is the terminus for the Esk Valley line which is also the link to the national rail network at Middlesbrough and sees regular services running between Pickering and Whitby.

The station's single platform severely restricted capacity and so, having secured funding from Coastal Community and the National Lottery, together with assistance from Network Rail, NYMR developed a scheme to increase operational capacity by building a new platform and making modifications to the associated track and signalling to support a central locomotive run-round facility.

With the final scheme commissioning planned for May 2014, the scope of Siemens' work covers all elements of design, supply, installation, testing and commissioning of the signalling requirements, with every element of the design work being undertaken by the company's strategic partner, Infotech.

Trackside Telephone Approval

Following a successful trial by Network Rail, TDM's GSM-R Trackside Telephone has been approved for use on railway infrastructure for which Network Rail is the Infrastructure Manager.

Network Rail has certified that the TDM GSM and GSM-R vandal and weather-resistant telephone is accepted for use at user-worked crossings and other similar locations where there are currently no fixed-line infrastructure, or where cost savings can be made in removing the fixed line infrastructure.

TDM's GSM-R telephone is a stand alone unit: post-mounted and solar powered it is ideal for installation in remote environments. Using GSM-R and GSM technology, no cabling is needed, and diagnostics and configuration updates can be made via text message.

Network Rail Chiltern Upgrade

The UK's Network Rail has awarded a £87m contract to a joint venture (JV) between Carillion and Buckingham Group Contracting to design and build new Chiltern Railways route between London and Oxford.

The new section of line, which will serve as an alternative link between Oxford and London, will also connect the western section of the East West Rail scheme to Bedford and Milton Keynes. The project will also involve widening existing track bed; doubling over 18km of track; increasing line speed to 100mph; constructing new over-bridges, under-bridges and footbridges; closing 37 level crossings; building a new station at Oxford Parkway; upgrading Bicester Town and Islip stations; and installing a new signalling system.

Chiltern Railways is scheduled to start Oxford to London Marylebone services from the newly built Oxford Parkway station in the summer of 2015. The project also includes a further phase to reconstruct and double disused track between Claydon junction and Bletchley; upgrade and double track between Bicester and Claydon junction, and Aylesbury and Claydon junction; and build a new station at Winslow.

EU to co-finance Italian ERTMS Project

The European Union (EU) is to co-finance the roll out of European Rail Traffic Management System (ERTMS) along a section of high-speed railway in Italy.

Around €4.5 million will be provided from the TEN-T Programme to help fund two projects designed to ensure the full interoperability of a rail corridor connecting Sweden, Germany, Austria and Italy.

The first, which the EU is contributing €1.4 million to, will involve upgrading the current in-cab ERTMS software on twelve Frecciarossa 1000 high-speed trains to conform with the latest version of the system. The second will see the installation of ETCS trackside equipment along a section of the line between Torino and Napoli.

PROFESSIONAL STANDARDS REFRESHED TO MEET THE EVOLVING CHALLENGES FOR ENGINEERING



Following extensive profession-wide reviews during 2013 the Engineering Council has recently re-issued its two key Standards documents. The UK Standard for Professional Engineering Competence (UK-SPEC) and the Information and Communications Technology Technician Standard (ICTTech Standard) are both now available to download from the Engineering Council's website: www.engc.org.uk.

For both documents the 2013 exercise was part of a periodic review that is carried out every five years, by specific steering groups comprising expert members from across the profession. Both groups sought the opinions of key stakeholders through online consultations, workshops and a number of face to face meetings. This community-led review method ensures that the documents remain current and relevant to an ever changing profession.

UK-SPEC was initially launched in 2003 and first revised during 2008. Since its introduction the Standard has enjoyed support across the professional engineering community, including employers and academia. Professor Isobel Pollock CEng FIMechE, Chair of the UK-SPEC Review Steering Group says *"The third edition builds on the strengths of the original and adheres to its fundamental principles and aims. It presents Engineering Technician (EngTech), Incorporated Engineer (IEng) and Chartered Engineer (CEng), as part of a progressive registration structure. It also stresses the value placed on every engineer and technician, no matter what their title, who each have an important and unique role to play in every engineering project or organisation."*

Changes to the standards have been minimal as the initial consultation highlighted that UK-SPEC was generally working well. The only real issue that emerged, and the reviewers looked to address, was the lack of clarity between IEng and CEng competences. Two key changes are to enhance the emphasis on the "commitment" element of the registration requirement and the inclusion of a new standard of competence for all titles, requiring registrants to exercise responsibilities in an ethical manner.

Further revisions have been made to include topics that have come to the fore since the previous review such as security, risk management, health and safety, and equality and diversity. More explicit cross references have been made to the CPD Code for Registrants, the CPD Policy Statement and Engineering Council guidance material, and a glossary has been provided. These received very positive feedback from respondents to the second consultation.

Again based on feedback, a new addition is the inclusion of a table comparing the requirements for registration in all three professional titles, provided as an Annex.

The ICTTech Standard was first launched in early 2009, making this its first review. Chair of the ICTTech Standard Review Steering Group, Paul Excell CEng FBCS FIET, says *"The revisions are designed to make the Standard more accessible, relevant and attractive to the wide range of professional technician roles in the ICT sector. Given the exciting range of roles, work environments and technologies that ICT Technicians can be involved in, and the dynamic nature of the industry, the Standard includes significant updates on relevant competences and professional development. It has also been closely aligned to UK-SPEC, with the same additions as described above."*

Jon Prichard, CEng FICE FlntRE, CEO of the Engineering Council says *"We are very grateful to the many individuals and organisations who assisted us with the reviews of our Standards last year. The number of responses that we received is an encouraging indication that the profession takes standards seriously. Feedback was not only helpful for informing the revisions, but has also provided further guidance as to matters that we should consider in the future."*

With regard to how UK-SPEC and the ICTTech Standard are used by professional engineering institutions, individuals and organisations, Jon Prichard says *"As a generic standard for the diverse profession we work in, UK-SPEC and the ICTTech Standard are designed to provide a threshold standard, which individuals may exceed, if not at the time of registration, then as their career develops. In addition, each institution is able to add its own interpretation, based on its distinct set of requirements."*

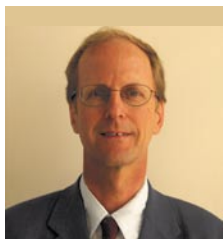
To avoid confusion with previous versions both new documents are now presented in Engineering Council corporate blue, with their version number stated on the front cover.

Jon Prichard concludes *"UK-SPEC has served us well over the past ten years and we hope that both Standards will continue to serve society and the profession equally well for many years to come"*.

The Standards documents can be downloaded from:

UK-SPEC: <http://www.engc.org.uk/ukspec.aspx>.

ICTTech Standard: <http://www.engc.org.uk/professional-registration/standards/icttech-standard>.



Cable Theft – an international perspective

By Ian Mitchell
on behalf of the IRSE International Technical Committee

INTRODUCTION

With the exception of the oldest mechanical and the newest radio-based systems, railway signalling relies very heavily on the use of electrical cables running along the track to signals, points, train detection and train protection equipment. The high price of copper makes these cables a tempting target for thieves, who steal the cables and strip the insulation to sell the copper content as scrap metal.

The cost to a railway infrastructure manager is enormously greater than the value of the cable itself, through the man hours worked in replacing the stolen cable and compensation paid to railway undertakings for the train delays that result from the signalling system failure. There may also be an impact on safety - while most cable thefts result in a "fail safe" consequence, there have been examples of wrong side track circuit failures due to stolen rail bonding and electrical hazards due to stolen earth connections – not to mention additional hours worked trackside to make the repairs.

A number of railways in Europe have experienced increasing levels of disruption from cable theft in the last five years, and this has prompted the IRSE International Technical Committee to collate information from different countries around the world about the operational impact and the initiatives that are being taken to combat the problem. The detailed results are listed in a table – the rest of this article analyses some of the headline issues.

A serious problem for many railways

Cable theft is a concern for many European railway networks, with typical annual train delays of between five to twenty delay minutes per km of route. This may not sound all that much, but the compensation bill to railway undertakings for train delays adds up to tens of millions of Euros for some infrastructure managers.

Burial is the best defence

Railways that routinely bury their cables instead of running them in surface troughing experience much less impact from theft of operational signalling cables (e.g. Finland and Switzerland). This does not make them entirely immune – they have experienced theft of cables not yet installed from worksites, and of overhead electrical supply return conductor cables.

Reduce the amount of copper on the ground

Replacing communications cables with optical fibre and power cables with aluminium makes a much less tempting target – assuming the thieves are smart enough to realise the cables are not copper before they cut into them.



The greatest train robbery yet.

Over the past three years cable theft cost the taxpayer more than £43 million, and the problem is growing. But it also costs passengers thousands of hours of their time through signal failure caused by stolen and damaged cables. We're working with British Transport Police and train operators to stop cable thieves stealing even more of your time and money.



Report cable theft by calling
British Transport Police on
0800 40 50 40

Helping Britain run better



Railways need to work with law enforcement agencies

Railways are not the only victim, there is also theft from buildings and electrical supply networks. The impact of cable theft is now being recognised in some countries with changes in the law requiring evidence of identity to be recorded when scrap metal is traded, and punishment for convicted thieves taking into account the cost of disruption as well as the value of the cable stolen. In the UK this is proving to be a significant deterrent for casual small scale criminals. It may be less effective in continental Europe where organised gangs can more easily transport large quantities of cables across borders – there are even stories of container loads being exported to recycling plants in China.



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Plan to manage the consequences

The operational impact can be minimised if processes are in place to detect and repair the damage as rapidly as possible, and backup procedures are in place to allow trains to continue to move in a degraded mode of operation. These responses range from simple initiatives, e.g. making sure repair staff have ample stocks of the right types of cable, to more radical approaches using diverse sources of information such as GPS location reports from trains and conditioning monitoring data from points to manage train movements when the primary signalling system is unavailable.

There is some success to report

In the UK at least, the range of measures that have been put in place seems to be turning the tide against the cable thieves. Network Rail reported a 50% reduction in train delay minutes in 2012/13 compared with the previous year. ProRail in the Netherlands have reported a 40% drop in incidents in 2013 compared with 2012. Internationally, there are initiatives by the UIC and CER to share best practice amongst the railways and raise the political profile of the issue at a European level.

See spreadsheet opposite for table of measures

- 1 Network Rail Cable Theft Poster
- 2 British Transport Police raid a Scrap metal dealer
- 3 Cable Theft Repair work
- 4 Belgian Cable Theft poster

- 5 Police are taking a hard line on cable theft
- 6 British Transport Police officer checking cable during a scrap-yard visit
- 7 SmartWater forensic spray can be detected using UV lights to link them back to a particular crime scene, long after the offence has taken place



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IMPACT OF CABLE THEFT AND MITIGATION MEASURES

	UK	Netherlands	France	Belgium	Germany	South Africa	Australia
Severity of the problem							
Train delays (hours per year)	5300	170	5800	543	4000		
Year of report	2008-2011	2010	2010	2010	2012		
Network size (km)	16321	2896	29640	3513	41981		
Normalised delays (minutes per route km)	19	4	12	9	6		
Measures to make cable more difficult to locate and remove							
Sealing cable troughs with locked or glued lids	X		X				X
Tie together cables	X		X			X	
Buried cable routes instead of surface troughs or open wire pole routes			X			X	X
Routing tail cables below, not above the ballast						X	
Fewer access points, e.g. disconnection boxes for track circuits, axle counters						X	
Avoid temporary cables on the surface during re-signalling work							X
Don't use bright colours that draw attention to the cable						X	
Don't mark location of buried cable routes						X	
Use apparatus cases that resist unauthorised entry and fire						X	
Painting bare copper wire so it looks like another metal				X			
Coating tail cables with black grease							X
Using cables that are less valuable to thieves							
Replace copper with fibre (communications)	X					X	X
Replace copper with aluminium (power)	X		X		X		X
Replace copper with steel (earth bonding)						X	
Fouling technology that contaminates copper if it is melted						X	
Marking cables so they can be identified after they are stolen							
Cables with distinctive marking	X				X		X
DNA tagging/Smartwater	X	X	X	X	X		
Means of detecting theft as it occurs							
Intruder alarms on buildings	X						X
Cable condition monitoring			X				
Tremblers, detecting disturbance	X						
CCTV (overt and covert)	X		X				
Security teams at high risk sites (e.g. cables not yet installed)	X	X		X			
Making it harder to sell stolen cable							
Law to prevent scrap being sold for cash anonymously	X			X			X
Railway staff visits to scrap metal dealers	X				X		
Increasing the likelihood and severity of punishment							
Sharing intelligence between railway, police, tax authorities	X	X			X		
Use of railway and police helicopters	X		X				
Police visits to scrap dealers and known criminals	X	X	X				
Raising public awareness of consequences of cable theft	X						
Sentencing taking account of cost of disruption, not just cost of cable	X						
Minimising impact on railway operations							
Duplicate/diverse/reconfigurable communications	X					X	X
Duplicate/diverse/reconfigurable power supplies	X						X
Equipment to detect where cable has been cut	X						
Vehicle on stand-by loaded with main cable types	X						
GPS train location							
as backup to conventional train detection	X						
Condition monitoring via radio							
as backup to conventional points detection	X						

Note: this table lists those mitigation measures specifically reported for each country - there will undoubtedly be others.

Chief Executive and General Secretary Appointment

As announced in IRSE NEWS 197, with my planned retirement from the role at the end of June 2015, the Institution is seeking to find a new Chief Executive and General Secretary to take over from that date. The paid role is envisaged in future as taking some 1 to 1.5 days per week averaged throughout the year. If any member is interested in being considered for the position, please would they contact colin.porter@irse.org and further details will be provided.

Colin Porter, Chief Executive & General Secretary

IRSE Survey of Members and Non-Members

You are invited to take part in a survey to help inform the preparation of a new IRSE strategy for the period 2015-2020. This survey is for both members and non-members who are interested in the future of railway signalling, communications and control systems. This survey should take around 20 minutes to complete and closes on 30 April 2014. The results will be published in IRSE NEWS as well as being used through 2014-2015 to develop our new strategy.

For IRSE Members, there is the option at the end of the survey to include your contact details and be entered into a draw to win a one year free membership. We hope as many members as possible will participate.

The survey can be found here:

<https://www.surveymonkey.com/s/9STGXRS>

We also wish to seek the views of non-members. If you know any non-members who you think would be prepared to complete the survey, would you please send the link to them.

Colin Porter, Chief Executive & General Secretary

How the IRSE works: Membership Committee

In Issue 197 of IRSE NEWS (February 2014), we described the role of the IRSE Council, the governing body of the IRSE. In addition, that Council has the power to establish committees to help the Institution to operate effectively and to delegate tasks to those committees, although for significant items, decision powers are not delegated. This article will now cover the role and operation of one of the main committees that report to Council, the Membership Committee.

Remit

A very 'simplified' version: To act on behalf of Council in respect of all membership applications and associated business as delegated by Council. To review and assess applications for membership, recommend approval and grade to Council. To encourage registration with the Engineering Council (EC), and assess applications in accordance with UKSPEC, making recommendations to Council as regards appropriate level of registration (C.Eng, IEng, or EngTech).

Committee Members

Members of the committee normally comprise a total of ten members on the committee and a senior member of Council normally the chair. In addition, the Institution's Membership and Professional Development Manager attends as the Membership Secretary, and the Engineering Council Liaison Officer.

Vacancies on the committee are filled from corporate members of the Institution to ensure that the committee is broadly representative of the S&T industry, grades of Institution Membership, and Engineering Council registrations levels.

The President is a member of all the IRSE committees, and the Chief Executive will attend as available.

The committee members at present are Gary Simpson (Chair), Roger Penny, Ian Bridges, Andrew Chaplin, Buddhadev Dutta Chowdhury, Martin Fenner, Robert Gray, Ian Mitchell, David Slater, Andrew Parsons, Pragnesh Patel, Ian Beaton (EC Liaison Officer), Christine White (Membership Secretary) and David Weedon (President).

Operation

The committee usually meets approximately every 6 weeks in London and where possible a week in advance of Council, thereby allowing the committee's recommendations to be endorsed by Council at their next meeting.

Considerable time is usually needed to review Membership and Engineering Council applications, often in some depth to ensure, as best possible, that the entry requirements are fulfilled and maintained. So slightly different to Management Committee (Issue 197 of IRSE NEWS (February 2014)) while some of the business could be described as 'routine', the process is routine, but EVERY application is unique, and the applications can only be considered as unique and based on the evidence submitted. However, by being a smaller focus group, Membership Committee can operate in a slightly less formal way, while remaining very structured in approach, all meetings are minuted and a summary of the outcome is presented at a formal Council meeting where Council members, local Section Chairmen and Country Vice-Presidents attend.

There are two very distinct areas: Institution Membership Applications and Engineering Council Registration Applications, and without the advance preparation and efforts of the Membership Secretary (Christine White), the committee would have great difficulty operating (*Thank You!*).

For all applications the Membership Secretary carries out initial pre-assessment checks of applications for basic anomalies, completeness (signatures, IRSE Exam status, etc) including performing a NARIC check (NARIC is the UK National Agency responsible for providing information, advice and expert opinion on educational qualifications worldwide.), thereby ensuring declared qualifications are internationally recognised and fulfil the entry requirements. This detail is then passed with the application to the committee, for the formal assessment at its next meeting.

Membership Applications

Within a meeting, all the attending members (excluding the Membership Secretary) would be divided into teams (two-three people) and the applications under review are spread randomly and evenly across the teams. Each team will assess in detail the applications in front of them, against the requirements outlined in the Institution's byelaws and detail on the IRSE website. At the end of that stage, as each applicant's name is checked-off, a spokesperson for the team will summarise their team's assessment of the application to the entire committee. The committee will question/review with the team any concerns, uncertainties or anomalies with the submitted application. Where any particular application is "challenging" an open and full review is undertaken by the entire committee.

At the outcome of the meeting an application is either recommended to Council for a particular grade of membership (occasionally re-graded to a more appropriate grade) or referred back to the applicant for additional information or supporting evidence. In some cases additional advice/clarity is sought from the application sponsors, and Country Vice-Presidents. The application would then be re-considered at the next meeting.

Engineering Council Registration Applications

Engineering Council registration applications have a differing process, where the Membership Committee oversee and manage the process to ensure the different levels of assessments, all carried out by a selection of trained independent chartered IRSE Members. The assessments are carried out and follow the mandated UKSPEC requirements to ensure compliance for registration. This includes pre-assessment of an application by a case panel, the applicant then submits a Summary of Evidence (SoE), the SoE is then given an initial assessment by nominated assessors, and finally, for IEng and CEng, an interview. The final assessments are reviewed by Membership Committee prior to recommendation to Council. We recently received a quote from a satisfied non-UK member: "Today I received my CEng certificate from the Engineering Council. I would like to thank the IRSE for the continuous and appreciable support and guidance during the process of CEng registration."

Gary Simpson, Chair Membership Committee

Future articles will describe the roles of the remaining Institution committees.

YOUNGER MEMBERS

ALL CHANGE PLEASE

On a cold, wet, strike-ridden afternoon in early February, the Younger Members (YM) held their Annual General Meeting (AGM), Seminar and Exam Review event. Despite the strikes, the event was well received and reached over 90% capacity, far exceeding the committee's wildest hopes.

Firas Al-Tahan was voted in as Chair and explains his reasons for volunteering his time with IRSE NEWS.

Why have you taken on the role of Chairman for the Younger Members committee?

Having been involved in the general running of the committee for some three years, I decided I was able to make changes which I felt were positive to the YM Community. As a graduate engineer, I was kindly supported by the likes of Mike Stubbs, Matthew Harris (both on the East London Line Project) and Geoff Mitchell (at Serco Docklands and DLR) – I see this as an opportunity to give back and push younger engineers in our field to use our events to meet their goals and have a good time while doing so.

What does your role involve and how can I suggest events / get in contact?

We are tasked (through our YM Terms of Reference) to support the development of YM in the early part of their careers – this is done in number of ways including seminars, lectures, technical visits, study days and supporting study sessions. We all volunteer our time and take great pride when an event is well received. Our showcase event, the annual seminar and technical visit normally takes place in November – these events take some months to organise and require sponsorship from suppliers to make attendance free for delegates. Our events are open to all and contacting the YM Committee is easily done through email, IRSE HQ or even Twitter – our handle is [@IRSE_YM](https://twitter.com/IRSE_YM). If you want to hear more about our events get yourself on the distribution list by contacting us at Younger.Members@irse.org.

So what are these changes you've referred to?

Glad you asked – I felt our sporadic event calendar lacked fluidity. I have tasked the committee with organising YM events every month. That is quite a challenge but we are a five-strong team and the only way we are going to get better is by having a target. I am also trying to get our YMs onto Twitter because it enables two-way communication and is instantaneous. We currently advertise our events through IRSE NEWS and their deadlines require a whole month prior to publication (no offence editors!). We hope our actions will lead in higher uptake of our events and facilitate feedback on how we do.

Who else is on the team?

We have Matt Slade from Siemens, Helen Kellaway from Siemens, Mo Sekanderzada from Network Rail and Nathan Garratt from Atkins – further detail about their YM roles can be found in the YM Section of the IRSE website.

One last thing?

Sure, we are an approachable team who want to aid the transfer of knowledge while having a good time – if a Younger Member asks for an afternoon of 'CPD' with us – let them have it!



**New YM Chair:
Firas Al-Tahan**

Age: 31

Employer: Interfleet Technology

Role: Senior Consultant –
Railway Control Systems

Interests: Flying light aircraft,
technology, motor sport, travel
and current affairs

January Meeting: Western Projects

The Midland and North Western Section looked to the west on 14 January when they were privileged to welcome Patrick Hallgate - Western Route Managing Director, Network Rail - to Crewe. The subject of the presentation was 'Transforming Western'.

Setting the scene, Patrick told how a railway built by I K Brunel between 1838 and 1840 that has changed little in between (bar a little track gauge adjustment and adding a few colour light signals) is being transformed into a 21st century railway over a period of six years. There will be 13 major programmes of work, each costing of more than £10m each, ultimately providing additional capacity to go beyond the existing daily 1900 TOC and FOC (Passenger and freight respectively) services on the route. Growth in the south-west of England is a significant driver in the need to modernise the railway, with passenger numbers from Bristol alone expected to grow by 44% by 2020, not including the 'sparks effect', which could significantly increase this number. New platforms in the former Brunel terminal station will help provide the much needed capacity at Bristol Temple Meads.

Total investment per mile in the Western route will be significantly more than the West Coast Mainline (WCML) redevelopment at the end of the last decade. Whereas WCML was a single problem requiring a single solution - to significantly increase passenger flows between Manchester and London - Western is far more complex and requires many projects to deliver enhanced services. WCML cost £8.7bn for 401 miles from London Euston to Glasgow (£21 696 000/mile), whereas Western will cost £7bn for 200 miles from Paddington to Swansea (£35 000 000/mile). Progress is fast, with £800m spent last year, slightly more to be spent this year and twice as much to be spent in 2015.

Patrick spoke of how Reading station redevelopment, started in 2008, is the most visible part of the revamp, with five additional platforms and a new transfer deck that is 10 times the width of the previous footbridge. However, this is really the first part of the jigsaw and does not do a great deal to add to overall line capacity. A new flyover at the western end of the station, allowing the Main Lines from Swindon to pass over the line to Basingstoke and Newbury will provide a lot of increased capacity as north - south routes are separated from east - west routes. All this work, KO1, will be completed at Easter 2015, a year ahead of the original program with a saving of around £100m.

KO2 will see IEP electric services reach Bristol and Oxford, requiring 98 bridges to be altered to a greater or lesser extent. To put this number in perspective, Patrick illuminated that this is more than six per Bank Holiday weekend between now and completion of the project. Management of available resources across all disciplines in the industry is key, now more than ever, if targets are to be achieved.

The Western projects include:

- Reading station redevelopment;
- Track renewals;
- North Pole IEP depot;
- Four new OLE power supplies;
- ERTMS L2 introduction;
- Reading new TOC depot;
- Electrification of the route;
- Crossrail West;
- Maintenance improvements;
- Introduction of IEP;
- Introduction of GSM-R data;
- Full FTN coverage;
- Re-locks & re-controls.

The Route Asset Managers (RAMs) are playing a large part in how the various projects are scoped, as it is important from a whole life perspective that the correct building blocks are put in place. One challenge for the maintenance teams is that following the introduction of Crossrail services, the Relief Lines west of Paddington will carry around 300% more tonnes and access times will be reduced from that available today. Future maintenance plans need to consider how this will be achieved.

The first consist of the high output overhead line installation system train is now in the UK and is being put through its paces at Network Rail's test track at High Marnham in Nottinghamshire. Testing seems to support that it will be capable of achieving its planned 36 piles per night (compared with four using current practices). The train, costing £45m, can be used with the adjacent line open and starts delivering in March this year. The concrete batching plant, mast erection module and the wiring module will be delivered shortly.

The section wish to thank Patrick for the time he took out of his busy schedule to visit Crewe and to talk about a subject he is obviously passionate and very energised about. I am sure that all this work is just the beginning, with Devon and Cornwall to consider sometime soon!

YORK SECTION

Report by Tony Pinkstone

January Meeting: Signalling Control Centre Developments

The first technical meeting of the York Section for 2014 took place in the large meeting room in George Stephenson House on Thursday 23 January 2014. It is one of the York offices of Network Rail and the Section is grateful to Network Rail for the use of the room for its meetings.

Twenty nine members and six guests came to listen to Ian Mitchell of Delta Rail give his paper on Signalling Control Centre Developments. Chairman Ian Moore introduced the Speaker, having first reminded those present about the York Section Dinner/Dance on planned on 4 April.

The speaker began with a short history of Delta Rail, from BR research through A.E.A Technology to the present day. Delta Rail was now principally involved with software and technology for rail operations. It has significant investment in research and development and has over 200 highly skilled staff. Current projects were Signalling Control Centres, also Timetable Planning, Crew Rostering, and Real Time Information. Signalling and Control included IECC, ARS, ERTMS simulation and testing software, Asset Management, Rolling Stock, and Track Management.

Development of IECC was continuing, with 200-300 SEUs per workstation, Possession Reminders, ARS, TD, SPAD Alarms, and feeds to Passenger Information Systems. Highly available systems and communication links were essential. Nationally over 50 workstations were now in use, including Edinburgh,

Merseyrail, Liverpool St, York, and Newcastle. Scaleable IECC was cost-effective for the very large or small. It was CENELEC compliant with IP communications. The use of Message-broker and JAVA software was highlighted. The modular architecture can be adapted for different types of interlocking with protocol conversions, data mapping, and with non-vital reminders, ARS, TORR, MCB control etc. It is compatible with SSI, Smartlock, and Westlock, together with all types of relay interlocking.

Regarding ARS, Liverpool Street IECC was achieving 97% route setting by ARS. The aim of route setting was to give two consecutive green aspects to the driver. It was now possible to include conflict resolution, alternative routes, timetable management, and deal with terminating, dividing and joining trains. ARS was now compliant with Network Rail standard NR/L3/SIG/10210. Trials at York gave a 50% reduction in delays.

Ian gave examples of current workload associated with the Network Rail National Control Centres Project. The complex re-arrangement of the Great Western mainline control centres following the Reading Area remodelling, culminating in the Didcot ROC, was detailed, as was the progressive development of the Edinburgh ROC from the original PSB, recently adding on the Cowlares (Glasgow Queen Street) area. The Ely-Norwich Modular Signalling Project included a workstation in Cambridge PSB. In the latter, the ARS manages the strike-ins for the numerous MCB- OD crossings. A vintage Mechanical Signal Box at Harrogate now has a workstation covering the sections formerly controlled by Horsforth and Rigton SBs.

Moving to the future, Ian pointed out that IECC was 25 years old. The upper limit of workstation capacity was considered to be 400-500 SEUs.

The industry now had more IT-literate users and a flexible workstation is being considered, with a flexible allocation of areas of control – there is no software limit to the area of control. Developments include Train Graphs, Platform Docking, Possession Management, ERTMS TSR updates, and links with other supplier's equipment. The industry should be working towards the "joined-up" railway with Network Rail/ TOCS integrated control.

Customers, with Twitter and smart phones could now be included in the dissemination of real time train information. Customers should be Connected and Informed by systems that are Reliable, Available, Affordable and Adaptive. Analysis of threats and opportunities is key to progress.

The discussion which followed included questions by Richard Parker, Quentin Macdonald, Ian Moore, Alan Beevors, and Brent Conlan. The vote of thanks to the speaker was given by Grace Nodes, and the members and guests responded in the customary way.



ETCS ROLLOUT

Siemens' Rollout of ETCS L1 Limited Supervision on SBB

Siemens opened the doors of their Wallisellen site on 22 November to show the IRSE Swiss Section the rollout of ETCS Level 1 Limited Supervision on Swiss Federal Railways (SBB). Thomas Habermacher and Thomas Oberholzer explained how innovations in products but also in the industrial processes underlying the five-year rollout, are drastically cutting conversion costs.

ETCS: Full and Limited Supervision

In Switzerland, implementation of ETCS, with its interoperable air gap between balise and vehicle, is fulfilling two main objectives:

- Allow vehicles with ETCS Baseline 3 equipment to access the entire Swiss standard-gauge network;
- Help fulfil a 2006 agreement to equip the Rotterdam-Genoa Corridor with ETCS by 2015.

Switzerland is implementing two ETCS variants, Full and Limited Supervision:

Full Supervision	Limited Supervision
Implemented as ETCS Level 2 in Switzerland; can also be implemented as Level 1	Variant of ETCS Level 1 being implemented in Switzerland
Continuous supervision	Supervision only where needed
Full data on line profile	Simplified data on line profile
Cab signalling	Lineside signalling
Look-ahead functions	No look-ahead functions
Always SIL4	Ranges from SIL1 to SIL4
Standard ETCS vehicle components	Standard ETCS vehicle components

Limited Supervision was not originally part of ETCS, but was proposed by Switzerland and then integrated within the European standard. Easier, faster and cheaper to install than Full Supervision, Limited Supervision (LS) requires no changes to interlockings or driving rules and in Switzerland maintains the same safety level as the legacy solutions it replaces without a SIL4 implementation. Switzerland plans to use LS as a flexible stepping stone in a later migration to ETCS Level 2.

In Switzerland, ETCS L1 LS is replacing two legacy systems – the Signum magnet and ZUB:

	Signum magnet	ZUB
Application	All line signals	All high-risk line signals on SBB (and all signals on the smaller BLS and SOB networks).
Function	Communicates either stop, warning or proceed to the train in line with the adjacent signal's aspect.	Supervises a train's speed after it passes a distant signal to ensure that the train slows properly or stops at the next signal. An inductive loop extending some 200-300 metres upstream of the signal prevents unauthorised departures and improves performance by informing the train immediately of a less-restrictive aspect.
Component replacement during ETCS L1 LS rollout	Two balises replace the Signum magnet.	Two balises and EuroLoop, a leaky-feeder cable, which replaces the ZUB inductive loop.

ETCS Lineside Equipment Unit

Siemens developed and is producing the products for ETCS L1 LS at SBB mostly in Switzerland. A central component is the Lineside Equipment Unit (LEU). Siemens – and Thales, electronic interlockings it has supplied – are deploying ETCS in Switzerland in three variants:

	ETCS L1 LS		ETCS Level 2
With speed supervision?	No	Yes	Yes
Deployment	Replacement of existing Signum magnet at signals without ZUB	Replacement of existing Signum magnet and ZUB	Signalling system for the new Alpine tunnels on the Corridor lines
LEU solution	Siemens MiniLEU linked to signal	LEU linked to signal	(None: RBC transmits data via GSM-R to the train)
ETCS track equipment	Balises	Balises and EuroLoop	Balises

In ETCS L1 LS without speed supervision, to detect the Signum aspect at the signal without modifying the signalling system, Siemens' solution for Switzerland is the MiniLEU S11, which:

- is a low-cost solution for simple Signum magnet replacement;
- awakens to read the Signum relay contacts only when the balise detects an approaching ETCS vehicle antenna, thus minimising power needs;
- has solar panels on three sides and rechargeable batteries;
- can operate the entire year in shadow and up to three months in darkness, for example in snow;
- requires external power only in tunnels;
- reports faults – including low batteries – to vehicles for forwarding to the infrastructure operator.

Installation

A crew of two mount each balise on a non-metallic bar. This allows them to just loosen two rail fixation bolts instead of boring holes in the sleeper. The higher position may worsen the balise's exposure to ice blocks and hanging coupler hooks, but 3000 installations in Switzerland have yielded no problem reports.

At signals without ZUB, the crew affix the MiniLEU to the ground or a mast, wall or foundation, wire the components together and check that the balise correctly transmits the stop aspect. Installation takes two hours at most.

At signals also equipped with ZUB speed monitoring, Siemens installs its LEU S21, which unlike the MiniLEU can power the company's EuroLoop S21, a leaky feeder cable that, like the ZUB loop it replaces, typically runs 200-300 meters upstream from the signal.

An Industrial Rollout

Siemens has pledged to install ETCS L1 LS at ten SBB signals per day over five years without affecting operations. Some 15-20 Siemens installers are working on the rollout, which aims to convert 436 interlockings and 9300 signals, of which about 1500 are already done. (Thales is converting another 1700 signals linked to its own electronic interlockings.)

SBB had projected that under the traditional approach of engineering each signal individually, the full cost of the ETCS L1 LS rollout – for SBB and its suppliers – would have been CHF100 000 (€82 000) per signal. SBB's strategy was therefore to encourage supplier innovations to industrialise the rollout with the goal of cutting costs by 75%. With its budget of CHF300million (€245 million), the rollout project will nearly meet this goal.

Whereas SBB once would have done 80% of such work, and the supply industry 20%, this is now reversed. (The smaller BLS still do more work themselves.) SBB has had to learn to accept the presence of Siemens crews on their tracks. Siemens has taken over the whole installation task, including acceptance.

From January 2008 to November 2010, SBB organised a prototyping and development phase in which suppliers tested all processes and components, including the MiniLEU. This minimised risks for everyone. Siemens and Thales each converted two interlocking to ETCS L1 LS.

The tendering process began in November 2009. In September 2011, Siemens won the job of converting all SBB relay interlockings to ETCS L1 LS. Siemens and Thales will each convert their own electronic interlockings. SBB's initial ETCS rollout will be complete in December 2017. ETCS Level 2 will equip the new Alpine tunnels on the Corridor routes and L1 LS the rest of the SBB network.

To increase capacity, SBB will then migrate from L1 LS to Level 2 until 2060.

For Siemens, performing the rollout on a tight timescale and budget has required innovation not only in products, but also in the industrial rollout process, in the following areas:

Rollout process automation: The basis for data exchange between suppliers and SBB in all phases – including engineering, verification and service launch – is a formal workflow and automatic, electronic interfaces that minimise manual steps.

Fixed-duration work cycle: For each interlocking, no matter what its size, conversion is engineered, planned and conducted over 18 months in the same seven project steps.

Focus on logistics: To ensure that the change-over requires only one work session, all materials for a given signal arrive in a crate with everything the installers need. A number of such crates move together in a container, along with rolls of cable and a crate for documents.

Focus on quality: The requirement is to "get it right the first time" in a single work session at each signal, with no coming back.

Small set of standard solutions: In engineering the ETCS L1 LS rollout, Siemens was faced with five interlocking types, seven interface types, two signal-aspect generations and an endless variety of signal masts. To deal with this complexity, Siemens developed a small set of standard, modular solutions for the rollout, so SBB does not have to approve Siemens' solution for each site. This also cuts maintenance costs in the long term.

President's comments

In thanking Siemens Switzerland for hosting the event, IRSE Swiss Section President Markus Montigel observed that innovation in rollout processes, and not just in technology, makes for lower costs. He said that "a wind of industrialisation is blowing through the railway", moving it away from "hand-knitting". He also noted that among the event's 35 attendees, a record four were women.

Upcoming Swiss Section events include a May 2014 CENELEC seminar and a September 2014 visit to the new Gotthard tunnel.

INDIAN SECTION - YOUNGER MEMBERS CHAPTER

Workshop on Train Detection & Protection System

By Anshul Gupta, Secretary & Treasurer, IRSE India
with inputs and pictures from Nikhil Swami, Chairman, YM Chapter, IRSE India

The Younger Member (YM) Chapter of IRSE India organised its inaugural event of a Workshop on "Train Detection and Protection System" in the Satish Dhawan Auditorium of I.I.Sc Bangalore on 11 October 2013.

A first of its kind, a technical visit for younger members to Bangalore Metro was organised for the following day.

Considering it was an inaugural event by the YM Chapter in India, we were extremely pleased to see enthusiastic participation of both young and senior S&T professionals. All in all more than 100 S&T professionals attended the workshop coming from different regions of India and the world.

The event began with a starting address by the Chairman of YM Chapter, IRSE India, Mr. Nikhil Swami, who welcomed the audience and the senior S&T professionals who were present to encourage the youngsters.

Speaking on the future plans of the Younger Member Chapter in India, Mr. Swami expressed the immediate need for representing the young S&T professionals in India and how the YM Chapter of IRSE is the ideal platform for addressing those needs. He emphasised the need for awareness among young S&T professionals to get associated with the global professional family of IRSE especially early in their careers. He mentioned the instrumental role of many in IRSE India and IRSE (HQs) that enabled the formation of YM chapter in India.



Participants gathered at the registration desk on 11 October for the 1st YM Event.

The first session of the day began with Chief Engineer (Signal and Telecom), Bangalore Metro, Mr. A.S. Shankar, who delivered his talk on the planning and opening of the Bangalore Metro and the plans for its expansion under Phase-1 and Phase-II.

The speaker gave an overview of the Signalling system involved in the operational metro line and the challenges faced in opening the metro line. Commercial service on Reach 1 (East-West Corridor) of Bangalore Metro started on 21 October 2011.

The informative and engaging lecture of Mr. Shankar was followed by a talk by Mr. Mahendra Patil from Alstom, India who took the audience through the finer aspects of the Signalling and Control System used in the operational section of the E-W metro

line in Bangalore. After fielding questions from an enthusiastic young audience, a tea break was taken which gave participants a chance for interacting with seniors and professionals from different companies.

Post Tea, the second session began in which Mr. Gerhard Grundnig, Head of Business Development Frauscher HQs, Austria, delivered a talk on "Wheel Detection by Fail Safe Axle Counting System".

Mr. Grundnig gave a comprehensive presentation on the principles and benefits of axle counting systems over track circuits with the option of additional functionalities on axle counting technology and adapting to the local requirements, like trolley suppression, various traction types, flooding and all climatic conditions. Finally the speaker described the experience of a successful project in Mumbai, the approval for MRVC, the current projects status and the planned local manufacturing unit in Mysore.

Later in the day a technical visit to the Frauscher India facility was also organised for the participants. The first YM Chapter event also coincided with the celebrations of Mr. Alok Sinha assuming the role of Managing Director of Frauscher (India).

This session was followed by a lunch break which gave another opportunity for Younger members to interact with senior members.

After a shortened lunch break, participants gathered for the third Session which began with Head of Rail Engineering Projects, Atkins (India), Mr. Kapil Khanna, speaking on the Design principles for Signalling. He talked in an interactive manner describing the principles of design in signalling projects, detailing how designers need to understand customer requirements, and then translate them into a clear basis of design. Assessing the resources required and available for carrying out the design are essential for a successful design process. The speaker also discussed the need for understanding the scope of work within the project lifecycle with a well-defined work-breakdown structure and deliverables for each phase.



Nikhil Swami, Chairman,
YM Chapter of IRSE India,
during his opening speech.

Every project should have a well designed feedback system in place which should accurately capture the lessons learnt during the process. This was followed by an engaging Q&A session where differences between 'Competency' and 'Skill' generated active participation from the audience.

The audience was pleased to greet the next speaker, Mr. Buddhadev Dutta Chowdhury from Radharani Rail, who is also a current Council member of IRSE.

Mr. Chowdhury gave a detailed presentation on development of competency through IRSE. He shared his vision for Younger Members and specified how Continuous Professional Development through the IRSE is available with various options, such as:

- Technical literature and publications of IRSE;
- reports produced by International Technical Committees;
- Licensing;
- registering with the Engineering Council;
- participation in seminar and conferences and technical visits.

The speaker explained the wider challenges of how to define and manage competency for people undertaking safety critical work on more complex systems, setting out the upcoming challenges against the current practices and describing how Signalling Systems have arrived at modern Communications-Based Train Control systems from the days of mechanical interlocking systems.

The complexity of modern signalling systems which interface heavily with rolling stock functions and of the on-board communication system which interfaces with track side functions was elaborated. Compliance with CENELEC standards is quite

crucial. Safety Integrity Levels and "Verification and Validation" need to be stringent for modern signalling systems. As the modern signalling systems are communication-based, knowledge and an in-depth understanding of signalling, telecommunication, system engineering and discipline boundaries are of paramount importance for successfully executing a project.

The last talk of the day was by a younger member, Mr. Neptune Sentilvel, Signalling Engineer from Atkins India.

He gave a detailed presentation on the project of Plug Couplers in Network Rail explaining the challenges faced today on cabling between Trackside equipment and the Location case which needs to be done on site.

He explained the working of the Plug-and-Play concept which reduces the amount of work required at trackside by moving activities to factories.

After the end of the third session, the Secretary, IRSE India took the stage for closing remarks giving a number of updates on the activities of IRSE India and expressed his satisfaction on the first event of YM Chapter in India.

A number of people coordinated and supported the event in all possible ways, thereby making it such a success, and we would like to sincerely thank all of them. The speakers who came and delivered lectures to young audience have enthused the YM Chapter in India to hold similar events dedicated to young S&T professionals.

We would specially thank our sponsors Frauscher India for supporting this, our first YM Event.



Ongoing presentation and an attentive young audience.



Enthusiastic audience participation during the Q & A session

Technical Visit to Bangalore Metro (Reach 1)

By Nikhil Swami, Chairman, YM Chapter, IRSE India ,
with inputs from IRSE Younger Members Raghav Konduri and C J Shravan

On 12 October 2013, with the support of Bangalore Metro, twenty IRSE Young Members (YMs) gathered near MG Road Metro Station of Bangalore Metro to begin their first Technical Visit.

MG Road Station of Bangalore Metro is on Reach-1 which is the operational stretch of East-West Corridor having a total length of 18.1 km, starting from Baiyappanahali Station (also the location of Depot for this line) and terminating at Mysore Road Terminal station.

The YM's were joined by Bangalore Metro Officials who started the tour by guiding us to the signalling control room of

MG Road station where they gave an introduction about the operations and various workstations in the local control centre.

After a description of the Signalling system and explanation of the local and central controls, the YMs learned how a route is set and released on the metro line.

Bangalore Metro uses standard gauge rails with a 750 V d.c. third rail traction system. Signalling & Train control is provided by Alstom with two types of point turnouts 1/7 and 1/9, and the use of MJ81 point machines in the main line and RDSO IRS 24 type point machine in the depot.

MG Road Station is an interlocking station which has a Local Automatic Train Supervision (LATS) system. The LATS cubicle communicates with the Centralised ATS (CATS) at the OCC through a fibre optic (backbone network).

In normal operation, the CATS controls and monitors the traffic of the main line and monitors the depot. In degraded mode (e.g. in case of CATS failure), traffic supervision and control can be performed locally from LATS.

After a detailed discussion the YMs boarded a metro train to Baiyappanahalli station from MG Road Metro Station and went on to visit the OCC (Operational Control Centre). There we were briefed about the working of OCC, scheduling of the time table, various controllers for Rolling Stock, Permanent way, Communication Systems and other elements responsible for smooth functioning of the Metro line.

We visited the control room that had seven types of panel and two work stations as follows:

PANELS:

- CBI (ASCV) panel
(Computer Based Interlocking);
- LATS panel;
- Adaption panel;
- Track side ATC panel;
- SDTC panel;
- Power Supply panel;
- Relay panel.

WORK STATIONS:

- LATS and VDU Work Station;
- SDM (System Diagnostic & Maintenance) Work station.

Here the YMs got a chance to appreciate the role and working of all the panels.

The ASCV is the Computer Based Interlocking, a SIL-4 equipment which is used for communication to the adjacent interlocking station's ASCV, performing interlocking functions.

The track side ATC Cubicle is based on 2-out-of-3 logic (2oo3). It is also a SIL 4 system. The communication between train borne ATC and the ATC cubicle is two way. It has three different sub-parts i) I/O subsystem, ii) computing channels, iii) power distributions.

Different types of beacons used in this system are:

- Moving Train Initialization Beacon;
- Precise Stop Beacon;
- Stationary Train Initialization Beacon.

The CBI sub-system is based on distributed processors controlling the inputs/outputs of signalling equipment installed along the track. It receives the track circuit occupancy information from the SDTC (Smart Digital Track Circuits). The ASCV computers (Interlocking) ensure command and monitoring of routes, linked to LATS, point machines, signals, indicators and platform screen doors. Each ASCV is either working independently or connected to its neighbouring ASCV in an adjacent station via the ASCV Vital

Link, which consist in a high-speed data network. This connection is kept separate from the ATC inter-sector link to respect the system's functional independence and to increase availability.

The SDTC sub-system performs track occupancy detection with the help of track circuits. It reports to its CBI and is also in charge of track-to-train physical transmission.

Finally, our technical visit concluded with a short walk around the depot.

After the obligatory team photographs, the YMs shared a sumptuous lunch in a Chinese Restaurant on the famous MG Road.

The YM Chapter is grateful to the IRSE Indian Section and Bangalore Metro for their support in organising the First Younger Members Technical Visit.



Younger Members outside Mahatma Gandhi Road Metro Station

Younger Members enjoying the wash-up in the Midland China Restaurant, Bangalore



Minor Railway Section Cable Maintenance and Testing Course

Following on from its successful Signalling Maintenance and Inspection Technical Workshops run at Signet Solutions in Derby, a change in location happened on the 8/9 March 2014 when Signet went to the North Yorkshire Moors Railway (NYMR) at Pickering station to deliver the next course in the series for the IRSE Minor Railway Section, a Cable Maintenance and Testing Course.

Saturday

Seven students from minor railways across the country assembled at 09.00 sharp in the NYMR learning centre on platform two of Pickering station for the first session of the new course delivered by Signet Director Andy Knight.

Andy started by explaining the need for good housekeeping and practice, including the use of Log Books, the requirements for good planning of the work, how to work safely on site, what to do before the job is finished and before leaving the site.

Andy then took the course through the basic good practice for jointing and termination, stripping wires and cables (not using a Stanley knife), followed by termination techniques, how to make a proper wire loop and how to check terminal block arrangements and crimp integrity.

The course then decamped to the workshop to cut and strip some cable and set up to make a joint including "feathering" the crimps to make a neat joint. Students then made a scotch cast.

A splendid lunch was provided by the NYMR in the buffet which included excellent cream scones.

After lunch it was back to the workshop where more cable was cut up and jointed, re-checked by the instructor and finished using a wrap round heat shrink application. On completion of a further test for continuity through the completed joint that was the end of the first day.

Saturday evening saw the students and instructor assemble in the Black Duck for a livener, followed by a very convivial meal in a local restaurant, where the intricacies of testing was discussed and the woes of the world put to rights.



1. Andy Knight of Signet Solutions introduces the course at the NYMR education centre at platform 2 Pickering Station
2. Andy Knight of Signet Solutions gives a practical demonstration of cable inspection
3. Students check the circuits at the first location
4. Andy Knight of Signet Solutions checks the crimping tool before jointing a cable begins
5. The test piece for the crimping practice
6. Major Hughes pours his Scotchcast whilst the instructor does a continuity test
7. Cable prepped up for the heat shrink to go over the top
8. The good doctor checks for a pulse
9. The course assembled for lunch in the station buffet
10. Major Hughes presents Mr R Whalley with his Volunteer of the Year cheque. Andy Knight supervises



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Sunday

The students reassembled on platform two at Pickering station for the theory of continuity, insulation, core to core, core to earth and Time Domain Reflectometry (TDR) testing. However before the formalities began the Minor Railway Section Volunteer of the Year Mr R Whalley of the Foxfield Railway was presented with his winner's cheque for £75.00 by Major Hughes the Section Chairman on behalf of the Volunteer of the Year Committee.

This was followed up with a test on a 10-core cable from a location to a ground frame disconnection box. All students had the opportunity to complete the full range of testing including using the "bunch" method the Megger and TDR. Students alternated between the "Tester" and "Assistant" function.

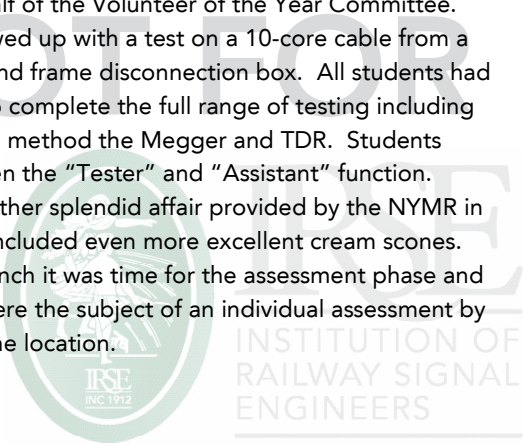
Lunch was another splendid affair provided by the NYMR in the buffet which included even more excellent cream scones.

On finishing lunch it was time for the assessment phase and all the students were the subject of an individual assessment by the instructor at the location.

RE-PRINTING

The course ended with a wash up and a thank you to Andy from the course delivered by Ian Hughes, Andy was thanked in the usual manner by the students. All had an excellent and very enjoyable weekend of training.

Thanks go to our main sponsor John Tilly of Señalización Ltd, Andy Knight of Signalling Solutions, Craig Donald and the staff of the NYMR and Green Dragon Rail.



FEEDBACK

Frustrations

In IRSE NEWS 193 (October 2013), two short items of mine were featured under "Feedback". One concerned the data channel for a Track Feed Relay at Ditton, the other an unnecessarily low speed limit at Deal Street Junction, Manchester. Readers may be wondering why I penned these missives. Well, I found my final few years at Railtrack/Network Rail extremely frustrating, these being just two of many such frustrations that were not dealt with sensibly. There were two main problems. One, dealing with the monumental quantity of Group and Company Standards that had to be complied with, seemingly without regard to commonsense. The other was the monumental effort required to get scheme plans signed off by the Zone.

As to the former, I believe the Standards should be guidance to good practice, but not to be slavishly obeyed regardless. If legal requirements whatever make them mandatory there must be a quick an effective derogation process, within the timescale of projects, so that non-compliances can be obtained easily when required and are acceptable. At the time (I suspect it is still so, ten years later) most designers just stuck to the Standards regardless of sense and cost because it was the only way to get projects done on time with least hassle. There was a prevailing attitude that all one had to do was meet the Standards. Costs, or even sensible train operation, took a back seat when up against Standards. I found this extremely depressing. It is one explanation of the high cost of signalling projects and, for example, could well have killed off schemes to exploit new freight traffic.

As to the latter, an absurd amount of time was spent submitting plans to the Zone and obtaining sign off. A classic example was Ditton remodelling that took six months to obtain sign off, right up to the wire, just before the possessions long booked for the work. Theoretically the work (at enormous expense) could have been cancelled if the all-important signature had not been obtained. I believe it was only when faced with the enormity of this possibility that the plan was finally signed off in the preceding week, to avoid difficult questions of why not. This is hardly the way to go about running major projects. It should have been signed off within a week of submission and the Project allowed to proceed with confidence. During that six months I was totally diverted from my real job, that of seeing to proper engineering of the project. And the net changes to the plan were almost non-existent after all this scrutiny. There could not be, there was practically no room for manoeuvre in the confines of the layout of the remodelling (as allowed for in the original resignalling). And all the discussion revolved around 'does this meet the Standards?'

I believe, that for those that care, all this is very frustrating. I would like to see a movement to free signal engineers from the shackle of these Standards and procedures to allow commonsense engineering and suitable signalling for the job at a sensible price. Am I alone in this or is anybody with me? I have numerous further examples that I can cite if anybody is interested either here in IRSE NEWS or elsewhere.

I believe these are serious issues that are costing our railways dearly. I can be contacted at harcourt19@aol.com. I would welcome any feedback on the topic.

David Thornber (Fellow)

Reduced overlap at Manchester Victoria.

In early 1998, while work on the MVAIR (Manchester Victoria Area Infrastructure Renewal) project was progressing, the gantry carrying the signals controlling the approach to Manchester Victoria from the West near Deal Street Junction had been installed maybe 10m or so nearer to Victoria than intended. There was no way that it was going to be re-erected at its correct position. This meant that the overlap (reduced for 25 mph - ~41 km/h) was a few metres short. It ended up within the scissor crossovers on the approach to the station. The crossovers had been manufactured with the insulated rail joints (IRJ) in their intended positions. At least one now needed moving a few metres within this complex track work, a difficult operation that would destroy the 'factory made' nature of the layout. Also a leg of a track circuit (TC) would become very short, pushing the relevant Standard. I felt that this was most undesirable so performed a risk assessment in my own way of the situation.

Situation one involves following trains into Victoria. The probability of a preceding train coming to a stand with its rear end just at the point of the correct overlap distance from the red signal was absolutely miniscule. And, if it did, and a following train just happened to pass the red at this extremely rare event, but just coming to a stand at the end of the overlap (we now have three unlikely events happening at once) a slow rear end collision would occur of very little consequence (except dealing with the incident afterwards!).

Situation two involves a train using the diamond crossing to change tracks while entering Victoria, An overrunning train would side swipe such a train with potentially horrific consequences, no matter how slow the offending train was going at the time of impact. It would rip out the side of the carriages of the 'innocent' train.

I concluded that only situation two was of any moment and that we need not move the IRJ because moving it would not make any difference whatsoever to that situation. It would only affect following trains. I emphasise we are only talking of a few metres here on what is a quite arbitrary standard with no particular basis for the actual distances specified.

I prepared the risk assessment and put it to the independent testers. I was asked a simple question. Does it meet the Standards? Answer 'no'. So it has to be changed then. No ifs or buts, it had to be changed. Meeting the Standards is all that matters, regardless of costs or any other considerations.

I maintain the risks involved to the personnel carrying out the (I believe completely unnecessary) work was higher than the reduction in risk to operations of the railway, and that butchering the factory made scissor crossing was an unforgivable sin. As an aside perhaps the few thousand pounds spent could have been better utilised replacing the offending sleepers that kept the 10mph speed restriction in place off the Ordsall line!

Once again, could not the engineers involved be allowed a bit of discretion?

David Thornber

MEMBERSHIP



First upward trend in registrants for 12 years

The Engineering Council is pleased to announce that for the first time since 2001, the total number of individuals on the national register of Engineering Technicians (EngTech), Incorporated Engineers (IEng), Chartered Engineers (CEng) and ICT Technicians (ICTTech) has increased. The Annual Registration Statistics 2013 report, issued in February, shows that the downward trend in the total number of professionally registered engineers and technicians has reversed and begun to climb in an upward facing direction.

"This is a welcome outcome for UK engineering," says Jon Prichard CEng FICE FInstRE, CEO of the Engineering Council. "Maintaining high professional standards is key to the delivery of value to the economy. With almost 40% of professionally registered engineers and technicians currently listed on the register now over 60 years of age, and another 13% falling into the 55-59 year age bracket, it is vital that we ensure a strong pipeline of highly skilled men and women to replace these registrants as they reach retirement."

This breakthrough comes as a result of the year on year increase in the number of new registrants experienced over the past six years, coupled with the number of those no longer holding professionally registered status having decreased over the past two years. Comparing the 2013 figures to those of 2007, the number of individuals achieving professional registration has risen by 93%.

Jon Prichard adds "Now we have reached this important milestone in terms of stemming the net outflow of skilled professionals, it is vital that we continue to focus attention on raising awareness of the value of professional registration for engineers and technicians. We are, therefore, working closely with the professional engineering institutions to address this, in particular for technicians where we have highlighted the greatest skills gap to be filled, and I hope to be able to report further good news this time next year."

Other relevant statistics in the report show that registrants based outside the UK still represent 18% of the total.

Meanwhile, the number of females becoming professionally registered continues to rise gradually, with a healthy increase of 28% in new female registrations compared to 2012 numbers. However, females still only represent 4% of the total and it is clear that there is still a lot to be done to attract more women into the profession.

Routes into Rail

How can we attract more engineers into the rail industry? It is a problem that companies are facing in many parts of the world, and the UK is no exception. In a collaborative venture by the professional engineering institutions (including the IRSE) and a number of other industry organisations in Great Britain, we are planning to significantly increase the industry's appeal to undergraduates, initially through a programme of visits and presentations at UK universities. A video is being commissioned to support this ongoing work, which we intend to use in conjunction with the visits.

This initiative is not entirely new; programmes of visits by the Institution of Mechanical Engineers and by the Young Railway Professionals have taken place in previous years. But we are now seeking to raise our game, involving other professional institutions such as the IRSE.

To increase the programme of visits, we need your help. If you might be interested in assisting with one or more visits to universities in the UK later this year, please contact Francis How via the IRSE offices in London (francis.how@irse.org).

This is an exciting opportunity, one for which we will provide training and briefing, as well as, of course, all the supporting material and information.

Subscription renewal: e-membership

The next subscription year begins on 1 July 2014 and renewal invoices will be prepared during May ready for issue at the beginning of June. If you wish to opt into or out of the reduced service level provided with e-membership for the new subscription year, you need to register the change by 30 April 2014. Otherwise your existing service level will continue. To register a change go to www.irse.org, log in and select 'Home' then 'Manage your record' and scroll to the bottom of the page. Tick or untick the box labelled e-membership as appropriate to your requirement. A tick means that you wish to be an e-member.

For information on subscription rates and service levels go to 'Membership' and select the 'Subscription rates' page. Thank you.

IRSE PROFESSIONAL EXAM 2014

Please note that all applications to sit modules of this year's exam are made online and the deadline by which we must receive them is **30 June 2014**.

If you have not applied by this method before, please go to the home page of IRSE's website (www.irse.org), click on 'Register', and follow the instructions. A guidance document is also available on the IRSE Exam page of the website.

Please note that applications can only be accepted from those who are fully paid-up members of the Institution at the time of applying.

MEMBERSHIP MATTERS

ADMISSIONS

We have great pleasure in welcoming the following members newly elected to the Institution:

Companion

Smolders	B	ProRail	Netherlands
Wild	M	Public Transport Victoria	Australia

Fellow

Gerber-Balmer	D	Swiss Federal Railways	Switzerland
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Member

Boulangier	J-L	CERTIFER	France
Burdis	I S	Atkins Rail	UK
Darmana	Y	PT LEN Railway Systems	Indonesia
Lebarque Ep.Laforme	A	CERTIFER	France
Louie	V	Metro Trains Melbourne	Australia
Maggard	M	Pacific Railway Enterprises	USA
McEvoy	T	Rly. Procurement Agency	Eire
Ockeloen	S	ARCADIS, Infrastruct. Rail	Netherlands
Pignard	F C	Scott Lister	Australia
Shamoon	A H	Hatch Mott MacDonald	USA
Standaart	M	Arcadis Nederland	Netherlands
Wilcox	N R	Interfleet Technology	UK
Yusoff Khan	A K	Globalrail	Malaysia

Associate Member

Bagewadi	N	WS Atkins (India)	India
Bilgaiyan	S K	WS Atkins (India)	India
Buchanan	D J	Northern Ireland Railways	UK
Chang	K	Kilborn Consulting Limited	UK
Dambhare	R	WS Atkins (India)	India
Davis	K J	WS Atkins (India)	India
Dawes	A L	Bombardier Transportation	UK
Devarakonda	S	Indian Railways	India
Gaddam	S	Infotech Enterprises Ltd	India
Garg	V	Serco Middle East	UAE
Goje	S S	Infotech Enterprises Ltd	India
Gupta	S K	WS Atkins (India)	India
Gururaj Murthy	R	WS Atkins (India)	India
Ishak	A	SPAD	Malaysia
Ismail	F E	SPAD	Malaysia
Jayaraman	N	WS Atkins (India)	India
Jurkewitz	C	CERTIFER	France
Korlamanda	V	WS Atkins (India)	India
Kumar	A	WS Atkins (India)	India
Martin	R	Network Rail	UK
Muniandy	S S	Siemens Rail Automation	Malaysia
Nahe	R P	SERCO Middle East	UAE
Onteddu	S K	Siemens Rail Automation	UK
Paje	R	Mitsubishi Heavy Industries	UAE
Penfold	C M	Network Rail	UK
Pentakota	G	WS Atkins (India)	India

Pokkuluri	R U	Infotech Enterprises	India
Rogers	M	Network Rail	UK
Sriramulu Gajapathy	G R	WS Atkins (India)	India
Srivastava	A K	WS Atkins (India)	India
Srivastava	N	WS Atkins (India)	India
Srivastava	S	WS Atkins (India)	India
Van der Merwe	J H	HATCH	South Africa
Vatsyayan	A	WS Atkins (India)	India
Verma	A K	WS Atkins (India)	India
Williams	C	Interfleet Technology	UK

Accredited Technician

Crowley	M	Pacific Railway Enterprises	USA
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Affiliate

We are also delighted to welcome 81 new Affiliates. However, due to space constraints, we will list these in detail next month.

TRANSFERS

Member to Fellow

Mitchell	G R	DLR	UK
Walser	J	LTK Engineering Services	USA

Associate Member to Member

Chung	K H	MTR Corporation	Hong Kong
Kent	L C	Mott MacDonald	UK

Associate to Member

Blacker	P M	Atkins Rail	UK
Wong	WYF	MTR Corporation	Hong Kong

Associate to Associate Member

Fawkes	A	VolkerRail	UK
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Student to Associate Member

Ormslow	N S	Network Rail	UK
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RESIGNATIONS

Heywood	D A	Jansen van Rensburg	J J
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REMOVALS (due to non-payment of first subscriptions)

George	E	Beura	B
Misra	S C	Raushan	A K
Chen	Z		

Engineering Council Registrations

Deacon	R	Final CEng
Loughran	G	Final IEng
Stone	R	Final IEng

NB: in Issue 198, V Louie and M Standaart were listed as new Associate Members, and A Fawkes, as a new Member. This was an error and the correct entries appear above.

Current Membership: 5021