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The above events are regular courses which we run on an Open Programme. For more information on the full range of courses and bespoke events we deliver please visit our website.

Peter Scott then and now.
See A Day in the Life of ..........page 11

M&NW visit to the M6 Toll Road - see page 20

FRONT COVER: Main Picture: An Axle Counter Detection Point next to a signal on a block line near Trondheim in Norway.
A beautiful place for the installation of signalling equipment.
photo: Rui Alves, Project Manager for Axle Counters, Thales Rail Signalling Solutions GmbH.
The Ever Expanding Local Sections of our Institution

Having received the Proceedings in the post recently, it was a pleasure to read within the Section Reports about the endless activities that fellow members have all been up to around the world within the last year, of their own doing and in many cases independent of the main Institution activities.

Particularly of interest was the report from the new Dutch Section, who formalised their status and became a formal section of the Institution following the organisation of the Rotterdam Convention in 2007. Whilst regular meetings have been held in the Netherlands during the last 10 years for all Dutch speaking members, the Dutch Section finally will be formally constituted in accordance with Dutch Law following the Annual General Meeting and election of the executives and officers later this month. We wish them well and every success.

We also look forward to the formation of a new Indian Section, whose members are currently working upon the final details of the organisation, following initial Council approval to proceed with the idea. Again much work has to be done to provide the required information and to ensure compliance with both the main Institution bylaws and with the Indian law itself. This event will see the return of a presence of the main Institution back in India since 1956, when the previous section closed. We again wish them well and every success.

Additionally, support for the concept of a “Heritage” or “Minor Railways” Section has been given initial approval at Management Committee on the basis that there was great enthusiasm shown for the Heritage Seminar in the Presidential year of Mr John Francis, following which a number of those who attended have since expressed a desire for a continued forum. Of particular interest to them is competency, standards and codes of practice.

The suggestion that this Section become a technical expert group is very valid and there is now a need to be a canvass for potential committee members. Some of those who played a role in the seminar could be obvious candidates. It will also be useful too, to seek support from individuals within Network Rail and potentially other large railway infrastructure owners. Indeed there is great potential for two-way information exchange with Network Rail and the possibility of visits to Network Rail installations and joint visits/meetings with existing Local Sections. If you are willing to become a potential committee member of the Minor Railways Section, please contact Martijn Huibers at martijnhuibers@hotmail.com or Ian Allison at irsenews@btinternet.com for further information and update.

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Your IRSE NEWS Team

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INTRODUCTION

Many readers of IRSE NEWS may remember the Havenspoorlijn from the IRSE Convention in 2007, when a bus tour was organised along the line. The Havenspoorlijn forms part of the Betuweroute. The Betuweroute is a new dedicated freight line linking the port of Rotterdam with the industrial hinterland of Europe and forms part of the Rotterdam – Genoa corridor.

The Betuweroute consists of two parts: A new 107 km double-track line along the A15 motorway, known as the A15 section. This part begins at the existing Kijfhoek marshalling yard and runs through to Zevenaar, where it connects with the line from Arnhem to Emmerich in Germany. The A15 section includes 104 points. There are two further links with the existing network near the beginning and end of the A15 section (at Meteren and Elst) and there is one marshalling yard (the Valburg container exchange point).

The existing 40 km Havenspoorlijn. This line passes through the most important of the harbours that make up the port of Rotterdam, between the coast and Kijfhoek. The Havenspoorlijn has been undergoing continual improvement and extension since 1998. It includes six large shunting yards (Maasvlakte, Maasvlakte West, Europoort, Botlek, Pernis and Waalhaven), with a total of around 300 points and 400 signals. See Figure 2: The Havenspoorlijn in overview. That figure shows only those tracks that are currently equipped with signals. Tracks that were not equipped under the old system will remain so under the new.

An ERTMS Level 2 system has been installed on the A15 section of the Betuweroute and the line uses 25 kV. The Betuweroute is capable of handling one train every 4.5 minutes in both directions. The Havenspoorlijn was to acquire the same functionality, i.e. ERTMS Level 2 and 25 kV.
FACTORS AFFECTING THE MIGRATION

The original plan
Originally, the Havenspoorlijn was to have had the same architecture as the A15 section.

Figure 3: Original Betuweroute architecture

An ERTMS Level 2 system entered service on the A15 section of the Betuweroute in 2007. The system supplied by ALSTOM consists of one Smartlock 300T interlocking and three RBCs (Radio Block Centres). Originally, the Havenspoorlijn was to have been equipped with the same systems as the A15 section. The existing systems (Vital Processor Interlocking, B relay interlocking and automatic block systems) were to have been replaced by the Smartlock 300T interlocking. The interface with traffic control was to have been replaced by the new KBV/VIS interface. (KBV, Koppeling Beveiliging-21 VPT is the connection between signalling and the Dutch VPT traffic control system, Vervoer Per Trein. VIS is the VPT Interface Server) The plan was to conduct the migration in a “big bang”, during which all field equipment (signals, points, train detection equipment, etc.) would have been switched over to the new system in one long possession (52 hours), following which the Havenspoorlijn would have run under ERTMS Level 2.

Following commissioning of ERTMS, a further three months would have been required to replace the existing train detection system (GRS track circuits) with a train detection system capable of running under 25 kV electrification (ALSTOM ‘JADE’ - Joint Accord Double Electrique). Once the new train detection system had been installed, it would have been possible to switch the Havenspoorlijn over to 25 kV.

The risks
However, experience acquired on the Betuweroute A15 project and on other ERTMS projects (especially in Switzerland) identified a number of risks. At the start of the ERTMS project, these risks were either unknown or else were known but judged to be less serious. They can be divided into technical, logistical and user risks.

Technical risks
An ERTMS Level 2 system for the Havenspoorlijn would have been so large, and so complex, that:
- there was a high risk of failing to keep to the project schedule due to development and design issues;
- the possession required to commission the ERTMS system would have been longer and more risky than originally foreseen due to the need for more tests than previously anticipated;
- there was a high risk of disruption to traffic for a more prolonged period following commissioning.

One important factor was the diversity of rail traffic on this line. By contrast, most previous ERTMS projects involved closed systems with a fixed combination of track system, trains and on-board equipment.

The Betuweroute is an open freight line, with:
- various freight operators (13 from the Netherlands alone);
- different locomotive types according to operator;
- several on board ERTMS suppliers;
- a highly dynamic train route supply and demand process; there is a flexible timetable and a number of train movements are organized on an ad hoc basis. In other words, one does not know today what trains are going to be running a month from now.

Logistical risks
The consequences of disruption on the Havenspoorlijn are serious, as this line constitutes the only rail connection between Maasvlakte and Kijfhoek. Moreover this is a line of high economical importance to The Netherlands and Europe. Imagine a situation in which ERTMS were to cause problems between Europoort and Maasvlakte, requiring trains to run on sight. Many trains would be unable to reach or leave Maasvlakte, or only with a delay of several hours or days. Initially, this would only affect transport operators, but customers throughout Europe (such as steelworks, power stations and factories) would rapidly begin to suffer. A German train drivers’ strike in November 2007 demonstrated the effects of a breakdown in freight operations, with car manufacturers Audi and Volkswagen forced to close down their factories. The losses caused by the 62-hour strike were estimated at 100 million euro. (see Endnote 1) After a week, the costs would have risen to around 500 million euro per day. (see Endnote 2)

This means that if things went badly wrong, ATC problems could bring rail movements to and from the port of Rotterdam to a standstill. Ultimately, this would almost certainly lead to financial claims from customers or even avoiding Rotterdam.

Another logistical aspect is that any delay in commissioning ERTMS would have affected the 25 kV project. No train movements can take place without ATP, but the Dutch ATB system does not work under a 25 kV catenary. ATB therefore had to be replaced by ERTMS before the 25 kV system could be switched on. As a result, railway undertakings will have to change their locomotives at Kijfhoek instead of being able to use their new multi-current traction units all the way. (see Endnote 3)
MIGRATING TO ERTMS

User risks
The impact of migrating the Havenspoorlijn is more far-reaching than that of just replacing an interlocking system, for instance. Introducing ERTMS constitutes a quantum leap for the entire transportation system. Under ERTMS Level 2, trackside signals and ATB are replaced by stop boards and cab signalling. Operational processes that have been in use for many years are replaced at a stroke by ERTMS processes. This affects many different groups: drivers, control centre operators, infrastructure managers, maintenance engineers, track personnel, etc. It takes time for staff to become familiar with these new processes. Mistakes will inevitably be made and time will be lost getting back into the daily routine.

Decision
Eventually, it was decided not to implement the original plan (i.e. ERTMS Level 2 on all lines). The plan had to be modified in order to reduce the risks that had been identified.

ALTERNATIVES
The Havenspoorlijn can be divided into two types of track: running line and sidings.

The running line (see Figure 2) is the twin-track “artery” of the line, on which through trains run at 80 km/h. The sidings (the rectangles in Figure 1) are where trains are shunted and made ready for departure. The maximum speed on sidings is 40 km/h everywhere.

The initial situation regarding ATP on the Havenspoorlijn in 2007 can be represented thus:

Figure 4: Initial situation on the Havenspoorlijn

Trains run under ATB on the running line and in sidings. As the maximum speed in sidings is 40 km/h and this speed is supervised when no ATB code is present in the track, so no ATB lineside equipment needs to be installed there. The intention of the original plan was to run under ERTMS Level 2 on all parts of the Havenspoorlijn. Shunting in sidings would have been conducted in ERTMS SH (shunting) mode, in which trains run under the responsibility of the driver, at an ERTMS-supervised maximum speed of 40 km/h.

The following three alternatives were considered. (At this stage only Level 2 based alternatives were considered, as it was still the project aim to implement Level 2 and have the same functionality as on the A15 section.)

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Running line</th>
<th>Sidings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original plan</td>
<td>ERTMS Level 2</td>
<td>Shunting: ERTMS Level 2 SH mode</td>
</tr>
<tr>
<td>Alternative 1</td>
<td>Original plan with ATB fallback option</td>
<td>Original plan with ATB fallback option</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>Original plan</td>
<td>ERTMS Level STM, Level 0 or Level 1 SH mode</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>Original plan with ATB fallback option</td>
<td>ERTMS Level STM, Level 0 or Level 1 SH mode with ATB fallback option</td>
</tr>
</tbody>
</table>

Table 1: Overview of alternatives

Alternative 1
This was the “fallback alternative”, i.e. to follow the original plan (i.e. Level 2 on all tracks), but include a fallback option by temporarily retaining trackside signals and ATB. Changeover between ERTMS and ATB would be by means of a keyswitch. Under this alternative, it would be possible to choose whether to run under ATB or ERTMS. This would allow for a more flexible migration from ATB to ERTMS, by gradually increasing the duration of the periods during which trains ran under ERTMS. However, the new system would be just as complex from a technical point of view, even though there would be the possibility of switching over to ATB in the event of a problem. Moreover it could lead to confusion to the drivers.

Alternative 2
This was the “simplification alternative”, i.e. to use an ERTMS level other than Level 2 on the sidings: Level STM-ATB, Level 0 or Level 1 SH mode. This would involve simplifying sidings from a technical point of view, reducing the technical risks. There would be no fallback option. In practice, the simplification would consist of not installing ERTMS equipment in sidings. Given that sidings are generally used for shunting, this would result in a situation that was just as safe as that obtained under ERTMS Level 2, as when a train is operating in ERTMS SH mode (which would be the case during shunting), the only function available is supervision of maximum speed, as is the case with ATB.

However, the migration risk would remain. At some point, the switchover from ATB to ERTMS would occur, after which there would be no way back. At least, not without serious effects on planning, costs and access to the harbours.

Alternative 3
This alternative combined alternative 1 and 2, i.e. to add a fallback option and also simplify the sidings. The result would be a reduction in both the technical risks and the migration risks.

Given the above, alternative 3 appeared to be the best option. This alternative presents the lowest risk. However, all of the above alternatives had one major drawback: it would take an extra year to make the necessary changes. This would delay the introduction of 25 kV with the risk that railway undertakings would claim for financial damage of not being able to run with electrical locomotives. A fourth alternative was therefore sought that would reduce the risks linked to the implementation of ERTMS by comparison with the original plan, while eliminating or reducing delay to the introduction of 25 kV.
MIGRATING TO ERTMS

**Alternative 4**

This fourth alternative was to use ERTMS Level 1. Because Level 1 can be added to existing interlocking systems relatively easily, it is possible to implement it quickly. The time saving comes from not having to adjust the new interlocking and RBC systems.

See Figure 5: Schematic design of the ERTMS Level 1 system for the Havenspoorlijn.

N.B. Adding ERTMS Level 2 to the existing interlocking systems (i.e. a Radio Block Centre - Vital Processor Interlocking (VPI) connection) was not feasible.

ERTMS Level 1 differs from Level 2 in the manner in which route information is passed to the train. In Level 2, this information is sent by a Radio Block Centre using a GSM-R radio link. Under Level 1, the aspect of the trackside signal is translated into an ERTMS message by an LINESIDE ELECTRONIC UNIT (LEU). These ERTMS messages are passed to balises via cables, transmitted by the balises and picked up by the on-board computer via its balise antenna. The above figure shows that Level 1 is “only” an addition to the existing VPI and automatic block systems. As a result, Level 1 can be implemented more rapidly, no risky system migration is needed and it is easier to test ERTMS while ATB is still in service.

The disadvantages of Level 1 are that a large number of cables have to be run to the tracks and between the rails, and that extra balises (“infill balises”) have to be installed for each signal to keep running times and headways the same. This is because the train only receives new (i.e. better) information when it passes a balise.

**THE NEW PLAN**

In summer 2007, it was decided to install ERTMS Level 1 on the Havenspoorlijn, as that system could be installed more quickly, would involve less risk and would limit the extra costs caused by abandoning the original Level 2 scheme. The aim was to install it in less than a year.

This brought a new challenge. Up until now, all development activity had been directed at implementing ERTMS Level 2. In other words, within the limited time available it would be necessary not only to design, install and test a system, but also to specify how it was to be built.

To save time and money it was decided to apply full ERTMS Level 1 functionality only to the running line. The sidings would be “equipped” with Level STM-ATB, Level 0 or Level 1 SH mode. (As in Alternative 2.) Deciding as soon as possible which of these siding options would be the best one, was part of the challenge. Overcoming such a challenge meant working together in an unconventional manner. The response consisted of forming a joint team, made up of specialists from ALSTOM, Movares, ProRail and POBR (the Betuweroute project organization). This team had to develop a complete ERTMS Level 1 application for a Dutch railway line in just a few months. But even if they would succeed, the engineers and installers still have to design and build everything in the remaining amount of time. With cables still having to be manufactured and only a limited period available each year in which it is allowed to dig in cables. And what about the required tests that (after installation) have to be executed on a railway in full operation? Full safety case required of course! On the face of it, this mission was impossible. But Part 2 of this article will explain how the ERTMS Level 1 trackside system was indeed realised on time.

*To be continued...*
Measurement of Transit System Service Dependability

by Valeriy Tatarnykov, P.Eng.
Thales Rail Signalling Solutions Inc., Toronto, Ontario

In this paper, the quantitative assessment of dependability of the passenger service in transit systems is discussed. Based on the comparative overview of a number of different approaches, a uniform method of assessment is suggested, namely calculating the statistics of observed delays in waiting time at platform and journey time, versus scheduled values.

Introduction

The need to assess the dependability of the passenger service in transit systems is driven by economical reasons. Transit system supplier (owner, operator) must make his own determination as to why and how much dependability is necessary in his product or service, due to the fact that the level of service dependability achieved by a transit system is the key factor to its business success.

Circumstances to consider include: characteristics of marketplace (passenger flow density location – and time-wise); market competition (alternative transportation modes available at a competitive price – personal car, bus, taxi); cost of implementing (or not implementing) a reliability growth program.

Cost of reliability improvement includes equipment upgrade and possibly some extra operating/ maintenance cost. From the other side, cost of not investing into reliability may arise from lost income; short-term from sharply increased maintenance cost and lost revenue, to long-term due to diversion of the patrons to alternative modes of transportation, lower public perception towards the system, loss of funding for new development (extensions, upgrades) and troubles to the associated businesses.

The challenge that the transportation system developer is facing is how to design, manufacture and operate transit system to best meet the expectations. However, customer’s expectations are different for transit system supplier and owner/operator.

The supplier’s customer is the system owner, who expects the product to be compliant to technical specification and project schedule.

For the transit system owner/ operator, the customer is the ensemble of passengers, each of them expecting to be provided with the service of transportation from point A to point B within the advertised time T, with the promised quality of the ride Q.

It seems important that the first party’s expectations (particularly the technical specification) would be as much as possible directed towards meeting the passengers’ expectations. Below, the argument is provided that the parameter of Service Availability is a valid quantitative assessment of passengers’ satisfaction.

Transit System Characteristics

Obviously, several key technical characteristics of a transit system contributing to the passengers’ satisfaction can be categorized as design-related: passenger capacity, travel time, headway, passenger amenities, and ride comfort level. Another group of those is quality-related: schedule adherence, service delivery, number of delays greater than the delay threshold, reliability, and availability/ dependability.

Definition of Availability

Existing standards and guidelines provide a number of definitions for availability and dependability that are used by the authors of technical specifications for transit systems.

<table>
<thead>
<tr>
<th>ID</th>
<th>Term</th>
<th>Context</th>
<th>Definition</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Availability (performance)</td>
<td>Dependability and quality of service</td>
<td>The ability of an item to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided</td>
<td>IEC Vocabulary ([1]), IEV 191-02-05</td>
</tr>
<tr>
<td>2</td>
<td>Dependability</td>
<td>Dependability and quality of service</td>
<td>The collective term used to describe the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance support performance. Note – Dependability is used only for general descriptions in non-quantitative terms.</td>
<td>IEC Vocabulary ([1]), IEV 191-02-03</td>
</tr>
<tr>
<td>3</td>
<td>Availability</td>
<td>Railway System Availability</td>
<td>A = MUT/(MUT+MDT) where MUT = Mean Up Time (MTBF), MDT = Mean Down Time (MTTR)</td>
<td>EN 50126 ([3])</td>
</tr>
<tr>
<td>4</td>
<td>Availability (Readiness)</td>
<td>System Reliability</td>
<td>A measure of the degree to which an item is in operable and committable state at the start of a mission when the mission is called for at an unknown (random) time. (Mission time excluded)</td>
<td>MIL-STD-721C ([2])</td>
</tr>
<tr>
<td>5</td>
<td>Dependability (Mission success)</td>
<td>System Reliability</td>
<td>A measure of the degree to which an item is in operable and capable of performing its required function at any (random) time during a specified mission profile, given item availability at the start of the mission (Non-mission time excluded)</td>
<td>MIL-STD-721C ([2])</td>
</tr>
</tbody>
</table>
Clear understanding of terminology is important, because not having well defined the meaning of a quantitative requirement in a contract for design/manufacturing of transit system equipment may result in disputes during commissioning and revenue operation.

There are differences in the definitions in various sources, resulting from the implied nature of the equipment under assessment. Most obvious difference is in the definition of dependability as a non-quantitative term by IEC (see Item 2 in the table) as opposed to MIL-STD-721 (Item 5 in the table). However, it seems like in the application to transit system, and without contradiction to the above mentioned documents, the Availability can be defined as “the chance of the product/service to work as expected when the customer wants to use it”.

In a transit system, there are two different ways to define the Availability: a) Operator-centered Availability as the ability to perform a set of equipment functions requested by the Operator; and b) Passenger-centered Availability as the ability to carry a random passenger from point “A” to point “B” within a specified time period and with an acceptable quality of ride.

Examples of Different Approaches

**Example 1: Single Item**

This illustrates the assessment of the availability for a single equipment item, like an on-board controller, a track switch, etc.

**Definition:** Availability = Uptime/(Uptime + Downtime)

**Inputs:**
- Operating time during a day: 20 hrs
- Downtime: 6 minutes (0.1 hrs)
- Uptime = 20 hrs – 0.1 hrs = 19.9 hrs

**Result:**
- Availability = 19.9/20 = 0.995 = 99.5%

**Example 2: Fleet**

For an ensemble of similar items, like fleet of railcars, or pool of platform doors, the definition of availability is extended.

**Definition:** Availability = Uptime/(Uptime + Downtime) (all parameters are cumulative across the fleet)

**Inputs:**
- Operating time during a day: 20 hrs
- Number of trains: 10
- Cumulative operating time: 20 * 10 = 200 train/hrs
- Downtime: Train1=1 hrs, Train2= 0.2 hrs, Train3=0.3 hrs
- Cumulative downtime: 1 + 0.2 + 0.3 = 1.5 train/hrs
- Uptime = 200 – 1.5 hrs = 198.5 hrs

**Result:**
- Availability = 198.5/200 = 0.9925 = 99.25%

**Example 3: Large System**

To evaluate the availability of an entire complex system such as Automatic Train Control Equipment, a number of different approaches have been implemented in the industry.

- Hypothetical configuration of a system:
  - 20 on-board controllers on trains;
  - 10 communication devices (Train – Control Centre);
  - 28 wayside units to control the signals and platform doors;
  - 12 wayside units to control the track switches and interlocking; and
  - other equipment.

It seems like the definition of availability of such system is not readily obvious.

**Large System: Solution 1**

The solution is the measuring of availability for multiple equipment groups separately and then combining the results with some weight factors:

- On-Board Equipment;
- Central Equipment;
- Trackside Equipment;
- Platform-based equipment;
- Other equipment.

This approach has the following drawbacks:

- Impossible to compare different sites or different configuration options;
- Complexity in data collection, e.g. much manual data entry;
- Since the passenger service is not directly accounted for, correlation with Customer’s satisfaction is insufficient.

**Large System: Solution 2**

For the reasons stated above, the Solution 1 has been modified by adding the measurements for passenger transportation dependability, like:

- Number of actual vs. planned train-trips during the day; or
- Number of delays during the day, etc.

**Drawbacks:**

- Still impossible to compare different sites;
- Even more complexity;
- Still insufficient correlation with Customer’s satisfaction.

**Large System: Solution 3 (suggested)**

The suggested method is the measuring of the passenger-based availability instead of operator-based:

**Availability = Number of Service Requests Fulfilled/ Number of Service Requests Total, where**

- Service Request is “Getting from Platform A to Platform B in not greater than $T_{AB}$ minutes and with the ride quality $Q$”.

**Features:**

- Easy to compare different sites;
- Can be easily automated in CBTC; and
- Direct measure of Customers’ satisfaction.
“All Origin & Destinations” Approach

In order to provide the most accurate assessment of service availability, it seems reasonable to account, as much as reasonably possible, for each separate passenger’s journey (or that of a group of passengers following the same origin-destination at the same time). The following example illustrates how a downtime event affects different passengers in a different way.

Example: 4-station system

A system has four stations connected by dual track; the traffic is organized in a pinched loop from station “A Eastbound” to “D Eastbound” then to the turn-back, “D Westbound” to “A Westbound”, then another turn-back, and so on.

On the platform “A-Eastbound” (shortened to “AE”) there are 3 passengers boarding, one going to station “B”, one to station “C” and one to station “D”.

This can be represented by the Origin-Destination (O-D) matrix (see, for example, [4]):

<table>
<thead>
<tr>
<th></th>
<th>AE</th>
<th>BE</th>
<th>CE</th>
<th>DE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>BE</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>DE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</table>

Obviously, a delay in B-C segment affects more passengers then in A-B; so, it can be expected the service availability numbers be different for same duration of downtime if locations of the delay event are different.

On many real systems, the O-D matrix is used for planning purposes (to establish the right number of fare gates on each platform, etc.), so this data can also be used for availability calculations as well.

Simulation Study

A simulation study has been conducted in order to evaluate the behaviour of a projected system in the event of a failure.

The model consists of 28 stations on dual track, 19 trains running pinched loop with headway of 7 minutes 18 seconds. The duration of simulated operational day is 16 hrs 58 minutes (1018 minutes). The algorithm of traffic regulation used the so called “headway regulation”; if a train is late, the dwell time at station platform is reduced and braking/acceleration values increased. The system was running as per schedule for some time, and then an emergency break was applied to a single train which was restored in 20 minutes. The trains behind have stopped at a safety distance each after another, thus creating a bunch. As the result, all trains’ schedules were affected; however the automatic regulation brought the system to equilibrium after some time.

The system availability for the operational day was calculated in four different ways, each based upon a specific definition of the term “availability”:

1. Direct application of the definition from EN50126:

   \[ \text{Availability} = \frac{\text{Operating Time} - \text{Downtime}}{\text{Operating Time}} \]

   \[ = \frac{(1018 - 20)}{1018} = 98.04\% \]

2. Same definition, but using the cumulative train-hours instead of system-hours for measuring both the operating time and downtime:

   \[ \text{Availability} = \frac{\text{Cumulative Operating Time} - \text{Cumulative Downtime}}{\text{Cumulative Operating Time}} \]

   \[ = \frac{(1018*19 \text{ trains} - 327)}{(1018*19) = 98.31\%} \]

3. Mission-based definition:

   \[ \text{Availability} = \frac{\text{Number of Train Trips On Time}}{\text{Number of Train Trips Total}} \]

   \[ = \frac{269}{304} = 88.49\% \]

A “train-trip” here is defined as a journey from one end station to the other. A “train-trip on-time” is a train-trip where the train has arrived to destination not later than one headway past the scheduled time. The delay threshold is discussed in the next section. The result of such calculation is also called a “punctuality” or “schedule adherence”, essentially meaning the probability of mission success.

4. Enhanced mission-based definition:

   \[ \text{Availability} = \frac{\text{Number of Train Trips On Time}}{\text{Number of Train Trips Total}} \]

   \[ = \frac{110880}{114912} = 96.49\% \]

“Train-trip” here is defined as a journey from any station to any other station. An end-to-end trip includes multiple trips: the trip from the terminus to all the stations down the road up to and including the station on the other end, then the trips from the second station, and so on. The mission is defined then as having the delay on the trip not greater than the delay threshold. If the number of passengers for each trip were known, this would truly represent the passenger service availability. Without that information, a simple assumption can be made that all pairs of origin-destinations are equal, and the assessment would still be closer to the true service availability than the previous methods.

Delay Threshold

The Delay Threshold is the duration of delay when passengers start to feel that the train is late and the passenger service is compromised. This is a subjective matter, depending on the nature of the system, culture, environment, presence of alternative transportation means, etc.

To evaluate this parameter, public opinion polls can be used; however this would likely be an expensive exercise. The delay threshold is usually set in a range of one peak-hours headway. The value greatly affects the calculation of availability (or Service Punctuality in the following example).

The chart below shows the dependency of calculated train punctuality from the delay threshold for two different methods, based on yet another simulation study.
**Delay Distribution**

Applying the usual statistical techniques to the pool of operational data provides additional visibility to the analysis in order to tell how the transit system is performing, especially when evaluating the results of changes in system configuration (such as routing, scheduling, regulation algorithm, new equipment, etc.). The figure below shows a typical graph of delay distribution probability density. Whilst the so called “string chart” or “time-position diagram” provides a graphic overview of the transit system stability during the operational day, the delay distribution can easily produce the exact number for such parameter as the availability or punctuality.

On the graph, the surface of area A is the probability of delay not exceeding the threshold (delay acceptable, mission successful), area B is for delay exceeding threshold (delay unacceptable, mission failed) so the availability is equal to 1-B/(A+B).

If the delay threshold is unknown, it may be reasonable to set it equal to the headway, since a longer time span between subsequent trains implies greater tolerance.

The next two figures are showing the observed delay distribution from simulation. On the first case, there were no delays in the system. Some fluctuations in the journey time can be explained by the inaccuracies in the traffic regulation algorithm. Ideally, the distribution would have the shape of an infinitely narrow pulse.

In order to obtain a statistic that is independent from headway and delay threshold, a non-dimensional parameter of normalized average delay is introduced as: 

\[ D = \frac{\text{Average of (Delay/Headway)}}{\text{Normalized Delay}} \]

For the distribution above, \( D = 0.69\% \). This means that even a perfectly running system (no failures causing passenger service interruption) has some intrinsic level of noise and the availability is less than 100%.

The second chart represents the delay distribution from a simulation where one train has made an unscheduled stop for 20 minutes.

For this distribution the parameter \( D=2.17\% \). Accordingly, the availability would be 100% - 2.17% = 97.83%, which is closely matching the results obtained by other methods (see section IV, items 1, 2 and 4 above).

**Discussion**

A list of different methods of dependability assessment in transit systems, with comments on the advantages and disadvantages, is provided in the table in Appendix 1. The methods usually represent the viewpoint of the system owner (or consultant) regarding the ways how the system operator must run the system, with the consideration of the lessons learned on the existing projects in the industry.

The methods 7 and 8 look optimistic, 10 and 11 are rather pessimistic, while 3, 5, 11 and 14 fall in the same range. It should be noted though that the simulation example included only one single interruption, whilst in the real operation, failures may overlap each other and failure management be complicated (such as establishing workaround routing), so the method 14 results be more relevant compared to the others.

**Results and Conclusion**

Quantitative assessment of the passenger service dependability provides an important input for the decision-making regarding the development, operation and maintenance of transit systems.

A number of calculation methods exist, which are often project-specific and lack the flexibility to compare different technologies or system configurations, or to adequately handle complex situations. Another weakness is that the assessment is subjective and insufficiently reflects the passengers’ satisfaction with the service.

In order to mitigate the existing flaws in the assessment of service dependability, it is suggested to include all actual origin-destinations in the calculations. Using formal statistics is also suggested.

**Acknowledgements**

I would like to thank Thales Rail Signalling (formerly Alcatel Transport Automation) for supporting the effort of writing this paper, as well as its continued innovation; Firth Whitwam for providing invaluable advice and support; Roger Fradgley, Abe Kanner, Ron Young, Yousef Kimiagar, Doug Tolley of Thales Rail Signalling Solutions as well the colleagues from IEEE Toronto for reviewing the materials; and all the colleagues from the SELTRAC© - user companies in North America, Europe and Asia, their Clients, Consultants and Operators, who were involved in numerous working discussions on the subject.

**References**


<table>
<thead>
<tr>
<th>#</th>
<th>Method</th>
<th>Pros</th>
<th>Contras</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equipment Downtime versus System Operating Hours</td>
<td>Directly follows the textbook definition. Calculations are the simplest.</td>
<td>Only applicable to single items of equipment. No account on whether passenger service was affected.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>2</td>
<td>Equipment downtime, by groups, versus equipment operating time</td>
<td>Applicable to complex systems. Provides some account for the severity of the impact on passenger service.</td>
<td>Subjective in the establishing of groups and weight factors. Some equipment, which is not directly related to the traffic, may be included (like escalators or station cleanliness). No account on whether passenger service was affected. Data collection can be difficult.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>3</td>
<td>System Service Downtime versus System Operating Hours</td>
<td>Provides some account for the severity of the impact on passenger service. Data collection and calculations are simple.</td>
<td>Result depends on the equipment quantity, so adding more trains or stations will lower the results. Increasing the speed would not improve the result of calculations, despite the increase of passenger flow, so the operator is encouraged to provide less service.</td>
<td>98.04%</td>
</tr>
<tr>
<td>4</td>
<td>The longest delay of train departure versus System Operating Hours</td>
<td>Provides some account for the severity of the impact on passenger service. Data collection and calculations are simple.</td>
<td>No account of how the rest of the System has worked when one train was down, so the operator is encouraged to provide less service.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>5</td>
<td>Cumulative Delay versus Cumulative train-hours</td>
<td>Provides improved account for the severity of the impact on passenger service. Data collection and calculations are simple.</td>
<td>This method provides a significantly better correlation with the true service availability than the methods based on system hours. Requires the use of the delay threshold which is subjective. No account for the location of delays and train capacity or speed. Operator is not encouraged to use graceful service degradation techniques.</td>
<td>98.31%</td>
</tr>
<tr>
<td>6</td>
<td>Cumulative Delay versus Cumulative car-hours</td>
<td>Provides even better account for the severity of the impact on passenger service. Data collection and calculations are simple.</td>
<td>Same as above, except that train capacity is accounted for.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>7</td>
<td>Number of actual round-trips versus scheduled</td>
<td>Provides some account for the severity of the impact on passenger service. Data collection and calculations are very simple.</td>
<td>No account for train bunching. No credit for graceful service degradation. If system allows for making up the missing trips, the result is too high.</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: system has made up for missing trips</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Number of actual single-trips versus scheduled</td>
<td>The account for the severity of the impact on passenger service is better than with the previous method. Data collection is still simple.</td>
<td>No account for train bunching. No differentiating of longer trips versus short ones.</td>
<td>100%</td>
</tr>
<tr>
<td>9</td>
<td>Same, with de-bunching provision (minimal headway to be observed to get a credit for the train-trip)</td>
<td>Encourages the operator to prevent train bunching.</td>
<td>Result is widely subjective, which may be sometimes not encouraging the operator to improve the service.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>10</td>
<td>Percentage of end-to-end trips on-time</td>
<td>Provides some account for the severity of the impact on passenger service. Data collection and calculations are very simple.</td>
<td>No credit for trips between intermediary stations, which may be sometimes not encouraging the operator to improve the service. Subjective parameter used (delay threshold).</td>
<td>88.49%</td>
</tr>
<tr>
<td>11</td>
<td>Percentage of all O-D trips on-time</td>
<td>Provides very good account for the severity of the impact on passenger service. Data collection still simple.</td>
<td>Subjective parameter used (delay threshold); however the correlation with passengers' satisfaction seems good.</td>
<td>96.49%</td>
</tr>
<tr>
<td>12</td>
<td>Number of delays in multiple categories</td>
<td>Provides some account for the severity of the impact on passenger service. Data collection and calculations are still simple.</td>
<td>The categories are subjective (e.g. “between X and Y minutes, N delays per day is acceptable”, etc.) The interpretation of the results is subjective, which may be sometimes not encouraging the operator to improve the service.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>13</td>
<td>Combined Statistics</td>
<td>This can provide a comprehensive coverage of various areas in a transit system, including the quality of ride and the amenities.</td>
<td>May result in an estimate which is difficult to interpret by various stakeholders and therefore being of limited value. Calculations are labour-intensive, with many subjective factors. Configuration-specific, impossible to compare different systems or variants of the same system.</td>
<td>Not assessed</td>
</tr>
<tr>
<td>14</td>
<td>Delay distribution analysis with Automatic Train Control data</td>
<td>Configuration-independent, allows comparison of different systems, extensions, upgrades, etc. Correlation with passengers' satisfaction seems good.</td>
<td>This method has yet to be proven in revenue service.</td>
<td>97.83%</td>
</tr>
<tr>
<td>15</td>
<td>Delay distribution analysis with Automatic Train Control data, supplemented by Automatic Fare Collection data</td>
<td>Same as above, with improved accuracy. Most advanced method that allows accounting for actual number of passengers on each train trip. Fare Collection System must allow data transfer. Correlation with passengers' satisfaction seems the most complete.</td>
<td>This method has yet to be proven in revenue service. Access to the fare collection data may be an issue.</td>
<td>Not assessed</td>
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A Day in the Life of a Technician Officer in Previous Years

by Peter Scott, MIRSE

Peter Scott - Technician Officer - Victoria Signalling Centre - 15 October 1983

A DAY IN THE LIFE OF ......

have set my “A Day in the Life Of...” in the 1980s, when I was a Technician Officer at two of the largest installations on the then British Rail Southern Region.

Victoria Signal Centre (VSC), at Clapham Junction, was almost a double signal box with ten operators’ control panels. I was one of the original Technician Officers in 1980.

At that time VSC controlled 1150 train movements every 24 hours. All twelve interlockings were GEC Geographical type, using BR 930 pattern miniature relays.

There were no automatic route setting facilities. A typical day would probably consist of talking a technician through at least one interlocking fault, and handling at least one electronic fault in the train describer or remote control equipment.

You hoped the failures would come in singly, so you were not dealing with more than one at a time. Any time not spent on faults, was usually occupied by sorting out first filament failures. This was a never ending job with 670 coloured light running signals. Some people found this a chore, but I enjoyed seeing the traffic movements on the panel concerned. It gave me as good idea of what the signalman had to contend with, when our equipment let him down. Very often you were so busy you did not get your 20 minutes meal break. This leads me to my first point media attention

On 13 November 1981, whilst I was on duty, two trains collided at Bromley Junction. This area is controlled from Crystal Palace remote relay room.

I noted the positions of track circuits clear and occupied, indications in signals and points, which train descriptions had stepped into the next signal berth and informed my manager. He got the staff out on site. Fortunately there was no loss of life and the only injuries were minor. Both trains were damaged; also repairs were required to a pair of points. This accident happened on a day with little other news, so it was covered extensively on national radio and television stations. A few weeks later, a public enquiry was held at Croydon, at which I gave my evidence. I believe a still photograph was shown of me on the TV that same evening. Following this, various people asked me if I had appeared on the programme. I could see people staring at me in the street and it was nearly a year later when the final person asked me if it was me about my TV appearance!

I am not complaining about this. Perhaps other people have similar stories?

Later on I moved to Three Bridges Signal Centre. This controls the main line to Gatwick Airport and Brighton. In the 1980s, it had seven operator panels, with prototype Automatic Route Setting equipment for the Hayward’s Heath area. The interlockings were a mixture of Free Wired and Westinghouse Westpac Geographical type. There were three lengthy sections of reversible signalling, all implemented with relay circuitry. A typical day, on average, was not quite as busy as VSC, but we seemed to get more right side electronic failures on TDM and FDM systems, due to the greater distances involved. Whilst at Three Bridges, I built a monitoring unit to isolate a faulty section with an FDM fault. I have been told it is still in use.

An interesting incident occurred one morning at Three Bridges when I was called to speak to a Telecoms Technician Officer at Stoats Nest Rely Room. He told me that smoke was coming out of the 650V power supply cabinet. Stoats Nest is at the edge of the London suburban area, 14 miles from London’s Victoria terminus.

It controls the four tracks of the main line, plus two slow line tracks. At that time, the main line had a basic train service of 34 trains per hour. I advised the operators to keep all the points in the normal position, in case we lost all signalling in the area and had to start hand signalling the trains. The local signalling technicians were called to attend at the relay room. On their arrival, the trouble was diagnosed as a faulty contactor on the 650 volts main traction supply.

The relay room’s power supply was reconfigured to the bypass path, taking the smoking equipment out of service. We were then able to change the burnt out contactor at our leisure. This is an example of the usefulness of knowing the traffic movements in an area. However, the failure that I spectacularly came to grief on concerned the main control panel and East Croydon Westpac relay room.

This brings me to my second point, the equipment fault you do not find.

One afternoon, I was called into the panel and informed that hardly any routes could be set at East Croydon. It quickly became apparent that this was a fault affecting more than one of the several interlocking rings in that relay room. The cross ring circuitry proved to be particularly difficult to comprehend. Nevertheless, our East Croydon technicians worked under my direction, observing relay positions and taking voltage readings. No progress was being made, so I escalated the fault to my two immediate superiors, who were both with me at Three Bridges. This failure lasted for about three hours. At its worst point, there were 16 trains at a stand
A DAY IN THE LIFE OF …

between Clapham Junction and East Croydon stations. Salvation came when one of our senior technicians returned from a fault at Billingshurst mechanical signal box. He was able to view the East Croydon failure through fresh eyes. He quickly found a collar had slipped off a warning signal exit button, on the main panel, where we were at Three Bridges. The TDM link to East Croydon was holding one of the interlocking rings off normal and the cross ring circuits had failed the other rings in the relay room. This senior technician was John Rodríguez, who is now a member of this Institution. As a consequence of this serious failure, special Westpac Interlocking courses were arranged for all maintenance staff over the Three Bridges control area. For my part, I dissected the complicated circuitry until I thoroughly understood it, then typed out a simplified sheet explaining the cross ring circuitry. The explanation sheet was widely circulated over the Three Bridges area. For my part, I

I gain from being a member of the ‘Institution.

Within the past five years, I have been told this explanation sheet has been used on a failure at Brighton relay room.

Has anyone else had a similar experience?

Part of “A Day in the Life Of…” entails me saying what I gain from being a member of the ‘Institution. Nowadays, I get a lot of satisfaction from my Institution membership, but in the 1980s, the IRSE was a bit above my head. However, there were certain papers I did enjoy, such as one that described reversible signalling between Didcot and Swindon.

This leads me to my third point, the Southern Region S & T Technical Society

This Society was affiliated to the IRSE. I was very keen on this. Some marvellous papers were read out, such as Southern Region Electrification and London Bridge Resignalling. I thought some of the visits were very interesting. I went to Henley on Thames, where the mechanical inter lever locking had been replaced by electronic devices. I have been told that the IRSE did not visit this installation, though I stand to be corrected on that point. On another visit, some members walked across the rail bridge from Gateshead to Newcastle, before the Tyneside Metro opened to passengers. One year I was also the President of the Society.

On another occasion, I wrote a paper on the topic “Isle of Wight Tokenless Block”. At the time of reading the paper, I was disappointed with the low turnout, but extremely pleased to hear it was used to understand the workings of that block system, when alterations were undertaken during the Network Southeast era. I think our Technical Society finished as a consequence of a reorganisation which removed our new works staff from the Southern Region and made them a function of the whole of British Rail. Whatever happened, I am sorry we lost it.

It provided a forum where topics could be quite local in character.

In conclusion, I have tried to raise some topics which I have never seen discussed before, in the hope that other people find them interesting. Any opinions expressed are, of course, my own.

£7.8M IMPROVEMENT AT FALMOUTH

The scheme to double the number of train services on the Falmouth branch line in Cornwall, UK has entered a vital stage. The additional 400 metres-long track, which is a key element to help deliver two trains per hour at peak period, was installed during a massive programme of work on 13 – 17 October and 20 -24 October 2008.

The extra track creates a passing loop adjacent to Penryn Station to enable two-way movement of trains. Work has also begun at the Penryn station, where its platform will be extended to cope with additional passengers that the new services will bring. Existing signalling systems will also be modernised to bring a more reliable service to passengers.

The project, which is jointly funded by the European Regional Development Fund, Cornwall County Council and Network Rail, is due to be completed by next Spring to coincide with First Great Western’s new train timetable.

The railway line between Truro and Falmouth is approximately 18 km (11 miles) long with a running time of slightly more than twenty minutes. However, the interval between each service varies and passengers sometimes have to wait up to two hours for the next train to arrive. The irregularity in services and inconsistency in departure time will be standardised when the time-table changes in 2009.

Over the past ten years, the number of journeys made on this line has increased by 67% with 261,000 journeys made in 2007 alone. Passenger demand is expected to grow further as Truro, Penryn and Falmouth continue to develop.

This improvement scheme also forms a key part of Truro’s integrated transport strategy that includes improvements to all modes.

The vital programme of work was arranged to coincide with pre-planned line closure organised 18 months in advance, so that service disruption is minimised. In addition, there was also a replacement bus service for passengers travelling during that period.

After the line re-opened, signalling work between Truro and Penryn continues over the next six months with no disruption to passengers. The project is managed by Network Rail and delivered by Amey LG Ltd.

The Falmouth branch project is part of a raft of improvements being carried out in the area
The Manchester South resignalling plan centred on Stockport with an area fringing to Crewe, Manchester and Stoke signalling centres, plus fringe boxes on the Stalybridge and Chester lines. Important junctions within the scheme were at Stockport Edgeley, Slade Lane, Heaton Norris, Cheadle Hulme, Wilmslow, Sandbach, plus the loop at Macclesfield. The existing signal boxes ranged in age from the 1880s to the 1950s but the signalling equipment essentially dated from the time of electrification. The signalling was worn out, with wire degradation being a particular worry at Sandbach and Wilmslow. Renewal was therefore seen as urgent and needed to coincide with track renewals on the route, the complete remodelling at Stockport and the introduction of bi-directional working.

The initial proposition, to use the Ansaldo product as used on Channel Tunnel Rail Link, was quickly dropped as it could not be introduced into the UK within the project timescales. However, in Italy in 1998, Ansaldo had successfully deployed a new computer based interlocking, ACC (Apparato Centrale a Calcolatore) for the main station in Rome. Having seen this in operation, Railtrack was impressed with its capabilities and suitability for large complex layouts. Thus a partnership contract was set up on a ‘targeted cost plus’ basis to introduce the product for the Manchester South project. Stage A would be Cheadle Hulme and stages B & C were to be Stockport. Later stages would include the lines to Crewe and Macclesfield. AMEC were brought in as the principal contractor and would do the Overhead Line Equipment, Permanent Way and civil works. These were of greater cost than the signalling.

When the design was submitted to the Safety Acceptance Panel (SAP), it was evident a shared view as to the process for product introduction did not exist. The project was therefore stopped while Atkins joined the team to assist with meeting the UK safety case expectations.
The Stockport Dilemma

The project now faced a combination of a delayed product introduction and a constrained end date for the full modernisation of the Stockport area in time for the improved London Manchester service.

To achieve the desired layout and running direction transpositions, a lengthy blockade and a significant period where only two tracks would have been available for the main through route to Manchester would have been involved. Late in the day it was recognised that while the plans were developed, the necessary consultations with the operating authorities had not progressed to schedule and Train and Freight Operating Companies’ operational acceptance of the overall service disruption from the combined track and signalling work was going to be difficult.

With the Train Operating Companies very uneasy about all this, a cautious policy was adopted and Railtrack (now Network Rail, NR) abandoned the original intentions. In order to meet the schedule, the signalling and construction plans and stages were simplified by retaining the basic existing layout and refitting the five existing signal boxes with new or refurbished conventional signalling equipment. Work proceeded, including a blockade to do more limited Permanent Way renewals in the station area, and was completed in 2004.

Cheadle Hulme

Clearly there was much to learn on how to adapt the Ansaldo equipment for use in the UK. Atkins was asked to give an independent assessment of the situation and, after a visit to Italy, confirmed that the system had much potential with many features that they considered could benefit the UK railway. They did stress the need to understand the technology and safety on a ‘total system’ basis, which was a different approach to that previously adopted. This had focussed more on establishing stand-alone fail safe elements within the system.

Thus a framework contract with AMEC, Ansaldo and Atkins was set up to develop the design for Cheadle Hulme junction with the minimum adaptation work to meet UK rules and with no change to the core software.

Mott MacDonald was appointed as the Independent Safety Assessor (ISA), having had the necessary experience to see the bigger picture and who in conjunction with the Network Rail Safety Review Panel declared the system as potentially fit for purpose and capable of meeting the appropriate operating rules.

In essence Atkins took on the task of documenting what the customer wanted the system to do, and Ansaldo focused on delivering that functionality. This led to the production of a complete suite of documentation to define the required signalling principles and to produce matching control tables. This work was done in parallel to NR signalling principles developed for Horsham and subsequent modifications to produce a standard.

Lessons learnt from this exercise were that the principles embedded in each of the major new interlocking systems introduced to the UK in this period were similar but not harmonised. Network Rail recognised these problems and in 2005 issued a CD with the baseline of signalling principles but still leaving combinational circumstances open to interpretation. This ongoing weakness has been recognised and, under the auspices of an IRSE forum, a study is now underway.

The scheme plan was developed by the project team but was subject to acceptance by NR designers who had the difficult task of resolving emerging issues that should have rightly been sorted out earlier by Railtrack and Her Majesty’s Railway Inspectorate in establishing the requirements.

Development of control tables was adversely impacted by these issues and getting these aligned to the interlocking logic proved an uphill challenge. Consequently a high level of control table change has been necessary to ensure appropriate logic re-use.

A further major task was development of a specification for the Signaller / Maintainer Man/Machine Interfaces in terms of alarms and indications. In particular NR wished to implement a ‘point and click’ operating mode whereas Italian practice was to use a functional keyboard. The new signalling for Cheadle Hulme junction did progress, being controlled from a new Signalling Centre located at Stockport Edgeley, and was finally commissioned in early 2003 without some of the scheme features required, e.g. bi-directional operation.

Only a percentage of the Ansaldo system ‘logic’ capability was used at this stage as the scope had been deliberately reduced to keep the approvals necessary to the minimum.

Signal Heads and Point Machines

The Ansaldo system uses a signal head design, SDO (Segnale Dicroico Ottico), that was offered as being integral to the system and giving maintainer diagnostic information. The ACC product provides high levels of diagnostics for attached products. To do this a tight integration is needed between the interlocking and each product. This means that individual ‘static drives’ are produced for frequently used products such as signals, points and track circuits.

For Manchester, initial investigation to produce a ‘static drive’ to handle the only approved UK LED signal highlighted product issues such that the alternate SDO signal was preferred.

Described as an electronic version of the 1950s searchlight signal, the SDO signal uses dichroic mirrors and filters to obtain the correct colours from the conventional quartz halogen lamps. This gives a more intense but narrower beam of light as compared to the standard UK signal head or its modern LED equivalent. The signal aspect displayed is controlled by a specific tone transmitted from the nearest lineside ‘peripheral location’. This means that a 2 core cable replaces the traditional multi-core cabling thus saving installation time and cost.

Virgin Trains then commissioned a study to see whether the new signals would be acceptable to their drivers. Perhaps inevitably, this resulted in an adverse report and a plea to use standard signals. Interestingly, the other Train Operating Companies using the line registered no criticism. The visibility of the SDO signal was at the crux of the problem particularly when drivers were close up to the signal. Lots of negotiations and tests were carried out, which all took time. Part of the problem arose because standards engineers had insisted that only one type of ‘lens’ be fitted in keeping with traditional BR signals having a standard lens. With a narrower light beam it was evident on pre-commissioning runs that some SDO signals were not as viewable as they could be. Ansaldo was then permitted to fit appropriate lenses (selected from a set of four) which considerably improved matters. The conclusion was that the SDO signals were considered to align with Group Standards and as such were acceptable. A promise to look at using standard signals on the next section was given by the project team.
A point machine new to the UK was also introduced, the Ansaldo type T72. This had been in production with satisfactory service on lines in continental Europe. The machine works with a separate facing point Clamplock called VCC and made by Cogifer. A minor non-compliance with gauge limits was found in relation to the VCC and the heater element was removed at customer instruction to overcome this.

During the early days of operation, problems emerged with the detection mechanism on inclined switches, the cable connector, and with installation, which led to an initial reputation for poor reliability. The detector problems were diagnosed as due to damage by works trains / yellow plant together with condensation due to the removal of heating elements. Both issues have been corrected and the point machines now work well. A recent comparison with a traditional UK point machine installation has shown that the T72 installation today offers superior dependability. It is approved by NR for high speed facing point application.

**Cheadle Hulme to Crewe**

With stage A of the project commissioned and Stockport no longer part of it, extending the system to Wilmslow, Sandbach and Crewe should have been straightforward. A first step was to add more functionality to the Cheadle Hulme junction area and this was done progressively: full Train Protection Warning System operation and the latest hardware and software, plus making provision for bi-directional working on the next stage.

In parallel with development work on areas B & C at Stockport, a separate NR team had developed route renewal works for the route through Sandbach and Wilmslow, to be followed by Macclesfield. With advice from Atkins, NR made a strategic decision to extend ACC application towards Crewe, but to re-fettle the 1950s signalbox at Macclesfield.

How then to expand the system to this section of line? Three ACC interlockings had been purchased: 1 in use (Cheadle Hulme), 1 for training and 1 as a test bed to keep spares ‘warm’. The original intention was to use a second interlocking for the Wilmslow, Sandbach and Crewe section, even though this would mean Ansaldo having to go through a cross acceptance approvals process for the interlocking serial interface.

Following consultation and debate, it was jointly decided to structure the new requirements on to the Cheadle Hulme interlocking. This was to be a challenge in terms of its size limits.

Work started in August 2005 to try and squeeze the new section into the Cheadle Hulme interlocking by firstly finding savings in code, secondly stripping out the non-vital elements in the interlocking and thirdly increasing cycle time. The new cycle time initially introduced transient problems, thus causing unforeseen errors on the working system. While the system hardware was installed and made ready for use, late delivery of flawed control tables (Feb 2006) to Ansaldo, meant that there was no possibility of tested application data being available for a March 2006 commissioning and return to traffic. A single full test cycle would typically take three months for a control area of this size. Non-signalling works were also being delayed for other reasons.

The blockade from Christmas 2005 to March 2006 did proceed in order to get the P-Way renewals done, but at its end, there was no signalling system to commission and the line remained closed.

How then to get the trains running again? With the guidance of the ISA, a cautious stage by stage resolution was devised. Firstly, a simplified unidirectional railway with no junctions was devised. The Operators were desperate to get the railway back and co-operated to the full with revised operating rules. The SDO signals were kept to the dismay of some Virgin managers but in general the drivers accepted this. A turn back loop at Wilmslow was permitted with strictly controlled operating conditions so that trains from the Styal line could reverse.

By July 2006, despite problems caused by installation of earthing and bonding not being to the stated specification, trains were running again. Subsequent stages saw the junctions at Wilmslow and Sandbach brought into use, the connection made to the Crewe avoiding lines and finally a bi-directional working capability introduced at the end of 2007. Great care was taken over the safety certification of the latter to ensure that the potential for a head on collision was avoided in all circumstances.

The signalling is now in full operation and provides a very reliable system.

**Lessons to be Learned**

This project progress has been an embarrassment but provides a textbook exercise in situation recovery that should provide a number of key lessons for all parties.

The main factors would seem to be:

- Projects that introduce significant technology need to be managed as engineering projects with suitable provision for addressing risk in both specification and deliverables;
- Procurement groups, whilst not necessarily understanding all the technical detail of a system, must be conversant with all the implications;
- Ensure that Procurement and Engineering functions work as a team;
- Signalling Principles, Operating Rules and User Interface Requirements must be explicitly documented using methodology that minimises ambiguity, be consistent and not be capable of differing end user interpretation;
- Do not let comparative Junior Engineers, flush with enthusiasm but lacking in knowledge and experience, be empowered to make contract changes;
- Avoid ‘preference engineering’ decisions by engineers who have ‘always done it that way’;
- When buying a developed system then take a systems approach, understand what it can do and also what it cannot do;
- Have an open mind to the use of new equipment that works well elsewhere, flexing standards if need be to avoid design changes;
- Minimise conditions attached to scheme plan approval and once a scheme scope is signed off, avoid changes unless proven essential;
- Work with Safety Experts to reach a safe, signed off solution, regardless of whether this deviates from strict compliance with standards.

So where does this leave the Ansaldo ACC product? With the Stockport area served by refurbished mechanical signal boxes and similar work having been done at Macclesfield, it is unlikely that the project will be extended to serve these areas until condition dictates renewal.
The SDO signals continue to be controversial in terms of viewing acceptability and lamp voltage stabilisation. Ansaldo and NR are jointly resolving both problems by gaining a better understanding of the design criteria for colour, brightness and visibility requirements. It is unlikely that the SDO signals will be used in future outside the Manchester South area but a generic interface is now available that allows the ACC system to work with other approved UK signals.

Another recent development has been an integrated axle count option to the ACC interlocking, thus not only permitting the use of axle counters instead of track circuits, but avoiding the need for separate external circuitry for the verification process.

The Ansaldo ACC product has now come through its UK baptism. With many ACC systems in use, it is a mature product with ongoing investment into sustaining its technical capability for handling complex signalling requirements. Current hardware platforms extend the geographic capability while the software has been enhanced to permit one platform to support multiple ‘virtual interlocking’ systems. This means that in large installations, the facility to test changes can be restricted to a pre-defined area of impact without a designer or tester having to determine the extent of the re-test scope. Such a facility can offer genuine efficiency benefits to signalling projects of the future.

Part 2 of this article, a consideration of the Portsmouth Area Resignalling Scheme, will appear in the December Issue of IRSE NEWS

Crossword No 8 by Locking Fitter

Across
1 A 19th century crossing keeper’s house (5)
4 and 9 across An Argentinian King lever (7 & 7)
7 He designed some of the first locking frames (8)
9 See 4 across
11 An Italian sausage (6)
14 Units of resistance (4)
16 To catch breath (4)
18 Italian painter (6)
21 A South Eastern & Chatham Railway station, or cereal (3)
22 Forget this station’s Wells (7)
24 Part of a relay (8)
25 Wild, frenzied (7)
26 International paint manufacturer, recently part of ICI (5)

Down
1 A cabinet used to house equipment (8)
2 Usually hung above a lever frame (7)
3 To carve or mould in relief (6)
4 Think of hair and football pools! (4)
5 A North British Railway station (7)
6 You need at least one for locking, or at sea (5)
8 A desert (6)
12 Changes (6)
13 A useful book or a useless process (8)
15 One of Mr Saxby’s rivals (7)
17 An aircraft’s wing or fin (7)
19 Sea-nymph (6)
20 You need miles or kilometres of this (5)
23 Do not criticise this illustrious Past President (4)
Licensing Scheme Finances

by Ken Burrage

People sometimes ask how the Licensing Scheme is financed and a common misconception is that the Institution somehow uses our IRSE membership subscriptions to help run the Licensing Scheme (or even vice-versa!); nothing could be further from the truth! Unease is also expressed about the licence fees that are charged, the perceived expense to obtain a licence and the cost to the S&T industry of using the Licensing Scheme as their competence management and certification system.

Some facts about the scheme

- It was originally set up in 1994 at the request of BR and LUL and with support from BR, LUL and the Railway Industry Association.
- It is a non-profit making activity that has to cover all its own costs and is operated at arms length from the main Institution.
- It publishes generic competence standards in S&T activities as determined by the users.
- It approves and audits Assessing Agencies who carry out the competence assessment process on behalf of the IRSE.
- It approves the appointment of Competence Assessors who carry out the assessments.
- It checks the assessments and issues licences via the Assessing Agencies.
- It operates a formal complaints process.

The whole scheme complies with ISO 17024, the International Standard for the Assessment and Certification of Personnel, and is audited annually for continued compliance with this standard by the UK Accreditation service (UKAS).

### Scheme Finances

The finances for a typical year currently look like this and details for any particular year can be found in the Institution’s annual accounts that are published each year in the IRSE Annual Report that is circulated to all members. The same information is lodged with the Charity Commission and Companies House in the UK.

Note that the actual cost of Appraisal Engineers’ audits is budgeted to be exactly balanced by the income. The IRSE’s costs for administering the audits are covered by the income from Assessing Agent annual registration fees.

#### Costs of Operation

<table>
<thead>
<tr>
<th>Description</th>
<th>Typical £,000 per annum</th>
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<tbody>
<tr>
<td>To operate the Scheme requires the full time employment of the Licensing Registrar and three members of staff to help with the administration. The costs of their employment (i.e. their salaries, pension provision and National Insurance, a proportion of the overhead allocation covering management costs and their office accommodation and IT equipment to enable them to do their job).</td>
<td>210</td>
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<tr>
<td>Fees for Appraisal Engineers (who audit the Assessing Agencies and Competence Assessors on behalf of the Scheme).</td>
<td>70</td>
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<td>Printing (including the logbooks), stationery, postage, telephone and other miscellaneous office expenses.</td>
<td>20</td>
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<td>Accreditation by UKAS.</td>
<td>8</td>
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<td>Insurance.</td>
<td>10</td>
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<tr>
<td>Depreciation of licensing specific office assets.</td>
<td>2</td>
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<tr>
<td>Reviewing existing and defining new licence standards.</td>
<td>40</td>
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<tr>
<td><strong>Total cost of operating the Licensing Scheme.</strong></td>
<td><strong>360</strong></td>
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</table>

#### Income received

- About 1400 new or renewed licences are issued each year and licence fees are taken into the income account equally over the 5 years a licence is valid. At £110 per licence the year’s income amounts to receipts of £30,800 from the fees for the first year of new or renewed licences. To this is added deferred fees of £169,200 for licences issued in previous years. Total licence fee income per annum.

- Receipts from the sale of Logbooks.                                        | 20                      |
- Assessing Agencies annual registration fees.                                | 60                      |
- Assessing Agency and Competence Assessment audit fees.                     | 70                      |
- Bank interest.                                                             | 10                      |

**Total Income received from operating the Scheme.** 360
LICENCES FEES

When the annual budget is drawn up for the Scheme the fees are set so that the income received will balance the costs of operation. In this way the requirement that the Scheme shall cover all its costs of operation and not use any funds of IRSE members is fulfilled.

The fees charged are reviewed each year and it has been possible to reduce the licence fees recently. The IRSE current fee for the photo card licence is £110 (excluding VAT) for a licence lasting five years. £22 a year or about 40p a week does not seem too much to pay for a widely recognised competence certification. The workplace and competence assessments are usually undertaken by the employer at their own cost as part of their duty to comply with the law in the UK that requires all persons engaged on safety-critical S&T work to be assessed as being competent.

If, in any year, a surplus of income over expenditure is achieved this is allocated to a Development Fund and is used in subsequent years to fund revisions and improvements to the Scheme.

Costs to Industry

There is a perception that the Licensing Scheme pushes up industry costs without significantly improving the calibre of the profession. It is not as expensive as people imagine or some people claim. Most of the costs have to be incurred in any case. Good practice in engineering requires that individuals keep a record of their work experience and continuing professional development activities. So keeping a logbook up to date with these details is the responsibility of every individual engineer and technician and should be done anyway. The law in the UK requires that all persons engaged on safety-critical S&T work to be assessed as being competent. Employers have to use an effective competence management system to do this. The IRSE Licensing Scheme provides a ready-made framework to meet both the legal requirements of the ROGS Regulations and the individual’s obligation to keep relevant work records.

The additional costs to the employer of using the IRSE Licensing Scheme are minimal. Basically they are £11.00 per individual for each a 5-year licence issued, plus the annual fees for approving and auditing the employer’s Assessing Agency, which in total when compared to a typical company turnover, is a very small amount (about £5k per annum). If employers do not use the ready made and approved IRSE Scheme they have to incur costs to develop and operate their own arrangements to comply with the law in the UK. Their arrangements may not be recognised anywhere else outside their own company. The feedback from a recent IRSE membership survey shows that 67% of respondents consider that the Licensing Scheme provides a valuable service to the profession.

Although it is quite possible for employers to produce their own internal competence assessment scheme, in practice, if it is done properly, this is likely to be just as expensive as using the Licensing Scheme. However the costs of operating a separate in house scheme may not be so visible to the employer and their staff, creating the false impression that Licensing is relatively expensive.

IRSE COUNCIL MEMBERS SESSION 2008/2009

<table>
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<tr>
<th>Voting members</th>
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<td>President</td>
<td>Alan Fisher</td>
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<td>Senior Vice President</td>
<td>Frans Heijnen</td>
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<tr>
<td>Junior Vice President</td>
<td>Paul Jenkins</td>
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<td>Ten Fellows</td>
<td>Francis How</td>
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<td>Jim Irwin</td>
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<td>Ian Mitchell</td>
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<td>Charles Page</td>
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<td>Miss Andrea Parker</td>
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<td>Mrs Claire Porter</td>
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<td>Dr Alan Rumsey</td>
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<td>Christian Sevestre</td>
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<td>David Weedon</td>
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<td>Tony Kornas</td>
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<td>Daniel Woodland</td>
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<td>Nick Wright</td>
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<td>Two Associate Members</td>
<td>Buddha Chowdhury</td>
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<td>Douglas Young</td>
<td>Three Co-Opted Past Presidents</td>
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<td>Wim Coenraad</td>
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<td>John Francis</td>
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<td>Jacques Poré</td>
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<td>Non-voting Officers</td>
<td>Colin Porter</td>
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<tr>
<td>Chief Executive</td>
<td>Martin Govas</td>
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<tr>
<td>Treasurer</td>
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<td>Membership Manager</td>
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<td>Other attendees</td>
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<tr>
<td>Chairman Licensing Committee</td>
<td>K Burrage</td>
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<tr>
<td>Chairman Professional Dev Ctee</td>
<td>A Smith</td>
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<tr>
<td>Editor, IRSE NEWS</td>
<td>I Allison</td>
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<tr>
<td>Chairmen of other committees</td>
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CONCLUSION

The Institution operates the Licensing Scheme because the major employers of persons undertaking safety-critical signalling and telecommunications work in the UK asked the IRSE, as an independent authoritative professional body, to do so on behalf of the S&T industry.

The Institution undertakes this task on a non-profit making basis as part of its mission to fulfil its objective to maintain high standards of practice and professional care amongst those working within the industry and the promotion of improved safety standards for the protection of the general public.
York Section

The Chairman, Tony Kornas, welcomed 44 members and five guests to the final Technical Meeting of the 2007/08 session on Thursday 6 March 2008. The meeting took place in the Courtyard Room of the Bar Convent in Blossom Street in York.

The evening’s talk was to have been presented by Mark O’Neill but as he was out of the country Gilbert Moens, Project Engineering Manager at Systra kindly stepped in to present his talk “Channel Tunnel Rail Link, Signalling System”.

Gilbert began by giving a description of the route of Section 2 of the Channel Tunnel Rail Link, with new stations at Stratford in East London and Ebbsfleet in North Kent.

The new terminus at St. Pancras will enable faster international travel from the Midlands and the North. The distance from St. Pancras to the Channel Tunnel is 109 km with a maximum design speed of 300 km/h. The forecast usage is eight Eurostars and eight domestic trains per hour each way. Anticipated journey times are 35mins from St. Pancras to the Channel Tunnel and 2 hours 15 minutes to Paris and 1 hour 51 minutes to Brussels.

The Operating characteristics are three-minute headways, a fixed block system with cab signalling and full Automatic Train Protection (ATP), TVM 430 fitted along the route and lineside signalling with ATP at St. Pancras.

Block sections are divided with block section markers, which are used to protect routes and particular locations (viaducts, tunnels etc.). There also stop and proceed Block Section Markers and Shunt Markers which are mainly used for turn back movements. Engineering possessions are based on the SNCF and Eurotunnel “EZP” arrangements. Engineering Zone Possessions (EZP) are protected by the signaller maintaining route origin markers and signals closed for routes towards the EZP area. At the trackside the Responsible Person on Site (RPOS) operates a switch in co-operation with the signaller to apply the protection. This allows for a much faster taking and surrendering of possessions including specific identification of the RPOS. Points can be manually operated by train crews by use of an “Annetts Key”, which when used results in a loss of detection.

Also at the trackside is a co-operative release for use in times of track circuit failure, which releases track circuit locking and sectional route release but does not allow clearance of signals or opening of stop markers. Temporary speed restrictions of 80 km/h, 160 km/h can be imposed from each signalling relay room and additionally 230 km/h can be imposed from the route control centre.

At the interfaces with cab signalling it is important that the cab signalling and ATP system are closely co-ordinated. The interlocking uses three processors and interfaces with external equipment via a track interface rack containing relays.

The cab signalling and ATP system (TVM430), is similar to the one used on French high speed lines, Eurotunnel, Belgian high speed line and Korean high speed line. It is a continuous track-to-train transmission using track circuits. There is also an intermittent transmission by cable loops for specific functions such as Cab Signalling arming/disarming process, traction power on-board circuit breaker and lower pantographs sequences, and train stop functions. The trackside data gives the speed at the entrance to the block section, the speed at the end of the block section and the speed at the end of the next block section which is displayed in the cab as an initial intervention speed and a final intervention speed, thus at any block section the train speed can be controlled.

Design and testing of the system was initially carried out in a laboratory, then a test of the system in the factory before final testing on site.

St. Pancras is equipped with ITCS and conventional lineside signalling and for consistency CTRL signalling arrangements such as EZP, manual operation of points, local release of signalling controls and automatic Overhead Line Equipment protection is provided. The trackside signalling equipment comprises fibre-optic type signals, TPWS, High Performance Switch System point machines and High Voltage Impulse track circuits. The interface with ITCS is managed by relays. At the interfaces with cab signalling it is armed at the last conventional signal and the conventional lineside protection is disarmed at the approach to the first block section marker. When approaching conventional signalling the cab signal is maintained until the approach to the first signal and the lineside protection is armed after passing the last block section marker.

Tony Kornas, Andrew Smith, Richard Genner, Quentin MacDonald, Richard Parker, Chris Anderson, Bruce MacDouall and Denis Bowby took part in the question and answer session that followed. The Vote of Thanks was given by Richard Genner of Atkins who sponsored this meeting.
Midland & North Western Section

The 2008/2009 session was off to a driving start for the Section, with a visit to the M6 Toll Road control centre at Weeford in Staffordshire on Tuesday 16 September. The company kindly invited the section to participate in a very informative presentation, followed by a visit to the control room and to a toll collection plaza.

Many people have the impression that the road is always very quiet, and indeed, when compared with the original M6 through the Birmingham corridor, it is. However, the Toll Road carries around 180 000 vehicles per day, with around 10 000 vehicles per hour between 07:00 and 21:00. An average journey on the original road can take 74 minutes to complete the 26 miles (43 km) which is approximately 21 mph (34.5 km/h)) between the two ends of the Toll Road, compared with around 25 minutes on the new road, including paying the toll on exiting.

SYSTEMS

The 38 toll booths and their associated lanes contain a vast amount of technology, which is used to assess the class of vehicle passing through, read tags inside vehicles, operate the barrier once the toll is paid and communications with the control centre. The whole toll plaza is covered by Closed Circuit Television and the system can photograph your number plate should you decide payment is not for you. Even the money collection machines are complex, capable of accepting coins in pounds or in euros (the latter is not enabled yet), a mixture of both, or by credit card. Manual payment is also possible where change is required. All lanes can operate as either automatic, manual or by pre-paid tag, each being configured by the control room, depending on traffic conditions and time of the day.

Tags are pre-paid devices, which have a value deducted each time the tag is used. They are ‘interoperable’ in the sense that systems used on the M6 Toll Road are compatible with those used for congestion charging in London, other UK toll roads and many systems throughout Europe. The stumbling block to making them truly interoperable is how to set up the commercial conditions between the various entities involved in road charging. 30 000 M6 tags have been issued to date on some 16 000 different accounts. Vehicles that have a tag do not need to stop, passing through the plaza at up to 20 mph (33 km/h), increasing throughput considerably.

A looped fibre cable covers the majority of the length of the road, carrying the video signals from each camera, commands from the control centre and reporting from the toll booths. Voice over Internet Protocol (VoIP) is used throughout for verbal communication, including the 131 motorway emergency telephones. First line maintenance is carried out by the company, with second line being sub-contracted to Ascom, who can access the communications network directly using Virtual Private Network (VPN) technology. Some surprising systems elements were discovered on the visit, such as the submersible pumping system at Lichfield where the road dips under the Birmingham to Wichnor Junction railway line and is lower than the surrounding water table.

Toll collection is extremely important to the business as it is their only source of revenue. The road was built with £880m of private investment (plus a Department for Environment, Transport and the Regions (DETR) grant of £20m for widening the M42 link), which is to be recovered through tolls during their 53 year concession. £90m alone was spent on the purchase of land. For this reason, power supplies are secured via a 1 MW dedicated sub-station at Lichfield backed up with a generator; with further back-up at each toll booth via 3 hour Uninterruptible Power Supplies (UPS).

RENEWALS

The company has a 50 year plan to manage its systems infrastructure, based on a renewal of most components every 15 years, with the associated costs of replacement being built into the overall business plan. As computer technology moves on ever quicker, it becomes increasingly difficult to maintain equipment beyond this point, for example Windows 2000 is the core of many pieces of the Toll Road software, which Microsoft has already moved through various iterations to Vista.

Just in case you are wondering, the M6 Toll Road is part of the national road network and normal rules apply. The individuals that thought they could not be charged with speeding offences, can have a few beers before driving, can ride their pushbikes along the road or go for a walk along the hard shoulder, were all sadly misguided.

Ian R Bridges

All photos: Allison Railways Ltd
SECTION NEWS

Opposite page and left:
Inside the M6 Toll Road Control Centre
Right top to bottom:
IRSE members and visitors outside the Control Centre
Typical Toll Collection Plaza in operation
IRSE members and visitors observe a typical Toll Collection Plaza in operation
Typical Toll Collection Plaza
Toll Booth Layout
Having been 10 years since the views of the membership were last canvassed, Council has been eager to obtain updated feedback on the usefulness of the Institution and on how well it is performing in its stated roles. A Working Party1,2, was therefore established, which drafted out the contents of a Questionnaire that was then distributed to 3589 members in June 2007.

1 The working party consisted of Peter Batley (Chairman), Peter Stanley, Paul Jenkins and Andrea Parker.

A total of 526 responses, representing 15% of those sent out, were returned. The contents of these were input into a database, by Ken Burrage, enabling the Working Party to analyse them in detail and produce a report for Council. This report documented the analysis and, based on the responses received, listed suggestions aimed at change and improvement.

The questionnaire comprised eight sections:
1: Demographics/Profile
2: Questions regarding the IRSE
3: Publications
4: Technical Meetings and Visits
5: IRSE Professional Examination
6: Other Activities
7: Younger Members Activities
8: Licensing Scheme

Here now is a summary of the results, by section, together with the suggested actions that are to be taken forward with the aim of improving the Institution.

Demographics/Profile

In this first section the questions asked were the usual ones about name, age, sex, grade of membership and employment details designed to obtain the overall profile of those responding.

The responses received were from a reasonably representative group of the total membership, considering age, location and grade of membership, although there was a slightly higher proportion of older members and Fellows.

Whilst it is likely that the majority of the responses will have been from active members or members who wished to express specific views, the response rate was such that those received were considered to be statistically significant for the Institution membership as a whole.

Interestingly just over one-half of those who responded said they paid their own subscriptions. It was noted that the number of people engaged in construction and maintenance was quite low, although this may be masked by the 30% who work in management. Based on the demographic information received it was thought that it would be beneficial if the proportions of both younger members and of women in the IRSE could be increased.

**Suggested actions**

- Devise initiatives to recruit more younger members;
- Find a way of attracting more women into the profession and thus membership;
- Increase the number of members who work in construction and maintenance.

Questions Regarding the IRSE

This section, the largest and perhaps most important of the questionnaire, asked general questions about the Institution – was it still fulfilling its original aims, why are you a member, does the Institution have a reasonable public profile and the perennial ‘does the name need to be changed?’ In addition, questions were posed about the perceived views of non-members, and membership of, and comparison with, other Institutions.

Nearly three-quarters of respondents were members of another professional Institution with a very high proportion of these declaring that the IRSE gave the same or better value, but a significant number would like to see more technical information available on it, together with the ability to pay subscriptions on-line.

About one-half of respondents agreed, and a further one-third strongly agreed, that the Institution should adopt a higher public profile and comment upon topical issues relevant to signalling and telecoms.

One-third of respondents considered that the Institution was not perceived as being slow to endorse emerging technology, whereas a slightly higher proportion considered that it was.

A little over one-half said that their organisation encouraged them to be a member of the IRSE but rather less thought they were encouraged to participate in events whilst just over one-quarter said that membership was a requirement of their job. A desire to hold more meetings away from London was expressed.

Well over one-half found the website useful, but a significant number would like to see more technical information available on it, together with the ability to pay subscriptions on-line.

**Suggested actions**

- Further assess and decide whether an improvement in IRSE standing should be sought and if so how it might be achieved;
- Check the perception of the IRSE with non-members and stakeholders to see how large a problem this is. Specific actions to improve perception include:-
  - Portray younger people in publicity material/web-site, etc;
  - Publish the facts about age and length of membership;
  - Reduce the amount of historic/steam/mechanical articles in IRSE NEWS;
  - Encourage more younger members to join.
- Be more proactive on policy issues and publicise views more widely. Review and develop the IRSE policy statement on engagement with governments, public bodies and other institutions inter-nationally;
- Provide searching but factual articles in IRSE NEWS and in the lecture.
programme on problems, and lead more on technology advances and implications;

✓ Set Local Sections the task of covering new technology as part of their programme (if they do not already);

✓ Review collaborative arrangements with other institutions, possibly using the Railway Engineers Forum as a vehicle;

✓ Test employers’ support for the IRSE via the stakeholder interviews;

✓ Encourage wider representation amongst the membership, including technicians/maintainers, etc;

✓ Consider holding more regional events, including overseas;

✓ Improve the website to provide better access to information;

✓ Publicise the features of the website in a future edition of IRSE NEWS;

✓ Consider engaging professional assistance to upgrade the website. This would create a contemporary appearance and address ease of navigation, enable a discussion forum and the inclusion of more publications and technical information. The feasibility of including audio/video recordings of lectures and secure payment and update of personal details should be considered;

✓ Request the non-UK sections to bring forward specific recommendations;

✓ Produce regular statistics on membership levels by age and length of membership.

**Publications**

This section asked for opinions on the Institution’s books and publications, the Annual Proceedings and IRSE NEWS.

Well over three quarters of responses considered the books and publications to be useful, whereas the response relative to the Annual Proceedings was lower but still well over one-half.

IRSE NEWS received very encouraging feedback which is dealt with in a separate article.

**Suggested actions**

✓ Review IRSE NEWS guidelines to ensure there is an optimum mix of modern, historic and institution topics;

✓ Ensure the quality of photographs in IRSE NEWS is of a uniform standard with the front cover more forward looking than historic.

**Technical Meetings and Visits**

This section asked for opinions on the Technical Meetings, seminars and the ASPECT Conferences.

Over three-quarters of respondents thought that the Technical Meetings were useful and relevant, and in addition to the technical content, provided good opportunities to network and meet up with other members. One-half of respondents had similar thoughts about the seminars, and just under one-half about the ASPECT Conferences. Praise was given to the high quality of these events and to their usefulness to Continual Professional Development.

A number considered that the prices for the conventions and conferences were out of reach of those who were not sponsored by their employers and that pressure should perhaps be applied to employers to give more help to their staff.

**Suggested actions**

✓ Consider reinforcing the message that the Annual Dinner and the Members’ Luncheon.

It was found these events are of interest to only a small minority of the members, although a fair number considered the Dinner to be a good networking event.

Comments were received about the location, the price and the formality of the Dinner. Far fewer but similar comments, except for the formality issue, were made about the Luncheon. It was expressed that Younger Members should be encouraged more to attend these events.

**Other Activities**

This section asked questions about the Annual Dinner and the Members’ Luncheon.

Just over one-half considered that YMs were actively encouraged, but of those that were YMs, the figure was lower at exactly one-half. Only one fifth of YM respondents thought that there were YM events in their particular area.

Again just over one-half of respondents considered that the general development and encouragement of YMs was beneficial. Most of the suggested improvements revolved around staging more events, especially involving training, plus better publicity of these. There was some discussion about the need for a formal YM section, partially dividing the Institution into two parts.

**Suggested actions**

✓ Consider reinforcing the message that YM activities are open to all;

✓ Consider holding more events, with some of them at regional locations.
Licensing Scheme

This section asked about the value of the Licensing Scheme and what changes need to be made.

Of the licence holders who responded, just over three quarters considered that the scheme was valuable to the profession. Nearly one-half suggested improvements to the scheme, but it was clear from some of the returns that the scheme was not fully understood. Consistent comments were directed at reducing both the paperwork and the cost and ensuring consistency of assessment.

Suggested actions

✓ The full feedback for this section of the survey to be provided to Licensing Committee for them to analyse;
✓ Licensing committee to be tasked with trying to simplify the paperwork and investigating the use of electronic systems for recording competencies, e.g. PDA or web-based tools;
✓ An explanatory article for IRSE NEWS to be prepared, covering consistency of assessment amongst other things, and highlighting the reduction in fees for licences introduced in 2008.

Next Steps

Council considered all these recommendations at a special meeting held on 23 June 2008, with almost the entire meeting devoted to this topic.

In general, nearly all the suggested actions were endorsed, although some were after considerable debate. The actions were allocated to the various committees and groups within the Institution responsible for the different areas of activity. This will be done in conjunction with the review of the Institution’s 5-year Strategic Plan so that the direction of the Institution can be aligned with the views of the members.

It was further agreed that the working party would update the questionnaire to ensure that lessons learnt are available for future surveys.

Finally, it was agreed that the proposed survey of former and non-members, and also of key stakeholders must be completed to ensure the views of these people are incorporated in future plans.

VIEWS on the NEWS

Changes to the Pages

Your Editorial Team relies almost entirely on contributions submitted by members. At present this supply is just adequate to produce the regular monthly editions of the NEWS. From now on there will be eleven issues per year with separate December and January magazines. The number of pages of each issue depends partly on these contributions and also on the number of advertisements (which almost cover the cost of printing the NEWS). Occasionally we have to hold an item over to the next issue in order to fit the number of pages available. All contributions are welcome, and it is extremely rare that an item is not actually used.

In 2007 the Institution distributed a Questionnaire to all members requesting their thoughts on all ‘aspects’ of the Institution’s services. About 15% of these were returned, giving valuable feedback concerning member’s considerations.

Of particular interest to your IRSE NEWS Editorial Team were of course those questions relating directly to the NEWS.

There were 363 responses to the question What is good about the IRSE NEWS?

It is very gratifying to the Team that almost all respondents were appreciative of the NEWS and thought that a good effort was made in the balance of its content and production. However, the response from one member was “Nothing” which is slightly perplexing!

In the 257 responses to the question What could be done better? there was considerable constructive criticism and your Team aims to address these matters immediately. Rather more encouragingly, in response to this question, there were six ‘Nothing’ responses.

There were several contradictory comments that the articles are ‘too technical’, the articles are ‘not technical enough’ for instance. This of course is a purely subjective matter that cannot be satisfactorily resolved.

There were many comments on the balance between UK-based items and non-UK based items. Most people suggested there should be more ‘overseas’ items, although two people actually demanded less. Although UK based, the IRSE is an International body and so there should be more International items than are presently found. As stated at the start, the Team can only publish what they are offered, so we need more contributions from non-UK members. It may well be that such people are nervous about writing articles not in their native language, but please do not be discouraged. The Team would be more than happy to assist and give advice in ‘tidying up’ your language worries. We do not however have the facilities in carrying out complete translations.

In order to encourage more contributions from areas considered in the survey to be under-represented, the Editorial Team is being improved by the addition of specific Assistant Editors (which means the present Assistant Editor is re-designated as Deputy Editor). The Assistant Editors will act as local ‘agents’ to encourage and collect contributions from a particular section of members. The first of the two initial appointments will help to coordinate contributions from overseas, and the second cover the interests of the Younger Members.

Another balance problem that was mentioned several times was that between ‘heritage’ and ‘contemporary’ items, with a general feeling that there was too much of the former. The word ‘anorak’ was mentioned on more than one occasion. The Team have taken this on board, but again the balance does depend on member’s contributions. One item that came under particular criticism was the regular “Interesting Signals” feature. There was a general feeling that they were NOT really very interesting at all. As a result, this will no longer be a regular item. Our only defence is that the subjects did have to be working signals. A significant number of people involved in Heritage Railways have expressed an interest in joining the Institution if there was a specific Heritage Section. This possibility is being formally considered so in the future there might be an actual section in the NEWS devoted to Heritage items.

There were a number of comments on the reproduction standard of photographs. The inclusion of photographs and diagrams to break up an article is of particular benefit to the Production Manager, who has to lay out the pages of the NEWS so that articles fit neatly onto the pages without large empty areas. This task is helped by being able to alter the size of the photographs, filling in such
Dear Editors

A Signalling Enquiry
A good friend of mine, whom I understand to be a Fellow of your Institution, has suggested that I write to you with a plea for information that might assist me in a project that I am undertaking as part of my hobby; that of the reconstruction of a Westinghouse Style N lever frame for use upon the Acton Miniature Railway, where I am the General Manager.

My interest in railway signalling, although profound, is limited to my leisure time activities; and as such, there are gaps in my knowledge that are contributing to the delays in getting this project fulfilled.

The frame has come from "out of the racks" at the Museum Depot (which houses London Transport Museum's artefacts that cannot be squeezed into Covent Garden), and it is questionable as to where it came from (Kings Cross is a popular suggestion), and if it is complete.

Therefore, my enquiry is in two parts:
Relating to the origin of our frame, does anybody know about the disposal of LU lever frames?

Lever colours (in case this helps identify the origin of the frame) are 1-White, 2/3-Red, 4/5-White, 6/7-Red, 8-Blue, 9-White, 10-Red, 11-Black. Although this part of the enquiry is not contributing to the delay, it is information that would be useful for further enquiries in relation to the second part of my enquiry, thus:

Regarding completeness, is there such a thing as a list of components (or could one be created)? I am also lacking the correct descriptions of many of the various components that we do have, and I fear causing confusion with my enquiries of this nature (as you may see further down). In addition to the frame, we have one train describer (with the two rotary handles).

Presently, all eleven levers (and quadrants) are fitted to (what I have been calling) the main table, and this is supported at the back by what I think is the mechanical locking frame (we couldn’t get it to sit correctly at the front); and is resting at the front, on a mis-matched frame, as a temporary measure.

The Acton Miniature Railway is a 7½” gauge miniature railway that was opened in February 2005, following many successful operations with a portable miniature railway on the site. It has a long bi-directional single line, which goes around a ‘blind curve,’ and was this ‘risk’ that inspired me to offer to install a signalling system. This was a very ‘home-made’ effort; but, complete with electrical interlocking, it did what it needed to do, and so just as the railway became a more permanent feature, I have been asked to allow the signalling to become more permanent also.

It is a task that I am enjoying unquestionably, and I would be grateful for any help in relation to this enquiry.

Adrian J. Allum
adrian@actonminiaturerailway.co.uk

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FEEDBACK

gaps. However, the photographs must be of sufficient resolution to start with. A minimum file size of 500 kB would be satisfactory. But some pictures offered are only a few tens of kB. The photograph for the front cover is a particular problem. As it usually takes up the whole of the A4 cover, it needs to be 1 MB minimum, and in portrait format. Again there was a feeling that the cover pictures should not be ‘heritage’ subjects, so the Team is looking for some more relevant pictures to be offered.

A number of members stated that there should be more information published about well known problems with recent projects (Portsmouth and South Manchester for instance). The Team consider this perhaps the most difficult matter to deal with. We do not have ‘roving reporters’ available to visit the areas and interview relevant people. National Newspapers are independent of the parties involved and are quite happy to upset people. The Institution however is not and there is a grave danger of alienating people to the isolated from those involved on either side of the arguments.

The Team consider this perhaps the most difficult matter to deal with. We do not have ‘roving reporters’ available to visit the areas and interview relevant people. National Newspapers are independent of the parties involved and are quite happy to upset people. The Institution however is not and there is a grave danger of alienating people to the isolated from those involved on either side of the arguments.

Newspapers are independent of the parties involved and are quite happy to upset people. The Institution however is not isolated from those involved on either side of the arguments and there is a grave danger of alienating people to the detriment of the Institution as a whole. In this case perhaps the Team need to ask the membership (and in particular those that mentioned the subject in the Questionnaire) for ideas on how the problem might be solved.

One sole member complained about the number of spelling mistakes. This surprised the Team as they were not aware of any problems. Every item goes through the MSWord spell checking process, but of course that is far from perfect. A surprising number of contributions from the UK have the language set to “English (U.S.)” rather than “English (U.K.)” before the Team’s review.

To cover other suggestions resulting from the Questionnaire the Team is aiming to introduce other regular features in the NEWS:

- Articles directly detailing available products or systems. Whilst not directly advertisements, these would allow Companies to promote, with full technical details, a particular product or system;
- Interviews with prominent members of the Profession;
- Listing of career changes of members within the Profession. This will enable members to keep tabs on movements within the Industry.

Summarising, the Editorial Team are very pleased by the generally favourable responses to the present state of The NEWS and would like to thank all those that took part for their encouraging comments. Of those responding, 90% considered the contents to be relevant to their job.

Your Team have taken notice of the criticisms and as discussed above will be taking steps to make some appropriate changes. In general of course, what we publish depends entirely on our readers’ contributions, so why not assist with these changes and send in some contributions?

The space on the Questionnaire was limited, so if you feel like expanding some of your comments with more detail, why not write into the Editors. We are entirely in your hands.
Putting the record straight

I am obliged to draw attention to allegations made in respect of the LG Interlocking in the article West meets East in Issue 137 of IRSE NEWS.

The article comments on the level of integrity of the interlocking without offering a shred of evidence to support the author’s view which appears, in fact, to be based solely on a bit of technical visit chit-chat.

As we all very well know, validation and acceptance of a Computer Based Interlocking within our profession involves substantial procedures, yet this author appears to ignore this and on a whim asserts that the interlocking does not meet accepted levels of integrity and even goes on to insinuate that IRSE members could not believe their ears.

The State Railways of Thailand Specifications call for full compliance with European Standards, SIL 4 etc and require demonstration of such, including proof of certification, previous acceptance by major passenger railways and substantial performance history etc etc. The LG interlocking was accepted under these procedures. I suggest the author should have consulted with the Korea Railroad Research Institute who provided formal certification, Korean National Railroad, LS Industrial Systems (the supplier of the Interlocking, formally LG) and the British Consultants (well known) who accepted the system before making such unfounded allegations. Additionally had the author, and perhaps the members who could not believe their ears, thought to address one or two simple questions along these lines to the State Railways they would have been much better informed.

Notwithstanding the usual disclaimer in the IRSE NEWS, the IRSE has professional responsibilities and perhaps, in future, IRSE NEWS editors would ensure that technical articles do not contain such obvious unfounded allegations which, in view of the worldwide readership involved, could well have damaging technical and commercial implications for all concerned.

Roy Olive

LG 520 II CBI as installed on SRT.

Reference to Article in IRSE NEWS No 137, September 2008

Further to the correspondence from Roy Olive on 6 October 2008 regarding the LG 520 II CBI installed in Thailand, I would like to add the following information.

First of all, when in Thailand it is important to check and double check anything that is said, particularly information of a technical nature, to confirm it’s accuracy. On this occasion it appears that this important ‘rule’ was not followed, and what has been published is nothing more than hearsay gathered during a site visit.

In fact the LG 520 II Computer Based Interlocking system normally operates in hot standby mode, and is duplicated for availability only. When operating as a single system, safety is assured as multiple watchdog processes are incorporated to monitor for system faults, both internal and at the output level. On detection of a fault condition power to all outputs is immediately removed by de-energising a vital output relay. All lineside signals thereby assume a safe ‘red retaining’ state. This arrangement is depicted on the attached schematic drawing.

I would add that SRT are very satisfied with the LG 520 II CBI. It’s operational integrity has been flawless, and it’s reliability considerably better than the ARI’s that it replaced.

Cliff Latarche F.I.R.S.E,
Oriental Consultants, Bangkok

Ian Bridges replies:

I refer to the letter submitted to the Editor by Mr Roy Olive, who was concerned about part of the article West meets East in Issue 137.

In my personal view of the 2008 convention, I referred to the pragmatic approach taken by the State Railways of Thailand in improving their railway network at a cost that is commensurate with the country’s ability to invest in its national infrastructure.

There are many miles of single track railway in the country, controlled in parts by very old technology (token ball machines for example), which the State Railway are upgrading with particular emphasis on control, command, signalling and telecoms.

Unfortunately, Mr Olive has taken this as a negative comment, rather than the positive one I believed I was inferring. Mr Olive goes on to state that the LG EIER-520 III interlocking has achieved a demonstrable SIL 4 rating, in which case it does indeed have an equivalent integrity to British & European interlocking systems.

As there is not a widespread knowledge of LG interlockings within the UK, perhaps Mr Olive would consider writing an article for the IRSE NEWS on achieving this level of integrity with a simple interlocking architecture, when compared with current UK offerings.

Ian Bridges
Obsolescence
When I first joined the design office, the word ‘obsolete’ didn’t seem to exist and a business case for investment assumed a commercial life of 40 years. Of course, there was some very old S & T equipment about, some of it dating back to the 19th century, and it was our job to keep this going with only vague thoughts of eventual replacement. We had the skills, tools and inventiveness to produce or maintain a working signalling installation.

Meanwhile, the supply industry understandably had different priorities – their future lay in innovation not perpetuation and their interest in keeping an ageing railway working was limited. Thus the railways in UK had to create and maintain their own in-house resources – design offices, factories, stores and a trained workforce – to “keep the ship afloat.”

Of course, this situation could not be maintained forever. There was pressure for change. The modernisation of the mainline signalling systems which took place in the 1950s/1960s removed much of the older equipment and the Beeching era saw the closure of many lines.

However, with all this new equipment, technological advances were rapid and, in the 1970s, we could find ourselves installing something which might be out-of-date within a short while of commissioning and spares increasingly difficult to obtain.

We had grown used to equipment which lasted over 40 years but our business case submissions now had to predicated a commercial life of 25 years. By the 1980s, a service life in excess of 10 years was becoming a hopeful target.

Obsolescence had arrived!
Then came the widespread use of microprocessors and software – a whole new environment to consider, with a much increased administrative overhead. Quite quickly a service life of only 5-7 years became a real possibility and the total replacement of a system could become an economic necessity, rather than selective updating. The era of disposable technology had arrived.

So, in the span of one career, we had moved from an expectation of a commercial life of 40 years to one of less than 10 years and the effect on business case submissions became predictable. One can only speculate where this process will lead.

A Past-President, in his inaugural address, stressed that we must move to a point where expenditure would be justified on the grounds of obsolescence alone.

I am not sure that the accountants of this world have been yet been persuaded of the reality of this argument. I wonder how many of them own a domestic washing machine which is over 10 years old!

Thorrowgood Scholar’s Report
I refer to the article by Gurdeep Singh Virdee, the current Thorrowgood Scholar, in the IRSE NEWS Issue 138.

I must first congratulate Mr Virdee for an outstanding achievement, being a Thorrowgood Scholar would be the dream of any young signal engineer (and older ones too, if one dare to admit).

As I read through the paper, I believe our tour guide must have done a good job showing Mr Virdee everything around the railway, but yet some of the key facts were miss-communicated to Mr Virdee. As I was the project manager responsible for the West Rail signalling and train control system, and had been the systems manager in KCR managing the East Rail, West Rail, Light Rail and Ma On Shan Rail S&C equipment, I would like to offer clarification on the systems for the Hong Kong railway, so that facts are recorded appropriately.

Under the one country two systems concept, Hong Kong Special Administrative Region has been part of China since July 1997. It is inaccurate politically to cross a “border” from Hong Kong to the mainland. We simply call it a crossing, or in a more formal setting a “boundary crossing”. This does not offend me but I know someone might have been.

On the East Rail signalling system, it is an ALSTOM supplied TBL system. Its intermittent track to train transmission is accomplished by beacons located within the foot, with loops at strategic location to improve headway throughput. Only at specific locations with a Return Loop, the information on the train is transmitted back to the ground. The bidirectional communication described in the East Rail section is in fact a Thales system (or formerly known as Alcatel) used in MOS Rail and West Rail. However, the last paragraph in this section precisely explains the TBL operation.

On West Rail, there is no SSI, ATP or radio infill. These are all part of East Rail system. The Light Rail interlocking is Siemens supply all right, but it is not a SICAS. In fact, it uses Siemens’ PLC system S5 and S7 for control.

I know I am overly pedantic, but the fact must be presented precisely as it should be. I apologise if our engineers in Hong Kong misinformed Mr Virdee, maybe next time, we can do better.

Henry Cheung, Manager - Hong Kong Ansaldo STS Hong Kong Limited

Level Crossings
Paul Cheeseman’s letter (Issue 138) has left me confused and I have to take issue with some of his reasoning.

As a clarification, level crossings have never been perceived as an operational hazard in railway terms - they have never been regarded like a pair of points or an occupied section of track, for example.

Controlled gates or barriers have only been provided as a means of ensuring a smooth railway operation in a specific area of busy road traffic. In any case, the physical protection offered by such flimsy devices, is illusory.

That a level crossing is a hazard is obvious - but the risk is borne by the road-user. Throughout the world, the overwhelming evidence is that accidents at these sites are the result of abuse, ignorance or stupidity by the road-user.

That the risk to the railway is zero, is not quite true - witness accidents at Hixon and Upton Nervet - both attributable to the road-user. To its credit, the railway has gone to great lengths to eliminate hazards to its operations like these but there must be limits, technically, practically and economically. However, as long as a level crossing exists a hazard will remain, primarily for the road-user. The railways have always sought to minimise this risk but never to totally protect the road-user from his own folly.

There may be a case for installing a central reservation at automatic crossings to eliminate the chance of zig-zagging by vehicles past the barriers but, frankly, speculation of “what the railways should do” to improve the safety at level crossings is very limited.

Short of removing a crossing altogether, the objective must be to find a way of controlling the road-user and this will require some ingenuity.
Risk Management Forum 2009 Call for Presentations

( Editor’s Note: This contribution was received too late for inclusion in the last issue of IRSE NEWS, when the closing date for outline submissions would have been meaningful. However, it is being included in this issue as advanced warning of the Forum taking place next year.)

The 2009 Risk Management Forum (RMF) will be held at the University of Nottingham (Jubilee Campus) 23-24 June 2009.

The principal objectives of the RMF are:

- Provide an opportunity for safety managers and risk practitioners at all levels to meet and exchange news, ideas and learning on current best practices in risk management;
- Provide an annual focus on a specific area of safety risk management relevant to industry, in addition to general risk management good practice;
- Launch new risk management tools and techniques;
- Provide practical experience of risk management techniques through workshops;
- Allow industry members to share their experiences of coping with current issues and/or changes in industry practice;
- Provide an opportunity to examine, and learn from, safety risk management in non-rail industries’
- Disseminate information on current and emerging issues from Europe and their potential impact on the GB rail industry.

The theme for the 2009 RMF is:

Managing Change – Delivering a Safe High Performance Railway.

Proposals for presentations and workshops at the forum would be welcomed in any of the following example areas:

- Related to the theme
- Change Management processes from other industries;
- Innovative or novel methods for managing change safely;
- Practical examples of successful change management programmes;
- Balancing safety and performance improvements;
- Managing safety and risk during major projects;
- Managing change at the interface;
- Influences of European legislation;
- Introduction of new products and technologies;
- Delivering a 24/7 railway;
- Monitoring the implementation of change;
- Changing human behaviour;
- Wider risk management related topics
- Practical use of risk management techniques;
- New risk management tools / techniques;
- Outputs from new research relating to risk management and human factors;
- Developments in Safety Management Systems;
- Managing Competency;
- Occupational Health;

In addition, papers on any other theme that meet the objectives of the RMF will be considered. Presentations would normally be 30 minutes with an additional ten minutes for questions; workshops can be up to 1½ hours. A formal paper will not be required.

An outline of the proposed presentation / workshop comprising approximately 250 words should be submitted to Kevin.Thompson@rssb.co.uk by 31 October 2008, for consideration by the RMF steering group. All presenters attend the RMF free of charge (including meals and overnight accommodation). We would particularly encourage submissions from railway companies - TOCs, FOCs, Network Rail and Infrastructure Maintenance Companies.

Feedback will be provided on all submissions by January 2009.

Merit Award for Tony Rowbotham

Tony Rowbotham, who has been the Assistant Editor of IRSE NEWS since March 1989 (Issue No.15) was presented with an IRSE Merit Award by Colin Porter, the Chief Executive, on behalf of Council, at the annual meeting of the IRSE NEWS editorial team on 23 September.

The meeting took place at Tony’s home near St Albans as Tony is wheelchair-bound for most of the time. He is a most deserving recipient as he has done an enormous amount of work for the Institution whilst carrying out this role which he took on after Mike Hewett handed over the reins of editing IRSE NEWS to John Francis and Tony nearly twenty years ago.

Tony reckons that editing IRSE NEWS helps keep him both sane and occupied during the last two slightly difficult years.

Colin Porter

Merit Award for John Colvin

Ken Burrage, Chairman of the Licensing Committee, on behalf of the IRSE Council, was pleased to present the Institution’s Award for meritorious service to IRSE Fellow and Licensing Committee member John Colvin at the Licensing Committee meeting held on 23 September 2008.

This award is made to an IRSE member for making a substantial contribution to the Institution’s work over many years to further the aims and objectives of the IRSE and in John’s particular case for his massive support for and extensive contribution to the work of the Licensing Scheme.
MEMBERSHIP MATTERS

Membership Matters
Elections, Transfers, Resignations, Deaths and Moves

ELECTIONS
We extend a warm welcome to the following newly-elected members:

**Companion**
- McLaren S: Signalling Solutions
- Muralidaran S: South Eastern Railway
- Varma B: IRISET (Indian Railway Institute of SE&T)
- Verma B R: McML Train Control Technologies

**Fellow**
- Biswas G G: Eastern Railway/Hqrs
- Dural V: Eastern Railway
- Muralidaran S: South Eastern Railway
- Vammi B: IRISET (Indian Railway Institute of SE&T)
- Verma B R: McML Train Control Technologies

**Associate Member**
- Carlile P R: Colas Rail
- Eichhorn M: Siemens Rail Automation
- Lo J T Y: Trackstar Alliance
- Ogden D C: Babcock Rail
- Repetto S: Penta Engineering
- Snell D: Network Rail
- Wain B C H: Westinghouse Rail Systems

**Associate**
- Boros L: Asia Pacific Rail
- Braid C: Westinghouse Rail Systems
- Griggs Y C: Queensland Rail
- Jones D: DeltaRail
- Mariapon V: United Group Infrastructure
- McLuckie S B: Network Rail
- Paterson P: Balfour Beatty
- Upton P J: V/Line
- Wakankar M: Bombardier Transportation India
- Ward S: Network Rail
- Williamson A D: Transport for London
- Wiseman N: Serco Docklands
- Xu J: Alcatel-Lucent

**Student**
- Antoney B: WS Atkins
- Beeson M J: Network Rail
- Hall D: Network Rail
- Jamison M: Network Rail
- Jayaraman E: WS Atkins Partners & Overseas
- Kitchen D R: Network Rail
- Luu Q-H: RailCorp
- Mahmoud J: Siemens Transportation Systems
- Palaniappan V: WS Atkins
- Pereira D S: O’Donnell Griffin
- Prachaktham J: Westinghouse Rail Systems Australia
- Sadhanalia C V: WS Atkins
- Sankaran Radha Krishnan H S: WS Atkins Partners & Overseas
- Wood S: Network Rail

TRANSFERS

**Accredited Technician to Associate Member**
- Warner L: Network Rail

**Student to Associate Member**
- Virdee G S: Siemens
- Wright S: Network Rail

RESIGNATIONS
- Brigoli AM
- Brigoli V
- Chung A
- Clark JE
- Dimalene A
- Durran CA
- Fletcher EN
- Green MS
- Kriangsakcharoen P
- Kulku C
- Meddings PG
- Niparyai N

**LAPSED**
104 members have been struck off for being 2 years in arrears with their subscriptions

**DEATHS**
It is with great regret that we have to report the death of the following member:
- Ackland G L

On the Move?
This is a new spot for you to let the membership know where you are.

Career moves, whether internal or between companies, new appointments, new responsibilities; use the NEWS to keep the S&T world up to date.

Let the Editors know, and we will slot you in…….. including a photo if you are brave enough!

**John Francis**
Has moved from Westinghouse Rail Systems at Chippenham to Network Rail Norton Junction.

Membership and Professional Development Manager
Christine White has been appointed to the post of Membership and Professional Development Manager, taking over membership matters following the sad loss of Derek Edney earlier this year. Any queries regarding membership should be addressed to Christine at the London office or to Linda Mogford, the Administration Manager.

Current Membership Total is 4163
You’re a rare breed

Know your power

EPCglobal’s Rail teams in Bristol and Sheffield are working with the industry’s largest active employers to fill a variety of specialist and senior vacancies on projects across the UK.

Signalling Design Engineers
UK Wide - Contract & Permanent - £Negotiable

We are currently looking for a number of licensed signalling design engineers and have a range of positions to suit all levels of experience and licenses. Our clients are looking to pay above market rate on both a contract and permanent basis to attract quality candidates that can demonstrate experience on either mainline or London Underground projects.

Blair Hickman / 0117 970 7712 / blair.hickman@epcglobal.com

Scheduler/Commercial Manager
London - £Negotiable

This is a fantastic opportunity to work within a growing company in the heart of London. My client is seeking a Scheduler/Commercial Manager to work on both pre and post contracts. Experience working with tender preperation, risk identification and re-tender opportunity identification is essential.

The ideal candidate will be from a planning, estimating or scheduling background and should have rail sector experience in cost loading programmes. The role will involve preparing tenders, change control / claims and supporting in the following areas: periodic internal reporting, variations/change control management, disputes/claims resolution, cost engineering/cost collation, cash flow management.

Fiona Mcblain / 0117 970 7700 / fiona.macblain@epcglobal.com

Signalling Professionals
London & UK Wide - Contract & Permanent - £Negotiable

We are currently supporting several large clients in the delivery of major metro and mainline signalling projects. We would be very interested to speak with any signalling specialists seeking a new challenge. Whether your strengths are technical knowledge, management of signalling projects or the ability to effectively support a project team we can provide you with challenging roles on a number of high profile projects.

Ellen Hipkin / 0117 970 7709 / ellen.hipkin@epcglobal.com

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 e-mail rail@epcglobal.com