

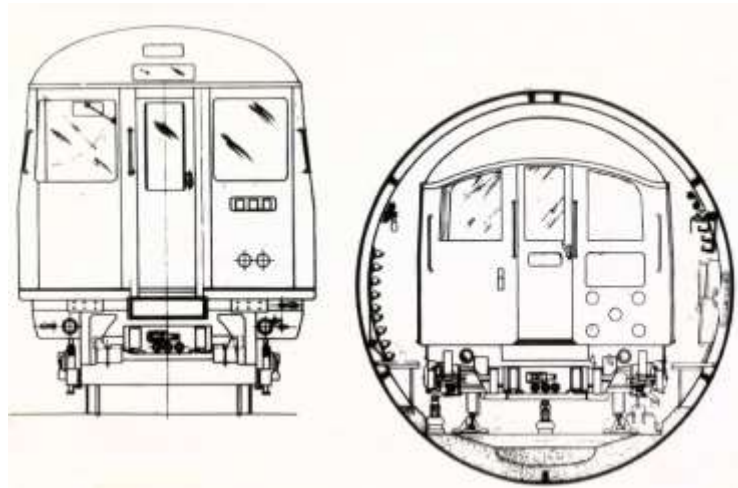
# **Railway Division Chairman's Address: All Change and Mind the Gaps**

**Graham Neil**

**November 2019**

# Introduction

- **Graham Neil**
- **Transport for London Engineering**
- **Professional Head of Vehicles**
- **FIET**
- **FIMechE**
- **CEng**
- **48 Years in the rail industry and London Underground/TfL**



# London Underground Performance



- In 2018/19 we completed 1.381Bn passenger journeys (+23M on previous year)
- We have 543/542 am/pm peak trains in service
- 2018/19 85M operated train-km (+0.8%) = 96.8% timetabled km run (+0.1%)
- e.g. 1.3 million door leaf operations just in the two peak periods every week

# 2<sup>nd</sup> August 1971 - Apprentice

Dated 19th July 1971

**This Deed of Apprenticeship** is made the 19th day of July 1971  
 BETWEEN THE LONDON TRANSPORT BOARD (hereinafter called "the Employer") of the first part **ALMA NEIL (MOTHER) of 8 MERSEY HOUSE LIVERPOOL ROAD LONDON** in the

THE LONDON TRANSPORT BOARD

AND

GRAHAM NEIL

Insert scale of wages applicable

Deed of Apprent

5. The general conditions of service relating to Adult Staff of the Employer except as varied by this Deed operating in the workshop or other place in which the Apprentice shall be employed shall apply to the Apprentice's services and he shall conform to such conditions or any others which may from time to time be made by the Employer.

In Witness whereof the Employer has caused its Common Seal to be hereunto affixed and the Guardian and the Apprentice have hereunto set their hands and seals the day and year above written.

e referred to.

ALLOWANCE IN LIEU OF BONUS	TOTAL
—	£13.00
2.53	£15.73
4.89	£19.39
6.60	£23.10

R WEEK

	PRESENT RATE	ALLOWANCE IN LIEU OF BONUS	TOTAL
1 ST. YEAR	£13.00	—	£13.00
2 ND. YEAR	£13.20	£2.53	£15.73
3 RD. YEAR	£14.50	£4.89	£19.39
4 TH. YEAR	£16.50	£6.60	£23.10

PER 40 HOUR WEEK

2. The Apprentice and the Guardian or surety for the Apprentice jointly and severally covenant with the Employer—


(a) That the Apprentice will during the whole of the said term diligently and faithfully serve the Employer and to the utmost of his power and skill attend to the Employer's business at such places and times as the Employer or its representatives shall direct.

(b) That he will keep the Employer's secrets and obey all lawful commands of the Employer or its representatives and will not absent himself during the usual working hours without their consent.

Signed Sealed and Delivered by the above named **ALMA NEIL** in the presence of

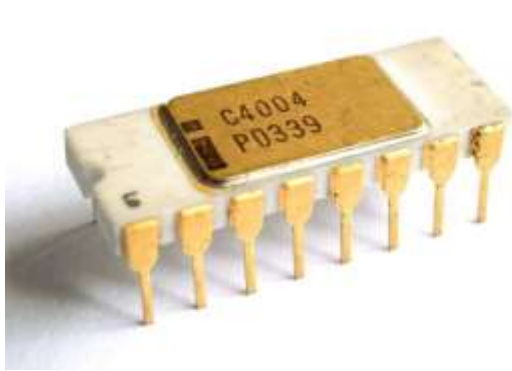
Signed Sealed and Delivered by the above named **GRAHAM NEIL** in the presence of

members of the Board secretary





# 1971 – Digital Age and Decimalisation



Microprocessor



Liquid Crystal Displays



Floppy Discs



UK currency went decimal

# 1971 – Acton Works



- Train equipment was overhauled.
- Trains were overhauled on a production line where their equipment was removed and sent for overhaul, the train was completely rewired and the overhauled equipment refitted before testing and the train returned to its parent depot.

# 1975 – Moorgate Disaster





# 1975 – Apprentice of the Year





# 1975 – Electronic Repair Workshop



All on-train Electronic Repairable Equipment, including:-

- Public Address and cab-cab intercom systems
- Passenger Emergency alarm units
- Speed sensing systems
- Speedometer drive Units
- Telemetry monitoring systems
- ATO (Auto-driver Boxes)
- Destination displays
- Train Number displays
- MA Voltage and Frequency Regulators
- Emergency Saloon Lighting Invertors
- Wheel-slide Protection equipment
- Heating Fan Invertors

# 1980 – Rolling Stock Design Division



**Chief Mechanical Engineers Department – Acton Main Office Block**

# 1980 – Auxiliary Equipment Section

**Rolling Stock Technician**, supporting the engineer responsible for the Auxiliary Equipment items in red below

The Auxiliary Equipment Section was responsible for the design, specification, procurement, testing, commissioning and integration of the following systems and components

- Public Address amplifiers and cab-cab intercom systems
- Train radio equipment (jointly with Signals & Comms Engineering department)
- Passenger emergency alarm system
- Speed sensing switches and speedometer drive units
- Train Control/Monitoring Systems / Train Data Recorders (OTMRs)
- ATO (Auto-driver Boxes)
- Destination and Train Number displays
- Interior saloon and emergency lighting system
- Cab and saloon heating and forced ventilation systems
- Cables, multi-pole connectors, crimp terminations and crimp tooling
- Fuses and Miniature circuit breakers
- Relays, switches and cab indicators
- Exterior lighting, headlights and tail/stabling lights

First came across a very young Malcolm Dobell





# 1983 – Auxiliary Equipment Engineer



1983 Tube Stock



1986 Tube Stock

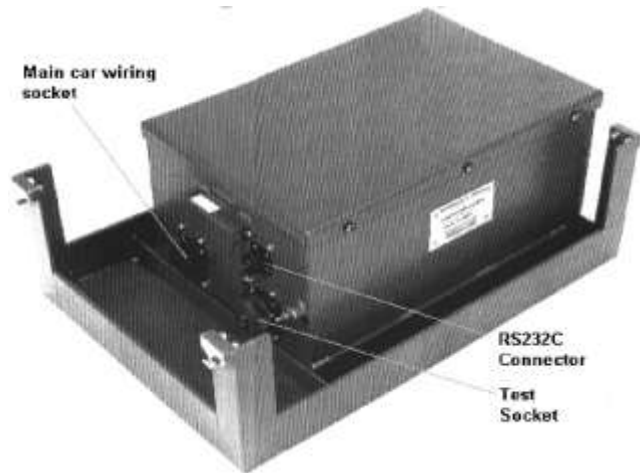
- Developed the first LU digitized automatic announcement system
- Developed new PIS for OPO on Metropolitan Line.
- Replacement PIS for the 1973TS on Piccadilly Line
- Replacement 1967TS ATO Box
- Numerous other train reliability & obsolescence projects.



1983 Tube Stock PLS  
Train Monitoring System

1983 Tube Stock  
Cab-Cab & Public  
Address System

# 1985-2019 ATO “Guru”



Worked on nine different ATO Systems over the years:-

1. 1960TS Westinghouse ADB
2. 1960TS Servidata ADB
3. 1967TS Westinghouse ADB
4. 1967TS Prototype ADB
5. 1967TS Replacement DTG RADB
6. Westinghouse HKMTR Evaluation ATO
7. 1967TS Westinghouse DTG NADB
8. 1992TS Westinghouse ATO/ATP
9. 1996TS Westinghouse ATO

Guest lecturer on ATO System principles for:-

- Birmingham University
- UCL, London

Supporting member of the NwR Digital Railway Steering Group (ATC)

# 1987-1991 RIA12/13/18/22/21/23/24

First started working closely with engineers at the BR Research Centre, Derby and RIA on the development of industry standards to improve the reliability of electronics



**RIA 12/13 – evolved into EN 50155**

**RIA 23/24 – evolved into EN 50129 & EN 61508**



# 1988 - Electronic Development Section

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1988 I transferred into the Electronic Development Section.

A small team of electronic engineers who were experts in the design of on-train electronic equipment and specialists in the design of bespoke on & off train test equipment.

This section carried out a number of very specialist tasks, including;

- technical investigations of rolling stock electronic equipment failures and development of modifications to remedy them;
- dealing with electronics obsolescence issues;
- research and development electronics design work;
- RIA12 Surge and Transient Test house;
- on train instrumented dynamic testing;
- Provision of the departmental test equipment and instrumentation loan management and calibration services.



# 1989 – All Change 1

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## Client Engineer (Standards)

London Underground Rolling Stock Engineering Department was divided into two groups –

- Rolling Stock Client Engineering.
- Rolling Stock Professional Services

My role was to develop a suite of output performance based rolling stock standards for future procurement of new rolling stock and for replacement systems.

In some cases we had to do some development work and examples of some work that I was involved with was fire and arc protection.

# 1989 – Fire & Arc Protection Standard

Early LU trains had only limited asbestos-type arc/fire barriers fitted and there had been some minor in-line and pole-pole arcing incidents. Jointly worked with our Scientific Services Department to develop arc protection materials and a revised rolling stock standard.



The power of an unconstrained electrical arc



1982 Piccadilly Line 1973TS Car 888 major pole-to-pole arcing incident between Wood Green and Bounds Green stations – the arc penetrated the floor and burnt out rear section of the saloon.



# 1989/90 – Heavy Current Arcing Tests

- LU conducted a series of heavy current arcing tests at Ealing Common depot as an R&D project designed to reduce the risk of train fires caused by traction supply pole-pole arcing and to develop a revised arc protection philosophy.
- Tests were carried out to develop materials for future use as arc and fire barriers and involved physical testing using dc traction supply sources capable of delivering over 5MW of energy
- The results were used to determine requirements for our future Fire and Arc Protection standard.



In each test a heavy current arc was initiated beneath the arc barrier test material and allowed to continue arcing until it either self extinguished (PASS) or eroded through the adjacent test material (FAIL)

# 1989/90 – Heavy Current Arcing Tests



# Arc Protection Standard on Trains

Arc and Fire Protection philosophy based on – Prevent / Contain / Extinguish

Modern positive and negative undercar shoe gear arc barrier assemblies (300mm exclusion zone) and with positive and negative shoe beams and arc splash barriers also made from arc barrier materials





# 1991 – Client Engineer (New Stock)



- Independent agent acting for the Chief Rolling Stock Engineer on the Central Line 1992TS project team
- 1992TS – First rolling stock delivered using a “performance based” specification and a suite of very prescriptive rolling stock standards.
- 1996TS then procured using the first 39 new “performance based” rolling stock standards included as appendices.
- 1995TS procured next under a PFI service provision contract with Alstom and with 89 of the new rolling stock standards either embedded in the technical specification or included as appendices.
- Programme eventually delivered ca 250 Standards – covering all parts of the train – now rationalised to less than 12.



# 1991-1996 Fleet Refurbishments



- Refurbished fleets – A60/62 Stock, C69/77 Stock, 1972 MkII and 1973 Tube Stocks
- Improved PIS, Passenger Emergency Alarm and Train Secure systems added
- Improved seating to provide increased capacity
- Improved rolling stock fire performance standards compliance following Kings Cross fire
- Fire compliant external paint system to a new LU livery.



# 1997 – LU Fire Tests / Standards

- London Underground conducted two fire tests on whole vehicles :-
  - 1997 – Central Line 1992 Tube Stock – Broadly compliant to BS6853 Cat 1a
  - 1999 – District Line D78 Stock – non- compliant to BS6853 Cat 1a
- The aim of the 1997 fire tests was to validate that the combined materials installed on a whole 1992TS carriage met the requirements of the LU Fire Standards developed post the Kings Cross Fire.
- The tests were extremely successful and had the benefit of us gaining agreement from the London Fire Brigade that LU could remove fire extinguishers from the saloons and retain only one per driving cab.
- The 1999 D78 Stock tests were comparative tests on a carriage design that pre-dated the new standards.





# 1997 - 1992TS Test results

## Fire test underway

8 wooden cribs 1kg placed on a single seat



Remains of the 8 wooden cribs and seat after fire test completed.



# 1991 LU Standards/New Stock Engineer

30

## Trend in LU Rolling Stock Fires

Period Year	Number of Confirmed Fires
2000/01	35
2001/02	43
2002/03	25
2003/04	23
2004/05	21
2005/06	12
2006/07	9
2007/08	13
2008/09	5
2009/10	4
2010/11	4
2011/12	2
2012/13	1
2013/14	1
2014/15	0
2015/16	0
2016/17	3
2017/18	3
2018/19	2

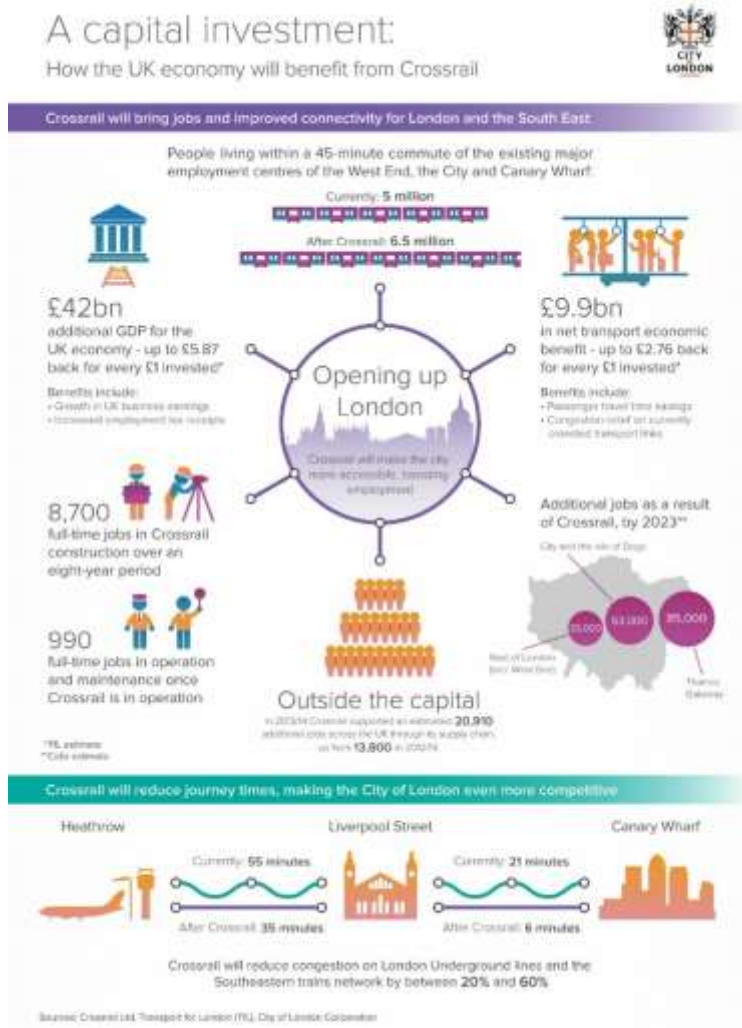


The number of vandalism related rolling stock fires has remained very low at 5 or fewer per year only.

Long term benefits of BS6853 Cat 1a Materials = reduced vandal fires  
Removal of saloon fire extinguishers stopped wet trains and platform passengers being squirted almost overnight



# 1994 - Crossrail



The LU Chief Engineer's representative providing expert knowledge and advice about deep tube rolling stock design and operations to the Crossrail rolling stock project team based at Toft Green, York.

First met Richard East who had a similar role for the main line railway.

BRB/LU jointly developed the first Crossrail rolling stock technical specification.



# 1996 - All Change 2

## Trains Delivery Group

In 1996 the Rolling Stock department was disbanded, moved to Canary Wharf and merged with other LU engineering departments to form two new engineering delivery groups –

- Stations Delivery Group – dealing with infrastructure disciplines
  - Civils, L&E, Stations, Fire, Building Services, Architecture, etc.
- Trains Delivery Group – dealing with train systems
  - Rolling Stock, Depot Plant & Equipment, Signals, etc.

Appointed Team Co-Ordinator in the Trains Delivery Group

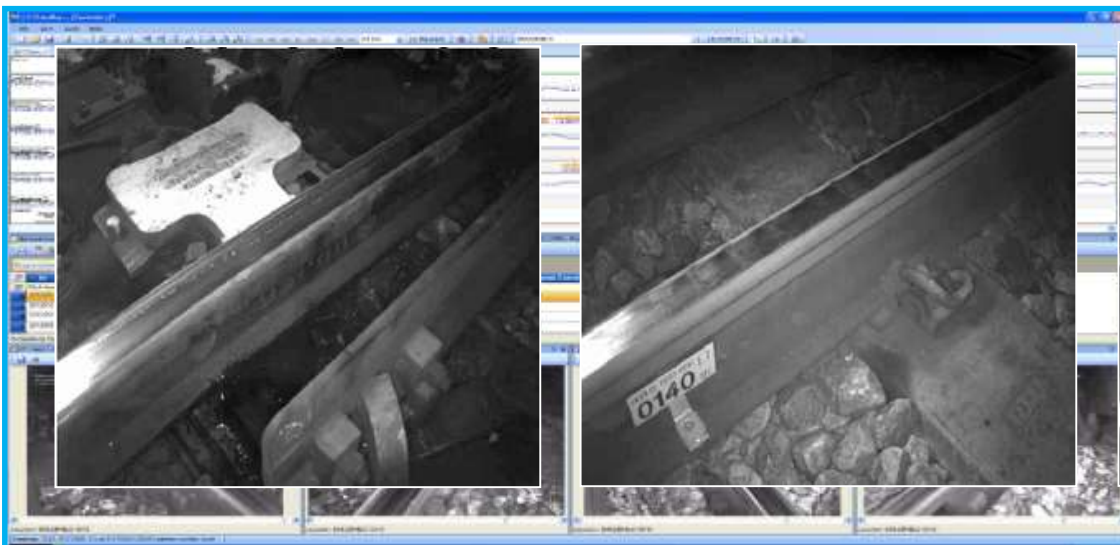
- 22 Engineers working exclusively on reliability improvement projects for the Central, Northern and Jubilee Line fleets, plus
- 8 Depot Assistance Resource Team (DART) Engineers supporting the 10 fleet managers at 14 depots across all LU lines
- In 1997 inherited 12 AVI and N&V specialist engineers providing on-train automated track monitoring (geometric, video inspection and noise & vibration services) to support prioritisation of casualty track maintenance and to resolve vibration issues and external noise complaints.



# 1997-2019 Automated Track Monitoring

## Automated Track Monitoring System

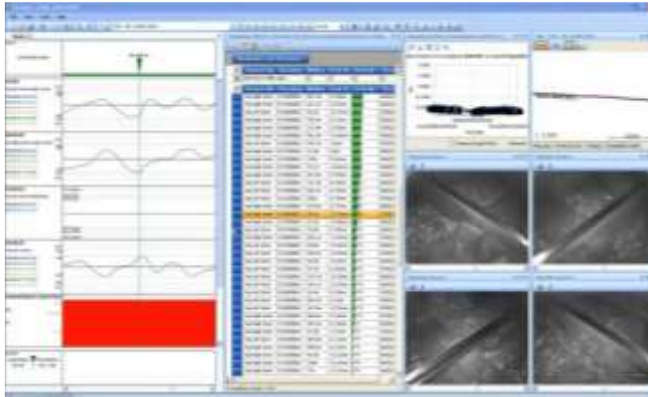
- Nine passenger trains fitted with ATMS to collect data at higher frequency than possible before
- ATMS gives geometry and supporting data at least twice weekly for six lines and finds faults not seen by legacy systems including the Track Recording Car
- ATMS has proven “unattended” data collection to be viable and next day data processing is now standard – staff no longer needed on train to report faults



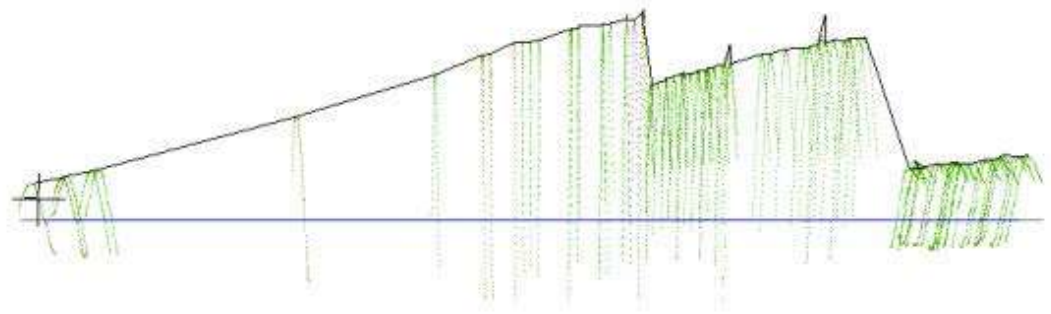
# Automatic Track Monitoring System

## Sample ATMS Displays and Reports

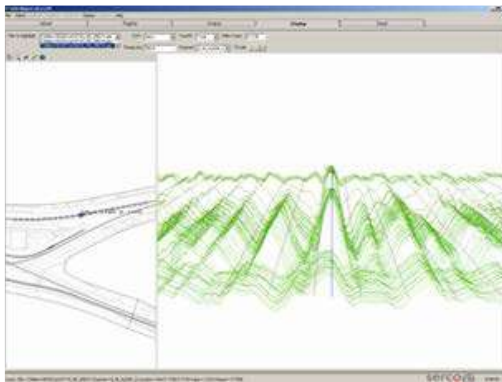
Note: The previous TRV train provided data every 6 weeks, compared with 20+ round trips of data every day with ATMS, now sent direct to desktops.



Main display



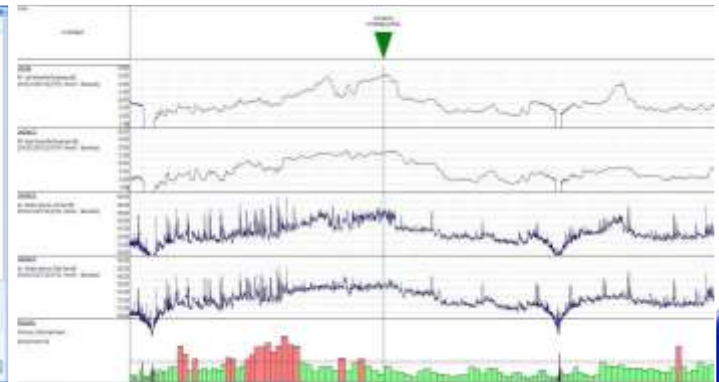
Time synchronised DataMap view – track defect growth rates



Track defect - Isometric View



Noise & Vibration DataMap



Noise & Vibration Output File

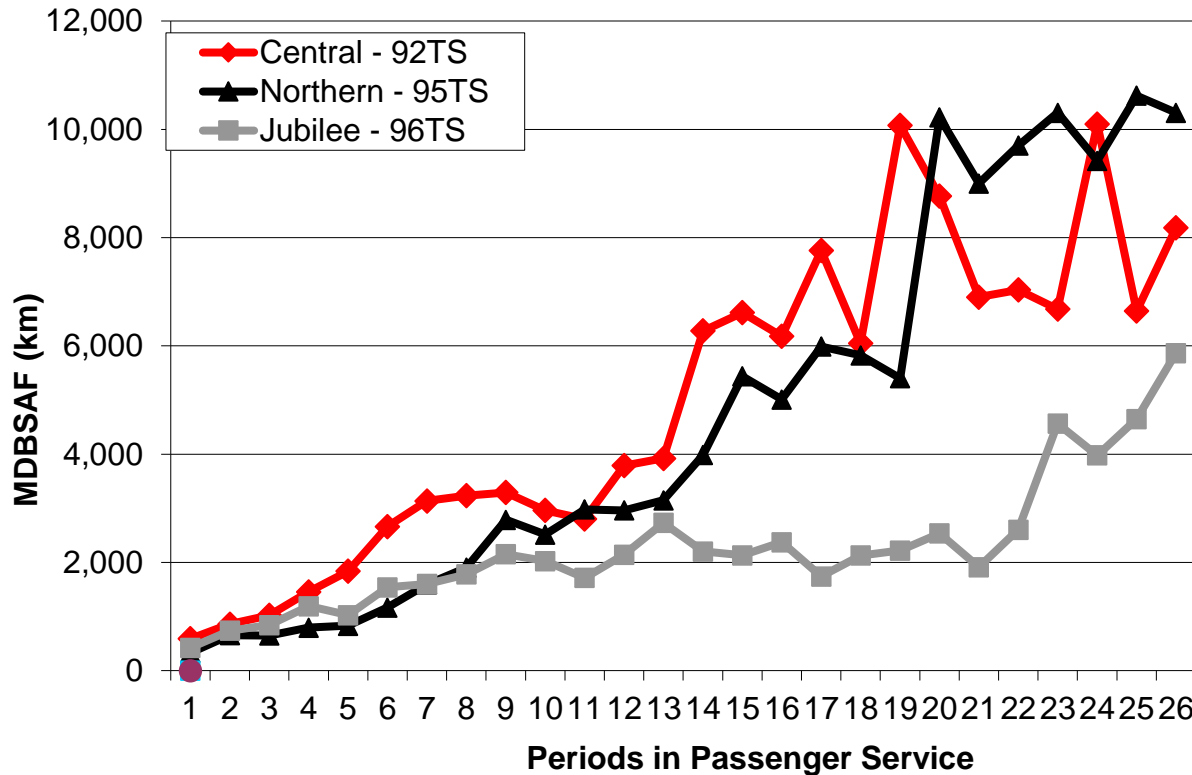


# 1996 - 25 Years working for LU



# 1998 Northern Line 1995 Tube Stock

New Train Reliability Growth - First 2 Years



Ceased my role as New Stock Engineer to become Project Engineer for the introduction of the fleet of 106 Northern Line trains and build their reliability.

# 1999 – All Change 3

## Shadow Running for PPP

Shadow running in preparation for the PPP Contract (2003)

London Underground split its engineering functions into four distinct groups

- InfraCo SSL – Metropolitan, District, Circle and Hammersmith & City
- InfraCo BCV – Bakerloo, Central, Victoria and W&C
- InfraCo JNP – Jubilee, Northern, Piccadilly and Transplant
- London Underground Chief Engineers Directorate (CED)

All LU rolling stock engineers divided between InfraCos except a handful of senior engineers from each discipline area remaining in LU as Chief Engineers.

In 2000 I joined LU Chief Engineers Directorate as Control Systems Engineer and Deputy Rolling Stock Engineer responsible for oversight of :-

- Introduction of ATO on the Central Line
  - a first in the UK for ATO operation in open surface sections of a railway
- Rolling Stock related depot, plant and equipment.
  - Train washes, Underfloor wheel lathes, lifting jacks, etc
- Depot Electrical Installation Safety Improvement Project (DEISIP)
  - EAWR compliance project for depot overhead traction supplies



# 1999 – Depot Electrical Supplies

## DEISIP Objectives

To comply with the Electricity at Work Regulations and a HMRI Improvement Notice, the following 4 main objectives were set.

1. Elimination of live overhead trolley shed plugs when not plugged into a car 630 volt DC receptacle box.
2. Elimination of live plugging and unplugging of trains within depot sheds.
3. Elimination of live train shoes within depot sheds/placing barriers adjacent to the live shoes.
4. Depot switchgear and distribution system to be fit for their intended purpose and comply with the relevant Health and Safety Legislation.





# 2004 – All Change 4

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## **Chief Rolling Stock Engineer**

David Waboso joined London Underground as the Engineering Director in charge of LU's Engineering Directorate and later the delivery of LU's non-PPP capital programmes work bank.

In order to retain a level of internal independence the Engineering Directorate was re-organised and Eddie Goddard became the LU Chief Engineer.

Eddie's vacated role as the Train Systems Engineer was filled by Malcolm Dobell and I was appointed as Head of Rolling Stock Engineering to fill his vacant role.

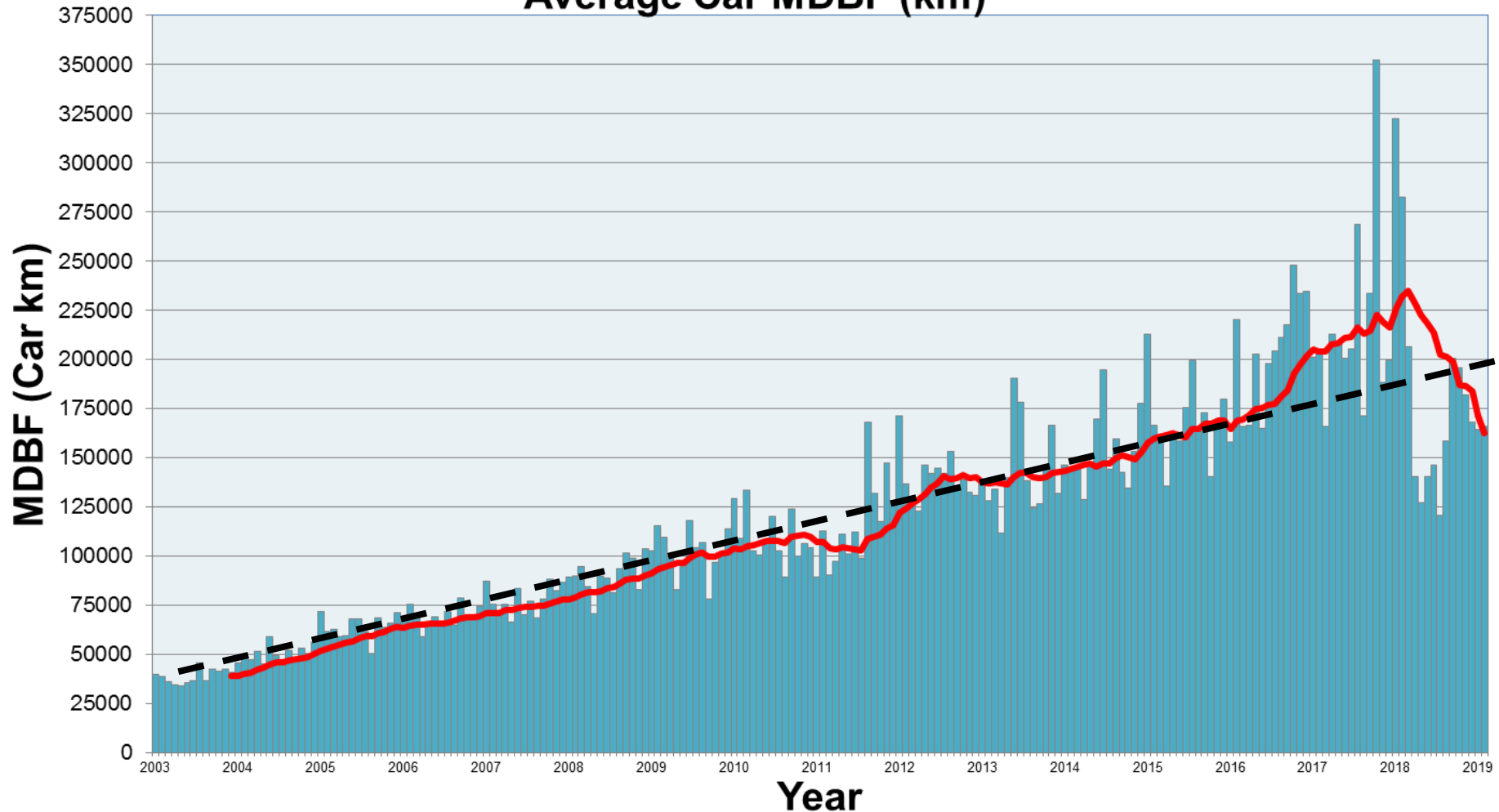
With promotion to this position I inherited the role of accepting that the new and altered trains delivered through the PPP contract complied with technical standards and were fit to enter service.

This role involved working closely with our PPP contract rolling stock engineers to improve overall rolling stock reliability which was very poor at the time.

I also had responsibility for defining the future strategic architecture of LU trains (open gangway walk-through trains with improved PTI) which are soon to be delivered as part of the Deep Tube Programme, the first of which is ordered and being designed for the Piccadilly Line.

# Rolling Stock Reliability – All fleets

London Underground Rolling Stock  
Average Car MDBF (km)



# 2007 – UITP Representative



Representing London Underground since 2007 on the UITP Rolling Stock Subcommittee.

Sharing rolling stock knowledge and experience with over 30 metros across the world.

Delivering or leading joint work on a wide range of topics of common interest, such as,

- Fire performance of rolling stock
- Remote train condition Monitoring
- Design Authority for changes and alterations to rolling stock
- Coating systems
- Bonding on rolling stock, etc.

Chairman of this committee since April 2019

Lots of foreign travel – only marred by long delays at airport security – apparently because of a likeness to some political figure!

I can't see it myself!



# Celebrations

2011 - 40 years  
with London  
Underground



2013 London Underground celebrates 150 years since  
the opening of the Metropolitan Railway – 9<sup>th</sup> January  
1863



# 2018 – All Change again

## Professional Head of Vehicles

TUPE'd from London Underground to TfL Engineering

All London Underground and TfL Surface engineers now “transformed” into one single engineering functional organisation.

Now Professional Head of Vehicles with technical responsibility for around 200 TfL Vehicles engineers delivering work for:-

- London Underground
- London Overground
- TfL Rail / Crossrail (+ Elizabeth Line when service commences)
- Docklands Light Railway
- London Trams
- London Buses
- London Dial-a-ride
- Santander Bicycles
- Emirates Air Line (cable car)
- London River Services
- Woolwich ferries



# IEEE / IET (IEE) – History

## IEEE

- Joined around 1985 as a member, became an Incorporated Engineer (IEng) and later elected to Fellow member FIIE(Elec)

## IEEE/IET

- 2000 – Joined in as Associate member (AMIEE), elected to Member (MIEE) soon afterwards
- Started a 2 year long process for Chartership under the Mature Candidate Scheme with a written paper on the design of Victoria Line ATO controllers.
- 2006 – elected to Fellow member (FIET) and also became a Chartered Engineer (CEng).
- Currently a member of the IET Transport Professional Network Executive Committee – similar in concept to a combined IMechE Railway Division Board and Events Committee and occasionally a judge on a number of IET Young Member Presentation competitions.
- A standing guest lecturer on Train Control and Management Systems at the IET biennial Electric Traction Systems Conference since 2004 and an occasional IET presenter on subjects as diverse as Railway Safety and Future LU Rolling Stock.





# IMechE – History

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## Early years

- 1980's – Occasional presenter on the Reliability of train monitoring systems, Modular on-train communications systems and on Northern Line Reliability Growth
- 1990's – Planning committee member and Session Lead on a seminar on Train Data Retrieval and Management

## More recently

- 2009 – Elected to Fellow Member and became a Railway Division Board member in 2011. I am also a committee member of various IMechE Railway Division committees and steering groups, such as the IMechE Railway Division Skills Task Force, IMechE Railway Training Steering Group and I chaired the IMechE Seminars & Conferences Committee until it merged with the HQ Lectures committee to become the IMechE Events Committee which until recently I Co-Chaired with Iain Flynn, now the current chair.



# IMechE – Railway Challenge



TfL Railway Challenge team sponsor for the last 6 years

Twice winners and this year came a very respectable 2<sup>nd</sup> place



# Why am I standing here?

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## Experience

- 48 Years of railway engineering experience with London Underground

## Knowledge

- of rolling stock design and integration on trains that are more compact and incorporated modern technology ahead of most mainline trains at the time

## Skills

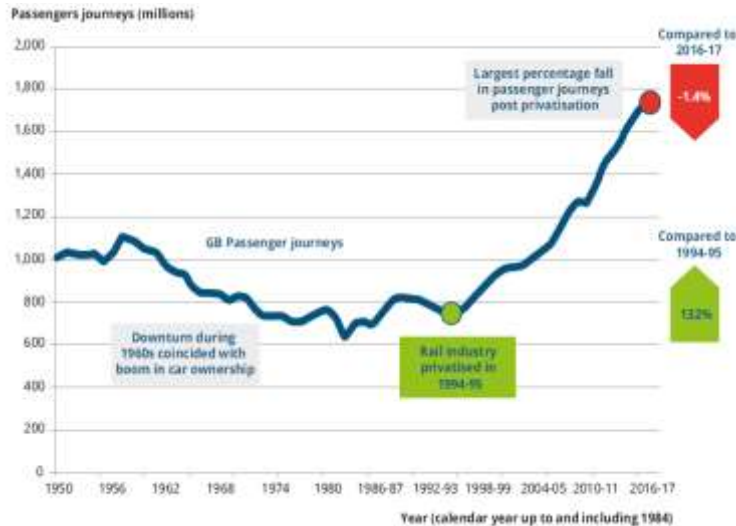
- that started as a bias towards electrical and electronic maintenance
- then developed into a design engineering role that required systems engineering thinking and integration skills at the railway level
- that were then used to develop rolling stock engineering standards to drive reliability and safety improvements for LU, national and international rolling stock
- that are now being used in the management and acceptance of a large portfolio of rail and other vehicle types in TfL





# The Institution

## Why we need to work differently



- Mainline railway ridership has increased by over 132% since privatisation
- Greater demand for lower fare options.



- Population of London set to grow by the population of Birmingham by 2029
- LU has increased passenger capacity by over 40% and still struggles to manage increased ridership.
- Modernisation of Tube services (night-tube)
- TfL annual budget reduced from £7bn to £6bn means doing more for less cost!

# Gap 1 – Skills Gap

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Rail industry – you can “learn something new every day” – retained my personal interest and fascination during my 48 year career as a rolling stock engineer.

The basic skill set of a rolling stock engineer has changed

- Rolling stock engineering was traditionally always a mechanical engineering discipline
- Nowadays modern rolling stock engineers need a mix of technical skills – electrical, electronic, software, systems, control, tele-comms and production engineering and should, by strict definition, be properly called railway mechatronics engineers instead
- They also need a basic understanding of data communications, analytics and data science – our world is now more digital than ever.
- Add a sprinkle of project management skills and you the have the recipe for a well rounded rolling stock engineer capable of delivering almost any rolling stock project.

# Skilled Resource Shortage

However the NSARE Skills Gap Report (2011) and the Traction & Rolling Stock Resources Review Report (2015) highlighted a shortage of skilled T&RS engineering resources and predicted that large numbers of the existing workforce will retire within the next 10 years.

Rolling Stock engineers are in very short supply at present – the UK is in the middle of a huge rolling stock renewal programme to replace over 7000 of the existing 14300 vehicles in the UK main line fleets by 2021.

TfL are also finding it very difficult to recruit and train sufficient resources for our needs as we strive to purchase 100+ new Deep Tube trains for the Piccadilly Line and to modify existing fleets to extend their life, improve reliability and deal with structural, corrosion or obsolescence issues.

There is a significant gap to bridge in attracting young people into a railway engineering career in the first place as engineering is taken for granted and its significance in daily life is not widely understood or appreciated.





# IMechE Report



“ ”

I think the work of engineers and a career in engineering have tended to be undervalued in our society, particularly by parents of students, in comparison to doctors, dentists, lawyers, bankers etc. Teacher

“ ”

Many people take for granted the work of engineers. It is 'behind the scenes' and not widely understood or appreciated. Careers Professional

“ ”

I think that we are naive and slightly ignorant of the impact that engineers have on our daily lives. School Governor

“ ”

I don't think we do value engineers – our educational system nationally and locally does not foreground the need for engineers, or the skills that engineers need. Oddly enough, we celebrate our ingenuity nationally, but there is an unwritten coda which implies that we believe these triumphs are achieved against the odds. If engineering is important, it should be part of a national strategy, not a reliance on talented individuals simply emerging. Senior School Leader

## Inspire the Young

We need to redress this imbalance by inspiring, attracting and recruiting a wider, diverse and inclusive intake of young engineers or engineers from other industries.

# Bridging the skills gap



There is a whole world of young people out there who have not yet decided on a future railway engineering career – it's up to us to help them decide!

Much great work has already been done by the IMechE and other professional engineering institutions but we can do more.

We must dispel the perception that railway engineering jobs are boring, monotonous, difficult, dirty and unrewarding – carried out by people in overalls and spanners.

We must show them that the modern railway engineer uses modern technology and tools to plan, design, simulate, predict, prototype, build, test and commission and operate whole railway systems and can then re-use these tools to improve, adapt and modify the railway as performance and operational changes occur.

# Gap 2 - BREXIT

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The long drawn out BREXIT saga has already had a profound impact on the future of the UK rail industry.

Many of our train builders come from Europe or the far east and they source their train components from Europe or the UK

- the choice for them is one of cost, performance and Logistics

The uncertainty surrounding BREXIT and its impact on UK trade and sourcing must affect their purchasing decisions.

- Will BREXIT increase cause currency fluctuations?
- Will BREXIT cause excise taxes that will increase costs?
- Will the UK supply industry and its SMEs be stable enough to survive BREXIT?
- With all the debate on “Deal or No Deal” I wonder if our politicians really do understand the impact of BREXIT on our railway Industry?



# Bridging the BREXIT Gap

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A further impact of BREXIT is that there are many highly skilled and competent EU engineers working in the UK rail industry and the uncertainty of BREXIT is already causing many of them to leave the UK. The number of EU applicants for rail industry jobs has dramatically dropped off in the last 2 years.

This is adding even more stress to the UK rail industry skills shortage previously mentioned.

If you ask friends or colleagues about the longer term impacts and benefits of BREXIT you will get mixed responses. But I've not heard anyone saying that there will be a positive impact in the short term?

We need our politicians to consider the impact on our rail industry and to make the right decisions for our industry to survive and thrive in the future.



# Gap 3 – Economic Gap

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This is the gap between what is asked for and what is affordable.

Long gone are the days when the railway companies were plush with money, when they were treated as “cash cows” for some suppliers to milk to their hearts content, when contracts were let on the lowest price and large profits made on contract variations.

Today funding is in very short supply and railway companies are looking to get suppliers to deliver what they need in a more lean, efficient manner at a cost that is much more affordable!

Significant changes in TfL have delivered a leaner more efficient organisation that has reduced headcount by 12%, is working with the rail industry to review and challenge its own standards to reduce purchasing costs and is streamlining its processes and methods to reduce internal costs.



# Bridging the Economic Gap

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To bridge this gap many railway authorities are reprioritising what they spent their funding on, optimising their maintenance regimes and costs by using risk based, more predictive maintenance strategies.

Some companies are using their own internal resources to carry out this work or, where work has to be carried out by external organisations, creating more cost effective framework contracts or beneficial alliances with suppliers to reduce this expenditure.

These are just a few examples of a new culture of economic change that is turning our railways into a leaner, more efficient industry.

But is it happening quickly enough to deal with the issues that are likely to affect us in the near future?



# Gap 4 – Technology Gap

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The rail industry is at a “tipping point” where advanced digital railway systems and the technology they use needs to be utilised and applied to our mainline railways to overcome their capacity issues and to deal with predicted increase in ridership.

Unfortunately, although many of these advanced digital systems are already commonplace on high density metro systems like London Underground, they cannot necessarily be directly transferred for use onto the mainline railways as they tend to be proprietary closed systems designed for individual lines, not suitable for mixed traffic and not compliant with TSIs and interoperability requirements.



# Bridging the Technology Gap

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However the same professional skill sets, knowledge and experience present in these high density metro railways can be shared.

Where used appropriately, these skills can help bridge this technology gap to give the UK mainline railways a significant advantage in developing solutions that deliver the right outcomes efficiently and “right first time”.

At this moment in time there is a unique opportunity for the engineers in mainline railway companies and high density railways to work collaboratively, share knowledge, skills and experience to deliver the significant customer and business benefits that digital railway systems can unlock and thereby enable our industry to meet the challenges of the Railway Technical Strategy and the future.





# Gap 5 – IMechE / Rail Industry Gap

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In 2018 Andy Mellors spoke about “Challenging Times” and at the time the IMechE was indeed going through very challenging times.

Times are still challenging!

The IMechE has had a very difficult 18 months that has resulted in three internal reviews recommending a significant number of changes.

My theme this year is all about building bridges to close the gaps that these difficulties have identified.

I will be trying to build new, closer and more collaborative working relationships between all areas of the IMechE – the volunteer groups, the Railway Division, the other Divisions and Groups, the Trustee Board, the Council and the internal IMechE staff.

# Bridging the IMechE / Rail Industry Gap

IMechE Railway Division is the professional engineering body that best represents the UK rolling stock industry with a massive following and an engagement figure 6 times better than other IMechE Divisions & Groups.

We hold numerous events organised by the Railway Division Centres around the country and abroad as well as the 15 or so events managed each year by the Events Committee at the IMechE HQ.

Our biggest event is the annual Railway Division Luncheon in Spring – the “not to be missed networking event for the railway industry” a great opportunity for railway people to meet, eat, socialise and network in a less formal social setting.

The rail industry is also at a “tipping point” with its £50Bn investment plan to deliver new rolling stock and improved infrastructure, HS2, Crossrail and the zonal re-organisation in Network Rail to improve operating performance for passenger and freight customers – add the skills shortages and the trauma of BREXIT and these are indeed Challenging times.



# Bridging the IMechE / Rail Industry Gap

In TfL we are also deliver some major packages of work, including

- installing a new CBTC signalling system as part of the 4 Lines Modernisation Project (4LM) to increase capacity on our sub-surface lines.
- extending the Northern Line to Battersea
- replacing the problematic dc traction motors on our Central Line trains with a new modern ac traction system and a replacement Train Control and Management System to improve the reliability of our services.
- working on our first Deep Tube replacement fleet for the Piccadilly Line and a replacement fleet for the Docklands Light Railway
- modifying two fleets of trains to comply with the Rail Vehicles Accessibility Regulations.
- life extending vehicles and dealing with corrosion, structural and obsolescence issues,

All of these projects need experienced professional rolling stock engineers that are extremely difficult to come by in today's employment climate.



# Bridging the IMechE / Rail Industry Gap

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Delivering engineering and technical change is something that I am very familiar with - its part of my “day job” in TfL.

As Railway Division Chair I shall be concentrating on people and organisational change. This is a relatively new skill that I am developing but is not something that I can accomplish alone.

Fortunately I have a very experienced team of Board members, past chairmen and volunteers to support me.

I have been calling on that support to help me make the changes we need for our Division and Institution to become more dynamic, inspirational and to drive and motivate greater professional engagement within our rail industry.





# Railway Division Chair Objectives

## Improve Learned Society Engagement

1. My first objective is to actively promote, engage and increase the membership, diversity and inclusivity of engineers in the Railway Division by promoting the benefits of IMechE membership and engagement in RD activities that enable us to share our significant UK railway industry knowledge, skills and experience.

## Increase Railway Industry Support

2. My second objective is to encourage our railway industry to provide speakers willing to share their knowledge and experiences and we need the railway industry to send your engineers and engineering managers, new and experienced, to our seminars and conferences to both learn and to share their knowledge and experiences.



# Railway Division Chair Objectives

## Broadening Railway Engineering skills

3. I am therefore working jointly with a number of railway organisations and professional engineering institutions to see how we might work together, more collaboratively to benefit the railway industry and our collective aims and objectives. You will have already seen this in action with joint IMechE/IRSE and IMechE/RIA sponsored events held in recent years. I propose to extend an invitation to the IET and the PWI to also join us in the future to hold events of mutual interest to members of those institutions.

## Sponsoring the RD as a profit centre

4. My fourth objective is to seek sponsorship from the railway industry to help us to cover these operating costs and to create a surplus so we can use it to improve our offering back to our members so that everyone in our rail industry can jointly benefit from our Railway Division activities.

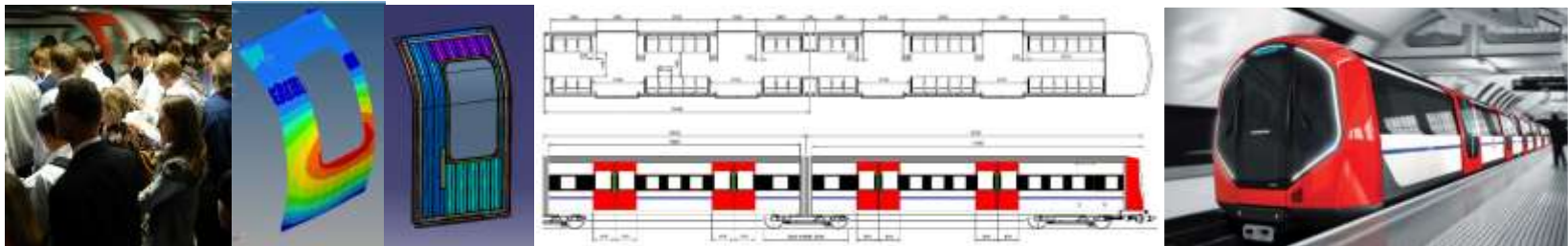
So do please contact me or the IMechE Railway Division if you wish to sponsor or otherwise support our RD activities.

Contact: [railwaychair@imechenearyou.org](mailto:railwaychair@imechenearyou.org)



# Conclusion

My advice to anyone joining the rail industry is to listen and learn as much as possible as early as you can from those that have the knowledge and experience but never forget that learning everything is impossible and I advise that you cultivate those career long friendships and seek out the advice of experts when you need to and likewise give advice when you are the expert; it is this type of ethos that makes a truly professional railway engineer, a real team player and eventually, with experience, a great engineering leader.



**Thank you for listening!**

**Any questions?**