

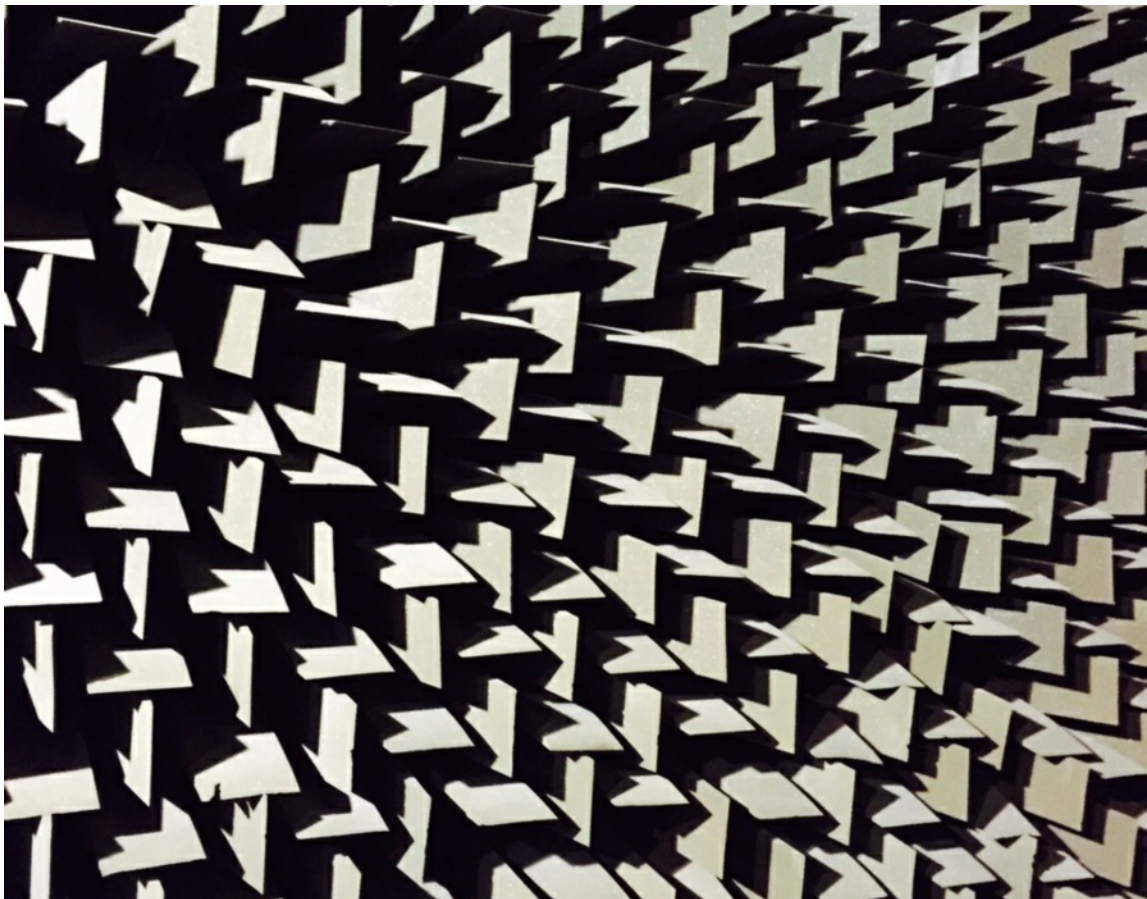


THE SWORDSMAN

Issue 38, May 2017

The Worshipful Company of Engineers

(Incorporated by Royal Charter 2004)



The Swordsman



Issue 38, May 2017

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From the Editor

The City, the livery movement and each of us are affected by the big events that shape our lives and the future of our successors. It may be helpful to future generations to know the context in national and global relations in which this edition is published. I confess to subjectivity to the extent that I choose the topics which seem to me to be the 'big events of the day'.

The UK's exit from the European Union took a significant step forward with the delivery of the Prime Minister's letter to Donald Tusk triggering Article 50 which marks the two year countdown for the exit negotiations.

Against all the forecasts of the pundits Donald Trump defeated Hilary Clinton to become the President of the United States and was inaugurated on 20 January 2017. Donald Trump's rhetoric before his election was pointing to an increasingly isolationist US policy towards the global community but he has already intervened in Syria and asserted his support for NATO. We all watch with interest because there is some truth in the metaphor, 'when the US sneezes the UK catches a cold'.

Terrorism has claimed victims in France, Germany, Sweden and the UK. The Houses of Parliament were locked down when a lone terrorist killed and injured pedestrians on Westminster Bridge and a policeman was killed while on duty within the boundaries of the Palace of Westminster.

One common thread to many of the current news stories is the vulnerability of IT systems to state sponsored hacking to the extent that the US asserts there is evidence that Russia has interfered in the US Presidential elections. President Trump has coined the phrase 'fake news' which is promulgated through the Internet and social media and now we all have to read any reports, wherever published, with a critical eye!

Since 1882 the UK has generated electricity from coal fired power stations. For the first time since then, the UK's electricity output did not rely on coal fired generation for a period of 24 hours over 20/21 April 2017.

Raymond Joyce

Contributors: Peter Blair-Fish, Audrey Canning, John Canning, Martin Cox, Sean Daly, Richard Elsy, Peter Elliot, Richard Elsy, John Garside, Alan Grant, David Holmes, Don Ives, Yvonne Joyce, Martin Knight, David Lamb, Neil Latham, Peter Liddell, Charles McAnally, Victor Mantey, Anne Millard, John Owen, Penny Taylor, Robb Eadie, David Shillito, Malcolm Vincent, Paul Wood

THE ANNUAL BANQUET AT THE MANSION HOUSE *4 November 2016*



The Master's speech



‘Wardens, My Lord Mayor, My Lord, Alderman, Sheriffs, members of the Livery, Provost, Ladies and Gentlemen.

It is my great pleasure to welcome you all to our Annual Banquet here at the Mansion House. It is a privilege for us to come together in your home My Lord Mayor and Lady Mayoress. Thank you for making us so welcome especially here in the magnificent Egyptian Hall.

You are coming to the end of a most successful term of office as the 688th Lord Mayor of London. In a very busy year, you have been here, there and everywhere and visited 26 countries.

And only yesterday, the Lady Mayoress hosted 400 guests in this hall for afternoon tea – and I much enjoyed it.

We welcome the City Sheriffs and their wives and wish them success as they embark on their busy year.

We have had a wonderful evening for which I thank:

- Caroline Gillett, our new Clerk,
- Sandra Watts, our events manager
- Mr Peter Thompson, our exemplary Beadle
- the Live Brass Quintet for their musical performances.

And the Mansion House staff for serving so impeccably excellent food and wine.

Too often, we do not think about where our food comes from. When I was President of the Institution of Mechanical Engineers, we produced a report entitled, “Global Food - Waste Not, Want Not”. This report highlights that an estimated 30 to 50 % of the food produced in the World does not reach a human stomach.

To reduce food waste in the UK, modern farming now uses advanced technologies. It is now “Precision farming” NOT intensive farming.

Camera drones are used for crop inspection. Field mapping programmes combined with GPS and sensors on tractors, interpret the crop density and adjust fertiliser levels.

An intelligent harvesting robot may well use a microwave measurement system to assess whether a crop like cauliflowers is ready to be harvested.

Smart ear tags and pedometers monitor cattle activity. Cows are milked and fed by robots – all with incredible accuracy.

And, efficient farming depends on imports too. Lord Mayor, with your shipping background, you are probably aware of the ocean-borne movement of chemicals. The phosphate has probably come from Africa, potash from Russia, slug pellets from Germany and nitrogen from Norway. Throughout my career, I have visited many engineering businesses in the UK and abroad and seen the sheer scale and breadth of the work done by engineers.



Engineering is an extra-ordinarily diverse and thriving profession, supported by many clusters of talented engineers, technicians, and apprentices – both male and female, and we need more.

In our recent Out of Town company visit to Yorkshire, we had guided tours of the University of Leeds, where we saw the largest academic testing facility in the world for testing materials for human joint replacements all with the aim that we have “50 active years after 50”.

At the University of Huddersfield we saw the new Railway Research Institute, the EPSRC centre for Surface Metrology, the Duke of York Young Entrepreneurs Centre and the Textile Design studio. Indeed the label “Made in Huddersfield” is internationally synonymous with the finest woollen fabrics.

There are still 62 textile firms in Huddersfield, employing thousands of people. The green jacket worn by the winner of the Masters Golf tournament is made in Huddersfield... as are soft furnishings in the White House. Today, our towns and cities no longer thunder day and night to the sounds of heavy industry in mills and factories.

Today’s Northern Powerhouse is precision engineering, advanced manufacturing and high technology complementing the area’s traditional strength in the manufacturing of high-value textiles.

Lord Mayor, Measurement and Engineering are all around us, and very evident here in the City. Using precision tunnelling, some of the largest infrastructure projects like Crossrail and the Thames Tideway Tunnel are well underway, each illustrating how we are “improving the world through engineering”.

For precision time keeping of events in the financial sector, NPLTime ® offers a certified precise time signal. This ensures that computer based trading is synchronised and traceable to a common reference time standard and is independent of GPS.

To ensure the quality of the coins from the Royal Mint, The Goldsmiths’ Company holds an annual “Trial of the Pyx” to check the coins against the standard calibrated samples held by the Measurement Labs.





... And, we also use calibrated standards to routinely verify that the lottery balls are perfectly round and of the right dimensions!

Whilst engineers use precise measurement units to define objects – from very large to very small – the media and general public still use everyday objects as their reference units to understand size.

For instance, in a recent letter to the Times and I quote:

Sir, "You say we have had the equivalent of 330 Windermers of rain this year (Feb 11). Could you advise how many London buses would make a Windermere?"

In response, *Sir, Windermere is 1,800 London buses long, 150 buses wide and a maximum 16 buses deep.*

I think this illustrates that our tradition of measuring distance in terms of London double-decker buses is still alive and well.

You may also be surprised to learn that headquartered beside the Guildhall in Basinghall Street is the Engineering Council. They are responsible for the Register of Engineers. They set the registration standards for professional engineers to ensure that the public can have trust in our profession.

They share offices with Engineering UK, who organise the Big Bang and STEMNET campaigns to inspire the next generations of engineers. As engineers, we are always looking to raise and modernise standards to ensure that they meet the realities of today's profession. We, therefore, look forward to the publication of the independent Uff review of the governance of our profession.

With all these examples of great engineering in the City, and with advice from Fellow Liveryman and past Lord Mayor, Sir Michael Bear, we are considering how we can work more closely with the City in promoting engineering.

When I started at Imperial College in 1973, I was just one of a small handful of women engineers,

among many men - Quite a surprise for a young girl from Northern Ireland. I well remember:

- Prof Ford talking about the principle of calculating total energy.
- Prof Cameron and his lubrication lab supporting most of the college rowing squad
- Prof Eric Laithwaite in the Electrical Engineering basement labs testing linear motors

I wish I 'd known that extra-curricular activities like rowing in the early misty mornings at Putney with Judith Hackett, chairing the HG Wells Society, going for a run in Hyde Park, or sitting in the Great Hall listening to Freddie Mercury and Queen practicing - would all be good for me and so significant. University is not just a preparation for life, it is life. In many ways you leave with far more than a degree, which was my experience at Imperial.



L to right: Dames Judith Hackett and the Master

Now, 40 years since graduation, I am delighted to be joined here tonight by 8 of my fellow graduates. Some have travelled from America and the Far East to be here.



Our guest speaker tonight, Prof James Stirling, will tell us what life is like now at Imperial, and he will speak about the current challenges faced by the University sector, especially the BREXIT challenges.

I read with interest the recent report produced jointly by the Engineering Institutions and the Royal Academy of Engineering entitled “Engineering a future outside the EU”

Professor James Stirling CBE FRS became the first Provost of Imperial College London in August 2013. Prior to joining Imperial, he was Head of the Cavendish Laboratory at the University of Cambridge.

Many years earlier, James had graduated from Cambridge with a mathematics degree and obtained his PhD in Theoretical Particle Physics in 1979. James and I meet on a regular basis through NPL, as we both are members of its Science and Technology Advisory Council.

James, you and your wife Paula are most welcome and we look forward to hearing from you shortly.

When James speaks, you will notice a slight Irish accent. We have both benefited from a wonderful education in Northern Ireland. Tonight, I am again joined by my two sisters, Jayne and Karen, their husbands Des and Peter and I thank them for their support during my career.

I am very proud to be an engineer. There is so much to look forward to: The Queen Elizabeth aircraft carriers, developments in 3 D printing techniques, Quantum Technologies, autonomous road vehicles, the Uff report, a Government Industrial Strategy, and six more months as your Master.

Tonight, in the presence of the 688th Lord Mayor, and Masters of other historical Livery Companies, I feel very much like the new kid on the block, as we, the Engineers, are only 33 years old. And yet, Lord Mayor, we already have a healthy Trust Fund, The Engineers Trust.

I thank our Trust Chairman, John Robinson and his team, for their stewardship of the Fund which is able



Professor James Sterling

to increase its funding each year for prizes, awards and scholarships, all thanks to our members’ generosity.

Last week, I had the pleasure of meeting two of our current beneficiaries of the Trust, our two Arkwright award winners both aged 16 and both looking forward to becoming engineers and to being mentored by our members.

In addition, the Engineers Trust supports The Lord Mayor’s Appeal. So, please accept these 2 cheques as our contribution firstly to your Appeal and secondly to the Mansion House Scholarship Scheme.

My Lord Mayor, ladies and gentlemen, it has been an honour to be here tonight and to speak about engineering and measurement within the City of London.’

The Master then proposed the civic toast.

A PERSONAL IMPRESSION OF THE BANQUET

4 November 2016



'White tie, crikey!' was my guest's response when I explained the implications of the invitation he had just accepted to the Annual Banquet. Outfitted in the traditional garb we approached the Mansion House to be slightly confused by the scaffolding covering the main entrance. Realising this was the platform for the Lord Mayor's parade we found the way in around 'the side'. With the Lord Mayor's parade being the following weekend the Engineers' banquet must be one of his last engagements.

The formal dinner in the magnificent columned "Egyptian Hall" commenced with pomp and ceremony. So, named by its architect George Dance the Elder, the hall's layout followed the "Egyptian" definition of Roman architect Vitruvius. Indeed, no Egyptian motifs are employed, the twenty niches between classic Corinthian columns are filled with Romanesque/Grecian sculptures completed with a Barrelled ceiling.

As always, the dinner was followed by the Master's address and response from the Lord Mayor and guest, Lord Stirling. The Master's pun on Stirling Engine, invented for its thermodynamic efficiency,

was not lost on the engineers present*. Nor was the link between Engineers and the City, although methinks if physical science engineers were paid the equivalent of financial engineers UK's industrial future would be very different.

Such occasions are memorable by the company. How did the 'Clerk' manage to fill the places so completely? But was there a Machiavellian intent. I discovered my neighbours had contributed the previous year's report to the Swordsman. Then there is always a splendid serendipity element. The scrumptious red wine came from an obscure village in South Eastern Italy (the heal); only for the young lady opposite to announce 'oh I spent a year there!'

The traditional evening ended with the 'passing of the Port'. My only observation is that, 'it is essential the Port is passed'! My guests were mesmerised by the evening. Jon has spent the past 30 years passing by the Mansion House, but had never been inside. He summed up the event thus, 'I have never been at a formal event that had such a laid-back atmosphere of good humour and friendliness'.

John Owen





LORD MAYOR'S SHOW

12 November 2016

The Lord Mayor's Show to celebrate the swearing in of the new Lord Mayor was cheered along by hundreds of thousands of spectators undaunted by the pouring rain.



The new Lord Mayor, Andrew Parmley



L to R: Peter Blair-Fish and Barry Brookes

Our Master, Senior Warden, Junior Warden, Master's Steward and Janet Groome were counted among the 7,000 participants in the show together with 200 horses and 140 floats.



L to R: Richard Groome and the Master



L to R: Janet and Richard Groome

CAROL SERVICE AT THE TOWER & DINNER AT CLOTHMAKER'S HALL *14 December*



The annual Carol Service at the Tower of London in the Chapel of St Peter *ad vincula* was as evocative of times past as ever. The Tower of London all lit up with the backdrop of Tower Bridge or the Shard, depending on which direction one looks, is a sweep of history unlike any other.

The service has an intimacy that makes the carols seem to be so much more meaningful. The Chapel's choir is quite exceptional. The intonation, balance, breathtaking pianissimos, ensemble and quality of the solo voices is a treat that would make attending the service a must even if there were no other 'attractions'. The Master and Wardens read the lessons well, but a special mention must go to Val Howse who read 'Advent 1955' by John Betjeman.

After the loosening of our vocal chords it was less than 10 minutes to walk to the Clothmaker's Hall for a superb dinner before the Master's speech. The evening was special for a very important reason because the Company said goodbye to Tony Willenbruch as past Clerk and formally welcomed Caroline Gillett as the new Clerk.

Tony was given a taper stick incorporating the figure of a sailor made by William Caffey in 1758. Tony was clearly delighted with the gift and the prospect of all the work in store in researching its background. Tony also received a cheque which he

said would be used for a short trip to discover the Baroque Art and architecture of Seville.

We all learnt how busy Tony was going to be in 'retirement' including being a Court Assistant with the Educators and trustee and Armed Forces adviser. This will include work for the Arts Scholars on apprenticeships and Armed Forces links, his college at Cambridge University and fitting in some lectures, exhibitions and talks at the British Library and the V& A Museum.

Tony reminisced about his seven years as Clerk and among his many thank yous picked out Graham and Margaret Skinner for their help and guidance.

As we said our goodbyes I think most of us would have agreed that we were well infused with festive cheer.





Queuing for the Tower of London



Christmas tree overlooking the resting place of Anne Boleyn in the Royal Chapel



A Christmas tree overlooking the Tower of London

COURT AND PARTNER'S DINNER

10 January 2017



The Court meeting held at the Watermen's Hall on 10 January admitted five new liverymen to the Company.



The Master with five new liverymen and their partners



The Master and her guest Mark Ramsdale



The Company of Watermen and Lightermen is a working Guild deriving its authority from legislation assented to by Henry VIII. The Coat of Arms above the fireplace in the photograph opposite display the Armorial bearings granted in 1585



Fireplace in the Watermen's Hall

ELECTION COURT, SERVICE & DINNER



7 March 2017

The year 'flies by' commented the Master and indeed it does! The results of the Election Court were announced as follows.

- Junior Warden (elect) - Gordon Masterton
- Middle Warden (elect) - Barry Brooks
- Senior Warden (elect) - David Johnson
- Master (elect) - Richard Groome



L to R: Barry Brooks, David Johnson, Richard Groome, the Clerk and the Master leaving the Armourer's Hall on their way to St Vedast in Foster Lane.

Below: Dinner in the Armourer's Hall



Above: The service at St Vedast's was taken by the Hon. Chaplain, Peter Hartley attended by all members of the Court and many partners.



PARTNERS' LUNCHEON ABOARD

HMQS WELLINGTON *5 October 2016*



Lunch was on board HQS Wellington, headquarters to the Honourable Company of Master Mariners. It is allowed to be such as its stern is just within the city limits.

King George V granted the 'Honourable' in recognition of the vital contribution Master Mariners make to the country. Its mooring at Temple steps was created by Sir Joseph Bazalgette in compensation to the Temple when he laid his great sewer on part of its waterfront. The ship was built to provide a British presence in New Zealand but at the outbreak of the Second World War it served on Atlantic convoys.



Among the many maritime paintings is the portrait of Mr Samuel Plimsoll of Plimsoll line and 'shoe fame'. The plimsoll was marketed as such by a Northampton shoemaker as they looked like ships, had a waterproof sole and floated like a ship. Our speaker was Caroline Diehl founder of Media Trust, a charity that works with the media industry to empower other charities and communities to have a voice and be heard. It became poignantly

pertinent when her son required a bone marrow transplant. After 23 years Caroline is stepping down as CEO in the knowledge that not only is her charity so successful it has now added to its list of activities its own TV channel but that her son received a successful bone marrow transplant through both the power of communication and bioengineering.

Yvonne Joyce



HMS WARRIOR

PORTSMOUTH DOCKYARD *4 October 2016*



On a pleasant October morning the Engineers and their guests gathered outside Portsmouth Dockyard. Collected by Liveryman Neil Latham, chairman of the Warrior Board of Trustees, we avoided the Victory's press gang and quickly walked the plank to HMS Warrior. Following our ration of grog and ship's biscuit (well, tea and chocolate cookies) we met the Warrior's captain, Cdr Tim Ash, who gave us an introduction to the vessel. After a maze-like journey to the Warrior's "heads", we met our other guides for the day, Lt Cdr Tony Ford and Bob Daubeney.



Some of the 'hands' on deck.

The ship is basically an armoured box holding the grim purpose of the vessel – its heavy guns, designed to sink the whole French fleet. The gun deck showed clear evidence of 5S thinking in 1860, with a place for everything and everything in its



place. A trip to the main deck showed the problems Warrior faces with wood rot, and the techniques being used to rebuild her bulwarks. Perhaps a worrying amount of interest was shown in the cells, complete with punishment birch and a cat of nine tails. A pleasant lunch followed the flogging re-enactment, with the Master (also a Trustee) expressing thanks to the Warrior team.

We then went to the Jutland exhibition, surprisingly moving with mementoes from the battle, including battle ensigns, shell splinters, and documents.

The day was rounded off with a visit to Monitor M33, a Dardanelles survivor, built in seven weeks, carefully conserved, and showing how basic a warship can be when needs must.



What is so interesting about the bucket and who is imitating Nelson?

The Warrior needs help. Not just money, but research capacity, editorial help, volunteer guides and membership of the Warrior Association. Any Liveryman interested in helping can contact Tim Ash. *Paul Wood*

BLUEBELL RAILWAY VISIT *18 October 2017*

By John Canning



An unusually clement day for mid-October saw a two pronged attack on (visit to) the Bluebell Railway in East Sussex. The primary flank was launched by the Master (*via* a special charter train from East Grinstead to the main terminus at Sheffield Park), whilst a back up group had assembled, through nefarious means, directly at the main terminus.

For the record, the volunteer-run, Bluebell Line is the UK's first preserved standard gauge passenger railway, re-opening (in 1960) part of the London Brighton & South Coast Railway between Lewes to



East Grinstead. The steam locomotive that was to haul the Company members was number 592, a C Class South Eastern & Chatham Railway loco built in 1902. 'The Engineers' head plate was proudly displayed on the loco, in recognition of the Company's visitors.

The main business of the day commenced with a welcome from Gordon Owen, the General Manager of the Bluebell Railway, after which a breakaway group left to enjoy the delights of the National Trust Sheffield Park Gardens. The remainers were treated to a series of excellent lectures on the challenges of maintaining the Heritage Railway and its Loco Works by Russell Pearce, together with a lecture on the 'new' (restoration) build of the Atlantic class locomotive 'Beachy Head' given by David Jones.

Following the lectures, we split up for guided tours. It was a real privilege to visit the workshops and see

the craftsmen/technicians at work, with lathes, grinders, welding torches, paint pots and brushes as they went about their task of maintenance of the locomotives. In addition to these heritage crafts, it was instructive to learn that the world of 3D CAD/CAM plays an important part in the maintenance and restoration of the Heritage assets. One of the challenges faced by today's maintainers (we were to learn) is meeting the materials' specification that requires 'the best quality Yorkshire steel'.

Following the tours, we were treated to an excellent lunch and a highly digestible introduction to the history of the Kingscote Signal box, presented by



Brian Hymas and Chris Bassett. We also had the opportunity for a short visit to the museum, before embarking on 'the 15:30 to East Grinstead'. En-route a small group alighted at Kingscote station for a tour of the Signal Box and its relay room – a very rare treat on today's operational railways - whilst others stayed aboard to the end of the line.

Those visiting the Signal Box caught the return train and had the opportunity to admire the very pleasant Sussex countryside, as we were transported back to Sheffield Park.

On behalf of the train enthusiasts, and those who came to learn about a Heritage railway and witness some 'hard' engineering, thanks go to our Company Chaplain / Bluebell Railway Volunteer Rev Peter Hartley and the enthusiastic Bluebell Railway staff and volunteers for their hospitality and enthusiasm which made a very pleasant and memorable day.



THE MANUFACTURING TECHNOLOGY CENTRE, COVENTRY

23 November 2016



The Master and a small group of Liverymen visited The Manufacturing Technology Centre (MTC), in Coventry is a partnership between some of the UK's major global manufacturers and the universities of Birmingham, Nottingham and Loughborough, and TWI Ltd. The initial global industrial members are Rolls-Royce, Aero Engines Control and Airbus. Rapid growth since opening in 2011 has created revenues of £33M, around 500 employees and more than 90 industrial global manufacturing members in sectors as diverse as automotive, aerospace, rail, informatics, food & drink, oil & gas construction/ civil engineering, electronics, and defence.

Chief Executive Clive Hickman gave a presentation outlining the purpose, scope, strategies and activities at the MTC.

The MTC was created with the objective of bridging the 'valley of death' between academia and industry by providing collaborative partnerships that take the ideas coming out of academia and look to develop them into commercial reality within industry.

The Key strategic goals are to:

- Accelerate the UK's industrial growth
- Deliver innovation
- Change the way businesses compete
- Create and embed skills
- Maximise synergies within supply chains

Examples of successful process development include the automation of Rolls-Royce manual and slow turbine blade casting. The throughput was improved dramatically to the extent that when the fully transformed process was installed at Rolls-Royce in Rotherham they ran out of feed material after the first week.

Skill development is a key area. An apprentice training facility has been established in an adjacent building so that youngsters can be involved in manufacturing processes in the MTC.

Clive and Stephen Byrne, the Industrial Partnership Manager, gave us a tour of the workshop.

The MTC houses some of the most advanced manufacturing equipment in the world. Alongside market leading expertise, this creates a high quality environment for the development and proving of new technologies on an industrial scale.

We were most impressed with the size and scale of the equipment for the development of:

Assembly systems - Advanced Tooling Fixturing,
Electronics Manufacturing,
Intelligent Automation.

Component Manufacturing Systems - High Integrity
Fabrication - Net Shape & Additive Manufacturing - Non-
Conventional Machining.

Data Systems - Metrology & NDT - Manufacturing

Informatics - Manufacturing Simulation.



The visit concluded with a 'world class' delicious lunch matching the 'world class' manufacturing we had been presented with in the morning.

The Master thanked Clive and Stephen for their time, highly informative presentation, tour and generosity and paid tribute to Clive's much appreciated support to the Engineers' Livery Company. The importance of Metrology was touched on, as it is a particular interest of the Master.

We came away having learnt a great deal and encouraged by the scale, scope and energetic and enthusiastic commitment of the MTC in supporting the hugely important High Value Manufacturing that is key to the future of the UK economy.

David Lamb

CROSSRAIL VISIT

PADDINGTON STATION 24 & 31 January 2017



Yet another oversubscribed visit to the Crossrail project! The interest in Crossrail is unsurprising because of the sheer scale of the project and its strategic importance to the transportation system within London and the South East.

Crossrail will increase the capacity of London's underground railways by 10%. Its 12 car trains will be 250m long and standard gauge size. The Crossrail station at Paddington goes five storeys down from ground level. It will have a 120m x 20m canopy allowing natural light down to platform level, as does the Crossrail station at Canary Wharf. The canopy will have 182 glass panels, all different, with the pattern of British cloud shapes. It takes six weeks to get a new panel if one is damaged. Work on the connection to the main line station and the subterranean connection to the Bakerloo line run through and under the bomb damage gap in the Grade 1A listed Macmillan House. These works needed listed building consent, even for the post-war infill in the bomb damage gap.

An integrated team of Costain and Skanska has been on site since 2012. There are now about 200 people on site with about 15 sub-contractors. Diaphragm walls were built around the station before the tunnel boring machines were driven through it to create the running tunnels. The station was then built from the top working downwards.

The works needed 170,000 tonnes of concrete, 14,000 tonnes of steel, and the removal of 250,000 m³ of muck which was sent by rail and water to Wallasea Island in the Thames estuary. One of the challenges is the logistics of moving materials into the site, which are mostly done at night and at weekends. The station will have 8818 metres of cable trunking, 80km of cabling, and provide up to 18 MVA of electrical power. There will be six vent fans of 3 metres diameter, capable of moving 300 m³/s of air in case of a fire. The station is due to be complete by late 2018. The contract is based on a target cost.

Our site visit took us past the 30m long trusses for two flights of escalators down to platform level and further down to the "Bakerloo box" for the 80m long interchange passageway to the Bakerloo Line.

Piles supporting the bottom of the new station are in tension as they have to resist hydrostatic pressure. The works for the interchange to the Bakerloo Line were a variation to the contract and needed low headroom Continuous Flight Auger drilling rigs. Work for the planned connection from the Crossrail station to the District and Circle lines has apparently yet to be instructed, possibly because of objections by the Great Western hotel to blocking of Praed Street for some time, or because of the "Paddington cube" to be built on the site of the former sorting office in London Street.

Peter Blair-Fish



The 'royal door' used by Queen Victoria leaving the Royal lounge onto the original station platform



'A VERY ENJOYABLE VISIT'

'Ian Faherty, Costains Contract Manager, was quite a philosopher'

'from WW2 bomb damage to today's challenges of containing bomb blast impact!'



'our host was an excellent presenter'

'informative and entertaining'

'it's great to see the construction side of the project'

NORTHERN LINE EXTENSION

VISITING AMY & HELEN *6 February 2017*



In February a small band of liverymen were privileged to be one of the very last groups to visit Amy and Helen, the twin Tunnel Boring Machines (TBMs), purpose built to construct the Northern Line Extension (NLE) from Kennington Station to the new Battersea Power Station.



Our visit, hosted by the NLE Head of Engineering, commenced with an overview of the NLE Programme, its purpose and principal tunnelling constraints. The Programme is designed to encourage economic growth by facilitating the sustainable regeneration and development of the Vauxhall Nine Elms Battersea Opportunity Area. When complete, the regeneration is expected to provide 20 thousand new homes, 5 hectares of public space, 25 thousand new jobs and up to 3km of Thames frontage. Responsibility for delivery is divided between the Battersea Developer and London Underground (LU). Responsibility for constructing the twin bore deep tunnel tube link is LU's. It will create a new junction in the existing Kennington Loop, two new stations at Nine Elms and Battersea, two new ventilation and emergency evacuation shafts at Kennington Park and Kennington Green, and fit-out of the new stations and railway, and their integration into the existing Northern Line Railway.

The new TBM tunnels run from the cross-over box at Battersea, in spray concrete lining launch tunnels, to the shafts at Kennington Green and Kennington Park. An excavation with sprayed concrete lining support has been used to construct tunnels from the shafts to the Kennington Loop. The actual junction at the loop is constructed using spheroidal graphite

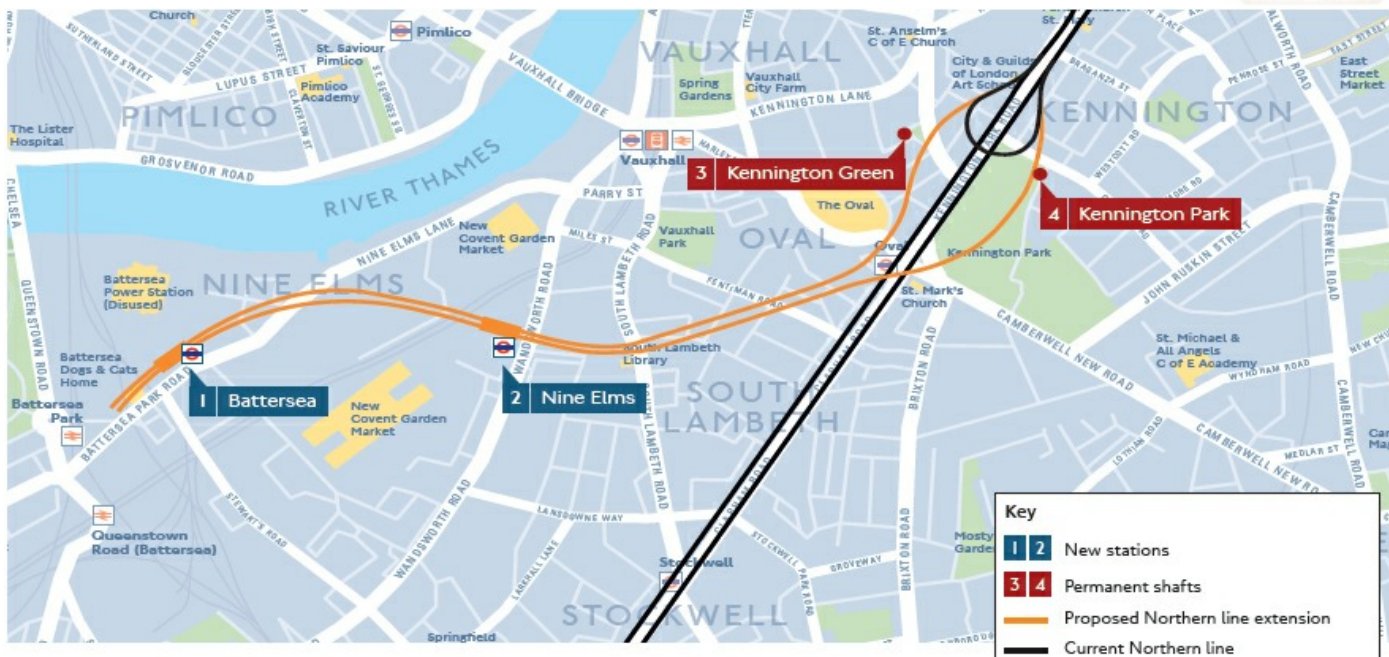
iron (SGI) rings encompassing the existing tunnel and stepping down in size (step plate junction) using headwalls back to the existing tunnel diameter.

The tunnelling route through London clay and some small areas of sand and gravel, will pass under existing Network Rail sidings, UK Power Networks cable tunnel and the South West London storm relief sewer and over the Thames Water Ring Main. The tunnels also pass under a significant number of residential properties. Other critical aspects have include the passage under the heavily contaminated Royal Mail site (with many piles from previous buildings). Significant risk reduction works have been carried out, including surveying the extent of legacy construction, as well as extensive ground movement monitoring.

The LU Principal Tunnelling Engineer explained that the TBMs will be lowered into the cross-over box at Battersea, constructed using diaphragm wall techniques. A tunnel eye has been formed through the diaphragm wall through which the launch tunnels have been formed in the London clay, using spray concrete lining techniques. Passive and active dewatering techniques are in place, which also requires careful monitoring to control ground movement.

From the launch tunnels the machines will advance towards the Kennington shafts, where they will be removed, the tunnelling toward the step plate junction at the Kennington loop having already been constructed using sprayed concrete lining techniques. Also constructed in advance are the two step transitions from the new 10m tunnel enlargement to the existing 4m tunnel, all without interruption to the operation of the existing Northern Line. Two weekend possessions are planned to remove top sections of the existing tunnel lining, enabling a more efficient closure over the Christmas 2017 period for fit-out of the new trackbed and P&Cs (Points and Crossings).

The TBMs are of the earth pressure balance type, used to good effect on the Channel Tunnel rail link project. This will allow for the tunnels to progress beneath highly populated areas whilst maintaining control of settlement, with spoil being excavated



1 2 New stations at Battersea and Nine Elms, providing step-free access from street to train

3 4 Permanent shafts at Kennington Green and Kennington Park are needed to allow air in and out of the underground tunnels, help cool the Tube and enable emergency access to and from the tunnels if necessary

View and download further information about each of the sites and other details about the scheme at tfl.gov.uk/nle

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from the front of the TBM shield and the tunnel lining being constructed at the rear of the shield using 5 steel fibre re-enforced concrete ring segments and one key segment. The cutter head comprises 26 double discs, 16 buckets and paired 35kN jacks, 104 cutter tools, 6 foam outlets (for soil conditioning) and 3 wear detectors. Spoil is mixed to uniform composition as it enters the shield transferred via a screw conveyer onto an extending belt conveyer the length of the tunnels for transport to the surface, before being transferred onto the main Battersea construction site conveyer and from there to a Thames barge.

The ground is never unsupported since the rings are built within the TBM tailskin and grouted as they leave the tailskin and the TBM advances. Around 20 full ring advances are achievable per day.

The cutter tools can be accessed for maintenance purposes from the rear of the cutter head. This is an area, sometimes referred to as the plenum chamber, within which, during normal operation excavated material is maintained and mixed at pressure to an even consistency and then progressively removed by rotating the screw at a rate that allows new material to enter the chamber at the same rate as material is removed, thus maintaining earth pressure. Whilst a facility to introduce compressed air is available to

maintain pressure in the plenum chamber when it is partially emptied to facilitate cutter tool maintenance, its use is unlikely whilst in London clay, since face deformation is relatively slow. Hence the cutterhead will more likely be forced against the face providing mechanical support. However, in case pressurisation is required, the TBM shield also incorporates a secure rescue decompression chamber for workers to take refuge in the unlikely event of an emergency.

Maintaining earth pressure balance (EPB) is critical to earth movement control. Spoil is weighed as it leaves the end of the screw conveyer to ensure that the correct quantity of grout is injected into the void outside the tunnel rings. Critical sensing of drive control, EPB sensors, grout pumping, conveyer movement, as well as CCTV and communications, is monitored from control cabin mounted on the TBM. It is from this cabin that the machine operator steers the machines by adjusting the angle of the cutter heads to ensure correct tunnel alignment.

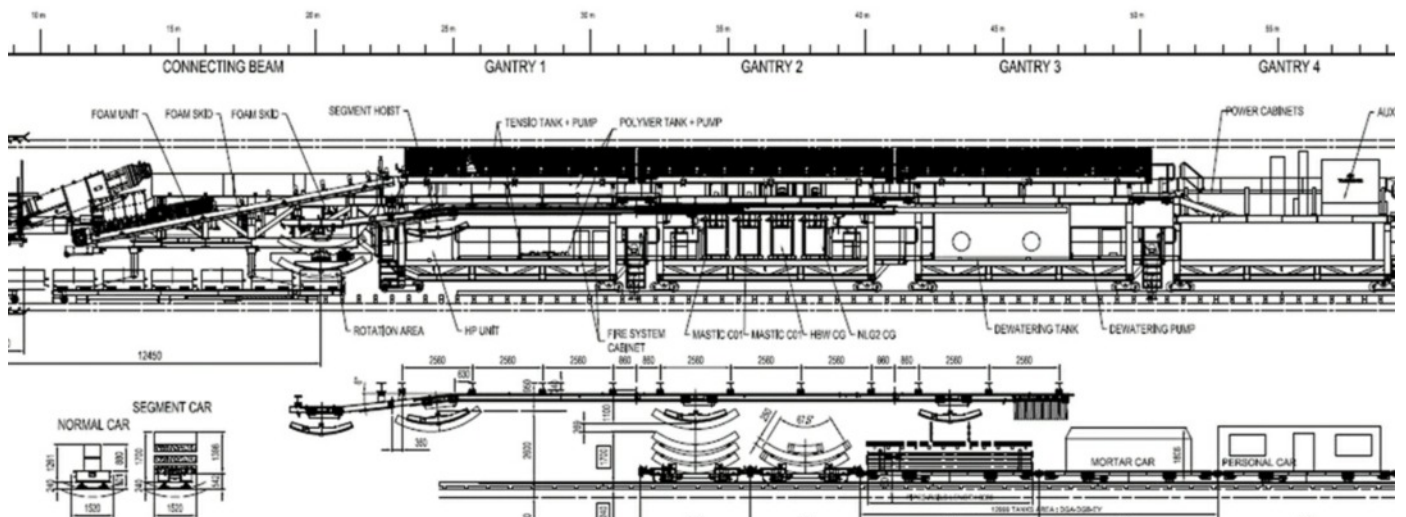
conveyer movement, as well as CCTV and communications, is monitored from control cabin mounted on the TBM. It is from this cabin that the machine operator steers the machines by adjusting the angle of the cutter heads to ensure correct tunnel alignment.



Our morning concluded with a visit to the viewing platform to view the two TBMs just five days before they were due to be lifted into the launch tunnels where they will remain for the next 6 months. In addition to viewing the machines, we were awarded an impressive view over the whole Battersea development site.

Our thanks go to London Underground and their Design and Build Contractor Ferrovial Laing O'Rourke for an excellent, insightful and educational visit.

Audrey Canning



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BUILDING RESEARCH ESTABLISHMENT



VISIT *28 February 2017*

On a damp February morning we gathered for what turned out to be an extra specially stimulating and diverse visit.

Dr Peter Bonfield OBE, the Chief Executive since 2012, started with an overview of the history of Building Research Establishment . BRE was set up in 1921 in Acton and was an executive agency of Government for 75 years. It was spun out as a management buy-out at the end of the Tory government in 1997. It is now owned by a charity with long term objectives. Peter opined that BRE seems to have more influence with UK government than when it was owned by UK government!

The proportion of its revenues from the government has dropped from 85% to 4%. Now 40% of its revenues are from outside the UK and 25% of its revenues from digital products.

BRE employs mostly graduates but also has about 40 apprentices in its 650 staff at Garston and about 500 elsewhere. Over lunch we had the privilege of meeting some of the young scientists and engineers.

One third of BRE's staff are from outside the UK, mostly from Europe and many feel insecure. In particular UK engineers have contributed to european standards whereas after Brexit, UK laboratories will not be allowed to CE mark.

BRE works with universities (Bath, Cardiff, Strathclyde, Edinburgh, Brasilia) and funds approximately 300 PhDs on the built environment and the quality of new build housing. It generates annual revenues of approximately £56m from industry sponsored multi-disciplinary research and certification schemes, notably the BRE Academy, BREEAM, LPCB, BRE Centre for Resilience, Home Quality Mark, BRE Innovation Parks Network, and BRE National Solar Centre. BREEAM is in use in many countries including several in Europe.

Following a visit from the Chinese President, who was impressed with BRE's capabilities, BRE was offered a research agreement with a 500 acre innovation park in China.

Our site tours included various energy efficient houses using different technologies on its Innovation

Park. John O'Brian who led the tour of the Innovation Park was a brilliant communicator. After listening to him most of us surely went back to their own houses buzzing with ideas for improvements.



insulation, supported by the Prince's Foundation for the Built Environment

One of the houses built from traditional materials has been subject to interior modifications to improve



resistance to flood damage. (as shown on the BBC's "Countryfile"). It will be a pity if the insurance companies do not pay for the more expensive reinstatement work using the water resistant technology because the houses can be made habitable within 24-48 hours of the floods receding.



Inside the flood modified house. The rug covered up the drainage grill to the sump!

We were also shown various laboratories including the structures laboratory which was used for trial assembly of parts of the "Cheesegrater" and for platform edge doors for Crossrail: the wind tunnel used for gas diffusion studies including a 3-D model of central London and finally a zero echo acoustic chamber.

After lunch we were treated to a presentation on BRE's role in WW2 in the development of Barnes Wallis' bouncing bomb. A scale model of the Mohne Dam, which is now a listed building, was built in BRE's grounds and used to test the optimum position for an explosion to break the dam.
Peter Blair-Fish & Raymond Joyce



What are they looking at?



The scale model 1:50 of the Mohne dam listed in 2002 as a monument of national importance.

VISIT TO RENISHAW PLC

4 April 2017



Nearly 30 members, including the Master, and guests of the Worshipful Company of Engineers had the privilege of a visit to Renishaw plc at its HQ in Wotton under Edge, Gloucestershire, on a lovely sunny day.

Our visit was organised by Immediate Past Master Pat O'Reilly - to whom many thanks. In addition other Past Masters in attendance included David Bawtree and Chris Price.

We were warmly welcomed to Renishaw by Sir David McMurtry, the Chairman & Chief Executive, on the 44th birthday of the founding of the Company. Chris Pockett, the head of communications gave us an outline of the company and its range of products and technologies.

Renishaw is a world-leading metrology company with revenues approaching £500M per annum, which employs over 4000 people. The company's products are mainly in metrology (95%) and in healthcare (5%), with 97% manufactured in the UK and Ireland.

The Company was founded in 1973 by two Rolls Royce engineers, (Sir) David McMurtry and John Deer, and has grown strongly and steadily since

then. Sir David invented the first product, a measuring probe based on a clever spring-loaded make/break switch mechanism, known as a touch trigger probe. Protecting the IPR in this and subsequent products is part of the fundamental strategy for the company, with a portfolio of over 1500 patents, and annual investment in engineering, research and development of around £70M per annum.

Renishaw exports around 95% of its products, of which 25% to China alone. Products for measurement and automation, digital encoders and metal additive manufacturing are sold in many market sectors, including the aviation, automotive, agriculture, and consumer electronics areas world-wide. It is a real British engineering success story!

One highlight was the inspection of a jet engine fan assembly by a touch trigger probe at high speed, with the probe touching each curved blade of the fan 100,000 times, providing 3-D data accurate to around a micron - vital information for the manufacturer of such a complex piece of engineering, see the photograph below.

Alan Grant





Another highlight was the range of complex shapes produced by ‘additive manufacturing’, such as a prototype custom steering wheel for the Bloodhound jet car, in the photograph below.

This was a super visit. We were hugely impressed by the energy, dedication and high confidence of all those we met at Renishaw. We wish them well!

Alan J Grant



This rapidly developing technology, often called 3D printing, is usually applied to plastic parts, which can be complex, and often to shapes that could not be produced by other methods. Renishaw have successfully applied it to metal parts, and offer a machine for this purpose.



Additive manufacturing of complex metal shapes has also been exploited by Renishaw to open a new area of business in healthcare, with products such as dental prosthetics, jawbone repair, and skull repair plates. Research in this fascinating new area is carried out in collaboration with NHS organisations including the North Bristol Trust.

A probe being used to check the internal co-ordinates of a cylinder in an engine block.

LONDON'S DOCKLANDS & THE ROYAL GREENWICH MUSEUMS

4 March 2017



You may well wonder how trains affect a WCE walk?

On Friday evening we were warned that Waterloo would be virtually shut down. Southern then announced there would be no trains between Redhill and Purley. On Saturday morning there were more calls to say that trains on the Marylebone line were in delay, disruption on the Circle and District Lines and that the DLR was partially suspended. Things were looking grim, but the ingenuity for which engineers are famous meant that all but two of us made it to the start!

Meeting at the Tower of London, on a beautiful sunny morning, we were careful to keep out of the way of the many joggers on the Thames Path. We followed the path to Canary Wharf with spectacular views across the river. There are a fascinating variety

of buildings, high-rise and modern, side by side with Victorian terraces and elegant Georgian properties. We passed the 'Prospect of Whitby', the oldest riverside tavern dating from around 1520. Most of the route was very quiet, apart, that is, from the joggers.

At Past Master David Scahill's house, we were received with extraordinary kindness and champagne refreshment and his Lady, showing great compassion, allowed us access to some much needed rest rooms. Given the critical timing of our walk, the further kindness of our hosts in pointing out a short cut along the riverside was deeply appreciated. The short cut ensured we arrived, in a timely manner, at the new Crossrail Station for the start of our Canary Wharf tour, courtesy of Liveryman Keith Clarke. Our first stop was the roof garden, an unexpected oasis of calm. From there we walked to



Middle Dock for an early history of West India Dock complex, and then to South Dock and Millwall Dock for an explanation of the decline of the London Docklands and their subsequent regeneration as a financial centre. In Oakland Quay we saw evidence of the struggle for modernisation in the 1950s electric crane. We also witnessed a failure of centralised planning in the deserted Millwall boat moorings. We were astonished that the 'Isle of Dogs' was so pleasant, hosting Britain's largest 'Urban Farm' next to the park where Millwall FC played their first matches. Walking through Poplar, we were expecting to see cycling midwives and nuns running a clinic – but this was real life and not BBC costume drama! The climax of our Docklands tour (at least for our walk leader) concluded with a walk through the Greenwich Tunnel, which, even for our members with a long history of association with Greenwich, was a novel experience. Congratulations and thanks to Keith, not only on his successful marshalling of our group through the Isle of Dogs, but also on sharing his extensive knowledge of the history of London's docklands.

In Greenwich we stopped for a much needed lunch at The Greenwich Tavern, before meeting our guides for the museum tours.

Twelve of us followed Stan, our cheerful and knowledgeable Greenwich Tour Guide, up the hill to the Observatory. After pausing at the Shepherd Gate 24 hour clock (one of the most important clocks ever made because it was the first to show GMT directly to the public) and after the obligatory Meridian Line group straddle in the Meridian Courtyard, we visited the Time and Longitude Gallery. Stan explained that a naval disaster in October 1707 when 4 ships and 1400 men, including Admiral Shovell, went down having struck the rocks off the Isles of Scilly, triggered the Longitude Act to solve the problem of determining the exact position at sea. We saw John Harrison's first three clocks and marvelled at the exquisite workmanship involved. The fourth clock, radically different in size and mechanism, met the Act's requirements and won Harrison the coveted prize. Pausing briefly at the Airy Transit Circle telescope whose eyepiece crosshairs were agreed in 1884 to define precisely



Longitude 0°, and then at the beautiful dolphin sun dial (accurate to one minute), we made our way to the Great Equatorial Telescope in the onion dome. The 28 inch refracting telescope was completed in 1893 and is the largest refracting telescope in the UK and the 8th largest remaining in the world. It was built to study double star systems.

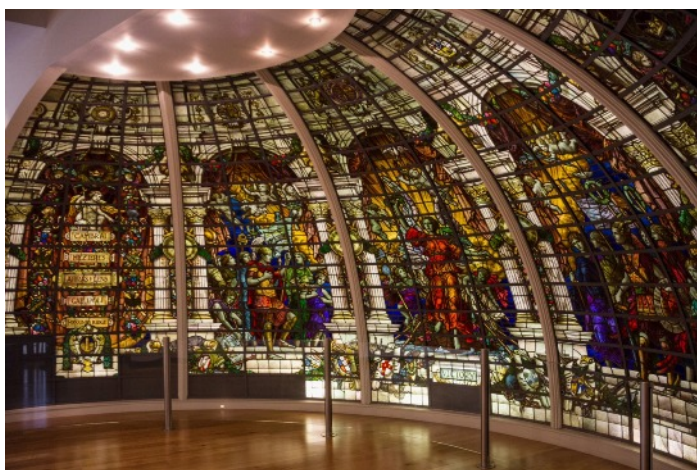
Our remaining members went with Greenwich Tour Guide, Nika, to the National Maritime Museum. The statue of King William IV at the entrance was a reminder of the City of London's link to engineering. This had been transferred from King William Street in 1936; and commemorates the First Lord of the Admiralty, William, who is reputed to have commissioned the first steam warship for the Royal Navy. The stunning stained glass windows from the former Baltic Exchange building, recovered and restored after the bombing in 1992, provided another poignant link to the City. Notable among the exhibits was "Miss Britain III", a speed boat from 1933 which was the first single engine power boat to exceed 100 mph on open water. Powered by a supercharged version of the Napier Lion VIII D aero engine and with a light-weight



aluminium alloy hull, she had an impressive power to weight ratio of 0.41 hp/lb.

Our day concluded with various and impressive return transport solutions, including reports of a *'fascinating journey home including a bus tour of the Isle of Dogs'*, and from the Thames Clipper, *'after a very sharp downfall, we saw a full rainbow from one side of the Thames to the other, over HMS Belfast and Tower Bridge. A lovely end to a memorable day'*. Perhaps the final word should go to our Master Isobel who said, *'to finish with the Harrison Clocks and an exhibition on time, was a perfect link to my theme and interests'*.

Contributions by Penny Taylor, Peter Liddell, Neil Latham, John Canning, and collated by Audrey Canning.



Above: Stained glass from the Baltic Exchange

Right: 1950's electric crane in Millwall Inner Dock



STOP PRESS - FIRE!

Reproduced below is the Master's message in an e-mail sent from the Clerk's office



This email is to inform you that on Tuesday (11/04/17) there was a fire in the basement of Wax Chandlers' Hall which was quickly dealt with by the emergency response teams. Everyone was evacuated and no-one was injured. An investigation into the cause of the fire continues which was contained to the basement area. There is extensive smoke damage throughout the building. Caroline and Sandra have been working with our Insurers and Loss Adjustors today in establishing the extent of the damage incurred



The two Sooties! L to R: Caroline Gillett and Sandra Watts

As a consequence, the Engineers office will be re-locating temporarily to Ironmongers' Hall where facilities have been offered. When settled, we will provide contact details. Until then, responses to enquiries and emails will be limited.

Our thanks to the Master and staff at Ironmongers' Hall for their assistance in this emergency situation.

The Evening Standard carried the story in the following terms:

Roads closed as firefighters battle blaze at livery hall in City

A number of roads were cordoned off as firefighters battled a blaze at a livery hall in the City of London. Emergency services rushed to the scene of fire, which broke in the basement of the four storey Wax Chandlers' Hall in Gresham Street, at about 4.30pm on Monday. Around 50 people fled from the building before fire engines arrived. A City Police spokesman said that road closures were put in place in Gresham Street, Staining Lane, King Edward Street.

Caroline and Sandra valiantly saved the Company's Silver and Treasures from the fire damaged soot laden basement along with the blackened robes and illegible archived documents. Well done!

The Ironmongers' Hall will be the temporary home of the Company until further notice.

The address of the Ironmongers' Hall is:

Shaftesbury Place,

Barbican,

London EC2Y 8AA

www.ironmongers.org

COMPANY NEWS

THE MASTER'S REPORT



This report updates you on the two Court meetings held on 10 January at Watermen's Hall and on 7 March 2017 at Armourer's Hall and some of the recent actions taken as a consequence of the recent strategy review.

Court meetings are now 90 minutes in length with written reports submitted in advance, allowing more time available to debate specific topics.

The January Court was the new Clerk's first Court meeting since taking over from Former Clerk, Eur Ing Tony Willenbruch. The Court were informed that the Master had received a thank you letter from the Former Clerk which thanked the Immediate Past Master Pat O'Reilly for masterminding his retirement gift of an antique silver taper stick. The Master informed the Court that the Former Clerk had tendered his resignation as he was a member of three other Liveries and wished to concentrate his time on those.

The Senior Warden provided a report on the cost of dinners, commenting that, if the right quality of dinners could be provided at a reasonable cost, then this would meet all expectations, and that increasing the numbers attending at certain dinners would assist in keeping down the cost per person.

The Court debated a proposal to establish a committee focused on marketing and communications. The Master observed that the recruitment campaigns had highlighted the need for improved awareness of the Company, our role and activities, and that current mechanisms were not meeting that need. The Marketing Working Group, under the Membership Committee has tackled some elements of a solution, but the necessary activities went beyond the remits of all the committees currently formatted. The proposal for a new, dedicated committee is intended to raise the Company's "game" if we are to achieve the membership growth targets set by the Court a year ago, and to deliver on the Royal Charter's objective of influencing and supporting the City (in the widest sense). The proposal was supported at the March Court meeting.

At the January and March Court meetings there were five and four clothings respectively. We are delighted to welcome Peter Elliot, Dr. Kevin Nix, Richard Elsy, Prof. Geoffrey Kirk, Sydney Chin-You, Robert Eadie, David Holmes, Martin Cox, David Shillito as members of the Livery.

It is important that all new members are welcomed in their initial engagements with the Company and the membership committee are considering how else we might strengthen what already happens through a series of hosting and 'buddying' arrangements, to encourage these individuals to participate as active members.

A Livery briefing event was held on 14 February 2017 at which new and prospective members and their partners were invited. Liverymen now number over 300 and the number of freemen stands at 23. The membership committee are developing an action plan to continue to grow the membership in both livery and freedom to reach our targets.

A full and interesting programme of events, with many ideas in the hopper for the future, is managed by the Programme Committee. A monthly e-mail is now sent to members highlighting the current programme and any changes. Members are encouraged to book events either directly on the web system or with the specific organiser for some of the activities. An appropriate ballot system has been developed to deal with over-subscribed events.

A review of the Strategy Action plan has shown that several items can now be considered complete allowing more focus on the remaining actions, many of which relate to improving our financial position and management systems.

Our Clerk, Caroline has now been in post for five months and with the assistance of Sandra Watts (Secretary and Events co-ordinator), Susan Buratti (Book-keeper) and David Johnson (Senior Warden) our office procedures continue to be reviewed. The membership and programme committee are now supported by a volunteer secretary and meet for longer. Work continues on our existing website while a new website is developed. Weboffice is now being used to book most events.

ENGINEER'S TRUST BURSARIES

15 February 2017



At an Awards ceremony held on the 15 February at IET Savoy Place the first five winners of the Engineers Trust/IET Horizon Engineering Bursaries were presented with their certificates - three apprenticeships and two undergraduates.

In the face of a nationwide engineering skills shortage, the Engineering Horizons Bursary scheme aims to help more apprentices and students to become engineers by making an engineering career more accessible to those who have had to overcome personal challenges to continue an engineering education.

This new bursary scheme, developed by IET, improves access to engineering apprenticeships and undergraduate courses and the winners are people who are passionate about their work, yet restricted by hardship or personal disadvantage and ensures such circumstances are not a barrier for new talent entering the profession whether as a student or apprentice. Each Bursary is for £1,000 pa for the duration of the course of either three or four years. Winners are

expected to maintain a positive engagement with both the Trust and IET throughout their course.

The Engineering Trust was represented at the Awards ceremony by Senior Warden David Johnson, Middle Warden Barry Brooks and Trustee Malcolm Vincent who presented certificates to the Engineers Trust's five Horizon Bursary Awards winners – see photograph opposite and Award winner's details below.

The event was inspiring with our winners being such enthusiastic young people totally committed to engineering.

We are in the process of appointing two liverymen as mentors but three more volunteers are sought for this batch of winners. The extremely positive reaction of our winners to the news of being assigned a mentor reinforced the importance of mentoring for young people. It is very much hoped that the wider livery engages positively in mentoring roles as we increase our support of the Horizon Bursary Scheme.

Malcolm Vincent

Undergraduate/ Apprentice	Name	Company/ University	Discipline/ Subject	Liveryman mentor
Undergraduate	Matthew Curtis	University of Hertfordshire	Mechanical engineering	Steve Yianni
Apprentice	Daniel Swain	Rolls Royce PLC (Aerospace)	Aero engineering	Paul Wood
Undergraduate	Emily Ellwood	Queen Mary College University London	Electrical engineering & Electronics	Sydney Chin-You
Apprentice	Thomas Linaker	Siemens Rail Automation Communication and Information Systems	Rail Technology and Electronic engineering	Victor Mantey
Apprentice	James Gibbons	Arup	Civil engineering	Andrew Walker



Left to Right - Matthew Curtis, Daniel Swain, Malcolm Vincent, Emily Ellwood, Thomas Linaker, James Gibbons

65 years of service honoured

On 17 February 2017 Walter Balmford, past-Master Lightmonger, member of the Engineers, Butchers and Educators Companies was invested as a MBE by HRH The Prince of Wales for his services to “Training and Education”.

In reply to the Prince, he explained that he has been involved in governance and administration for over 65 years at all levels from nursery schools to universities since becoming the Training Adjutant at RAF North Coates where Commonwealth officers were taught Bomb Disposal techniques. Walter is currently on the Court of City University, represents the Lightmongers for City & Guilds, and is President of Abercorn School which has three sites in London and daughter schools in New York and Houston, Texas.

He is very involved with the promotion of Apprenticeships, chairing the Livery Companies’ Skills Council Management Committee and is on the Board of the Livery Companies’ Apprenticeship Scheme.

Walter spent two years as Director General of the Association of Business Executives (ABE <https://www.abeuk.com/>), promoting British education in the Far East.

For ten years in the 1990s, he was financial consultant to the London Diocesan Board for schools providing advice to 158 primary and secondary schools in the London Diocese.

NEW ARRIVALS

Welcome to our new liverymen



Welcome to five new liverymen clothed at the Court Meeting on 11 October 2016

Sean Bartholomew Daly

BEng(Hons) CEng FIMechE MIET



Sean was sponsored by the CEGB to attend Aston University in Birmingham where he studied Electro-Mechanical Engineering.

Following graduation Sean worked for two years as a Consents Engineer with National Power (Swindon). This was followed by seven years as a Commissioning Manager with Alstom (various locations including Pergau and Manjung projects in Malaysia), five years as a Principal Engineer with McLellan and Partners (Surrey), two years as a Senior Project Manager with Siemens (Berlin) and five years as a Deputy Engineering Manager with EON (Coventry).

Since 2011, Sean has been employed by Poyry plc as Managing Director of its Malaysian business unit, based in Kuala Lumpur. This unit provides engineering, consulting and project management services for thermal and renewable power generation projects in Malaysia, Singapore, Brunei and Bangladesh.

Sean is married to Elizabeth and they have a twelve year old son, Thomas. As Thomas will be taking up a place at Abingdon School in September 2017, the family are now making preparations to relocate to Oxfordshire. In addition to being able to enjoy the refreshing British weather, the move will also make it significantly easier for Sean and Elizabeth to attend future Company events.

Charles Joseph McAnally

BSc CEng FICE FGS



Charles was educated at St Ninians High, Kirkintilloch, where he was School Captain and also a keen sportsman. He studied Civil Engineering at Strathclyde University, graduating in 1974, and qualifying as a Chartered Engineer in 1978. He joined Keller Group in 1979, and he has been with Keller throughout his career, specialising in Geotechnical Engineering. He initially worked on a series of overseas projects, including Tarbella Dam, Pakistan, and Victoria Dam, Sri Lanka. In 1985 he was appointed Regional Manager based in Cairo, for various geotechnical works including Cairo WTW tunnelling project.

In 1987, he returned to work in UK, and has worked on a number of major infrastructure projects including Canary Wharf, Jubilee Line Extension, DLR, Channel Tunnel Rail Link, and various LUL and Crossrail projects. Charles has won a number of



industry awards, including the ICE Fleming Award in 2006 for the Govan Station Dewatering project.

He has been a divisional director of Keller for 25 years, and was part of the management buy-out from GKN and floatation on the UK stock market in 1994. After 37 years with Keller, he retired in 2016 and is now an independent geotechnical consultant.

Charles has been married to Janet for 35 years who worked as a secondary school teacher. They are proud to say that they both started working for their respective employers in 1979, and both retired in 2016 after 37 years of service. They have one daughter (Jane), who graduated in Dentistry from the Newcastle University and The Royal College of Surgeons in Edinburgh.

Martin Christopher Knights

FREng BSc CEng FICE



Whilst his travels occupy a significant amount of time Martin is a rugby, football and cricket fan and so wherever he is in the world the seasons' endeavours of Accrington Stanley, Dorking RFC and Lancashire CC are paramount .

Martin has just started an independent consulting career having been the MD of a large engineering practice engaged on projects such as Crossrail., Tideway, High Speed 2 and Metros in Australia, Hong Kong , USA , Canada and Dubai.

Being a Liveryman Martin is keen to become more involved with the City of London and the various Livery Companies to add to his Engineering and professional City interests . Living in the North Downs and near to the South Downs Martin enjoys the benefits of living on the edge of and easy access to London , but having ready access to the great English countryside. He enjoys walking , a nearby growing extended family , international travel, geology and geography , but trusts that membership of the Livery will extend his current interests particularly in the greatest city in the world and the opportunity to meet a wide circle of colleagues with common interests.

Dr John Duncan Garside

BTech MTech PhD CEng FIMech.E



At last I am no longer an apprentice, but what a wonderful journey it has been!
My enthusiasm for engineering started at school (Sheffield), eventually studying Mechanical Engineering at Loughborough University. On graduation, I married Ros. My first job was with Plessey Automation (Poole), building machine tool control systems. Next, was offered a Courtaulds Research Fellowship back at Loughborough to design a camless circular knitting machine. University days over, and with two young daughters, it was down to Surrey, Sperry Vickers European HQ, developing fluid power equipment. After four years I moved to Dunlop Hydraulic Hose



(Gateshead), my introduction to manufacturing management.

Increasingly intrigued by manufacturing systems, I accepted an opportunity at Dunlop Technology (Birmingham), relocating to our present home in Solihull. My next move was to GKN Technology (Wolverhampton), providing experience in metal technologies. Four years later, returned to industrial management: Lucas CAV, (Acton) building diesel engine equipment, next a local job at Lucas Aerospace (Solihull) responsible for UK manufacturing sites. After an assignment in Lucas Fluid Power, I became Programme Director, Lucas Aerospace, responsible for change programmes worldwide.

My last appointment as Principal Fellow at WMG, University of Warwick, allowed privileged academic freedom, where I wrote two books documenting my industrial knowledge. For ten years I compiled IMechE's Mx Awards Questionnaire, also used in Germany.

Now retired, we enjoy the freedom it offers. We have five grandchildren interested in engineering: two at university and one applying for Mechanical Engineering courses. Our other two have yet to decide but both their parents are Mechanical Engineers! Ros and I enjoy visiting family, friends, grand houses, and gardens, interspersed with motor racing events. I cherished an Aston Martin for twenty years, but currently drive a more dependable Porsche Boxster. Still a 'petrol head' at heart!

Victor Kwame Mantey

CEng FIET FInst LM MIRSE MAPM

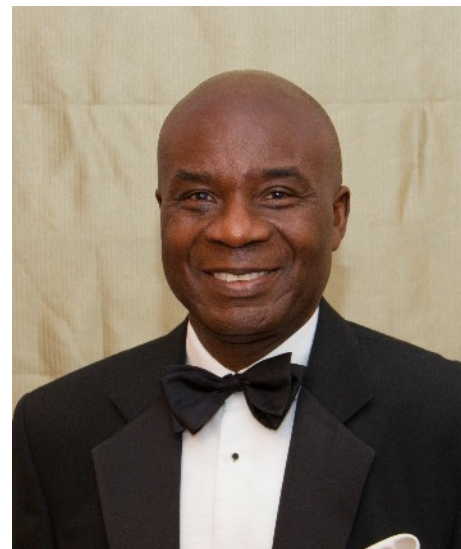
Victor works for Transport for London (London Underground) as a Test & Commissioning Engineer (Signals)) where he has worked for over 35 years.

He has worked on the Piccadilly Line extension to Heathrow Terminal 4, the Docklands Light Railway Re-Signalling Project which enabled Automatic Train Control (ATC), the DLR extension to Beckton, the Jubilee Line extension to Stratford

which also enabled ATC and the London Underground CONNECT Communications System.

He has also worked in Canada, Portugal, Spain and Finland undertaking works for Transport for London.

Victor is currently working on the Re-Signalling Program on the London Underground's 150 years history which is the Four Lines Modernisation Project (4LM) ATC System as a Test and Commissioning Engineer. He is responsible for the Installation and Test & Commissioning and Assurance of the new Signalling System as well as the existing Legacy Railway Signalling Systems. 4LM covers the Metropolitan, District, Circle, and Hammersmith & City Lines.



4LM is the most complex Signalling upgrade work that Victor has ever worked on because the Installation, Test & Commissioning is taking place on 40% of the entire London Underground Network whilst still operating 100% of the LU revenue service. He says, the project is like "performing open heart surgery on a runner whilst they are participating in a marathon".



Welcome to five new liverymen clothed at the Court Meeting on 10 January 2017

Peter Elliot

BSc(Hons) MEng CEng FICE



Peter Elliot started his engineering career with Scott Wilson, designing and constructing major international projects, including Heathrow Terminal 4, Tuen Muen (Hong Kong) Central Interchange, Trident Project infrastructure and development of industrial estates.

He joined BP in 1985 and in a 27-year career held numerous Senior Level Leader Roles including BP Director HSE Policy, Head of Integrity Management, Engineering Authority in BP Chemicals and BP Refining as well as HSE Director for BP's Major Projects worldwide. He has always been passionate about Safety in Operations. He advised 10 Downing Street on National Rail Safety and was Chairman of Judges for the SET "Younger Engineers at the House of Commons" Engineering Competition.

He is currently undertaking Professional Reviews of prospective Chartered Civil Engineers at I.C.E. Living in Virginia Water, Peter is married to Beverley and they have four children David, James, Emily and Gregor.

He is now Chief Engineer on Beverley's allotment and continuing his musical journey from boy soprano to bass, singing with Egham Choral and Windsor and Eton Choral. He also played first flute for the Glasgow Symphony Orchestra and has a collection of 30 vintage flutes. He is a keen philatelist (or gatherer of stamps as Beverley would say!) Retirement from BP enabled him to spend valuable time with his mother as she battled with severe dementia.

Dr Kevin Nix

BSc PhD DIC ARSM



I have recently retired after almost 37 years working in the electricity industry. A metallurgist by training, I joined the CEBG direct from Imperial College after completing my PhD. The electricity industry underwent massive change during my 37 years and my career followed that change, moving from R&D through business development to Management of Operations. I retired as Managing Director of RWE Generation, responsible for one of UK's largest fleets of power stations. The industry is still changing fast and whilst I have no intention of going back into full time employment, am keen to continue to support that change in some small way.



I have been happily married to Dee for 37 years and have two grown-up children.

My main passion outside of work revolves around my old cars and vintage motorsport. I don't race but I enjoy spending a lot of time restoring my cars and generally tinkering! A proud moment last year was to see my daughter driven to her wedding in my 1963 Ford Galaxie. Another of my cars has been off the road for 10 years so with more time now I hope to rectify that. I also enjoy travelling and photography.

Richard Elsy

BTech CEng FIMechE



Dick Elsy is in his fifth year as the Chief Executive of the High Value Manufacturing Catapult. He has had a long career in the automotive industry, the bulk of which was with Land Rover and then Jaguar, where he was engineering director. At Land Rover, where he started his career, he became a member of the Board from where he led the creation, development, and manufacture of the Freelander.

Prior to his most recent role, Dick was the CEO of Torotrak plc the FTSE listed developer of traction drive technology.

Dick takes a keen interest in engineering at a national level as a board member of the Aerospace Growth Partnership and a member of the Automotive Council's Technology group where he is responsible for the manufacturing agenda. Dick is the holder of a Silver Medal from the Royal Academy of Engineering and is also a Fellow of the IMech E and IET as well as a Board member of AIRTO.

He is a passionate believer in value creation through technology.

In his spare time, he enjoys contributing to his village community, gardening and spending time enjoying our great capital city. He cites a good claret as his major vice!

Prof. Geoffrey Kirk

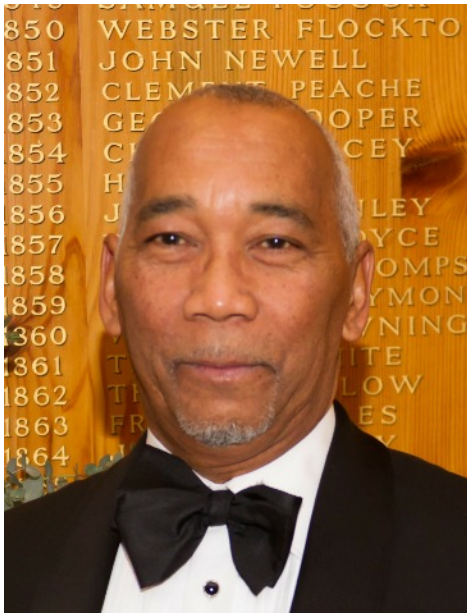
FIMechE FRAeS FIED(PP) FREng





Sydney Chin-You

FIRSE FLNSTLM MIET



Welcome to four new liverymen clothed at the Court Meeting on 10 March 2017

Robert (Robb) John Eadie

BSc MBA CEng FICHEM CSi CEnv Cchem



There are three things outside of my profession and my family that I do really well ... Motorcycles, Music and Cooking (specifically Chilli and BBQ).

I have run Motorcycle race teams for most of my adult life (Isle of Man TT Champions, UK Champions and even World Champions) both from a professional and personal perspective. I have managed to wean myself down to only owning and riding 3 bikes and only build Racing Engines for pleasure now ... though a Rotax 650 Paris Dakkar engine sits on my workbench as I type.

I am a semi-professional singer, songwriter, guitarist and luthier. I still play in a band and proudly own 11 guitars (guitars like motorcycles follow the (N+1) rule ... where the number required is (N+1) where N is the number currently owned).

I am one half of the world famous " Wonky Donkeys" - 2 x UK Chilli Champion (cooking not eating), World Chilli Champions and World Championship BBQ Team (this is proper BBQ'ing not grilling burgers).

So most weekends in the Eadie household will involve all three of the above, and when you add in our 2 kids, 6 ponies, 2 dogs and various other waifs and strays there's never a dull moment.

David Holmes

BSc CEng FICE CMILT

I am a railway civil engineer of 42 years and I live in Shropshire.

The first half of my career was in the public sector with British Rail and the second half in the private sector, mostly managing my own company. I have thoroughly enjoyed my career as an engineer and have never regretted it. One particular joy has been bringing on young people who, through coaching, training and the provision of experience, have become excellent professional engineers.

In the last years of British Rail I was Civil Engineer for Regional Railways Central in Birmingham, looking after about 1000 track miles across an area that stretched from Aberystwyth, through the West and East Midlands to Grantham. In the privatised



railway industry I have undertaken a wide variety of assignments including working with Virgin to procure and introduce tilting trains on the UK network, being lead civil engineer for a strategic safety audit of Irish Railways and investigating serious railway accidents and incidents including Potters Bar and Ladbroke Grove.



Away from work I enjoy walking with my wife, often in the Lake District and we also enjoy touring by motorcycle having been to Ireland, France, Switzerland, Italy and Spain in recent years.

[Martin Christian Cox](#)

[CEng FIMMM FEI](#)

Well worn from mining-oil & gas well engineering activities, equally matched as a well worn father, now looking to make further in-roads into the hobby space left vacant after offspring have flown, relieving the requirement for attendance in all weathers at football matches, swimming lessons (OK, so swimming is inside), and the endless hours and days at horse and pony club gymkhana waiting for events to finally kick into action way after the long delayed start time, having got up in the middle of the night to load up, drive, unload, get shouted at, watch, applaud/commiserate as required, and reverse the process with only a bacon sandwich with brown sauce to look forward to and lighten the experience.

Continue to put a former rugby players frame to use with cycling, setting an annual objective with the



Palace to Palace Princes Trust event - not too daunting but requires preparation in order to enjoy the 45 miles along the Thames out of London, through Richmond Park and on to Windsor. A winter bridge player with a frequently bemused partner, with plans in place to get the tennis going this summer along with a determination not to confront a son whose tennis club membership gave him a ferocious forehand that depletes defences, not to mention resources!

[David Edward Shillito](#)

[CEng CSci CEnv FICHEM FEI FIEMA](#)

David started his career in process chemical engineering with the Ever Ready Company, then with Columbian Carbon Inc, in the USA. In 1969 he joined the “pollution control team” of the Cremer & Warner consultancy. They also had a sideline in accident investigation and safety. In 1974 the Flixborough disaster reversed the situation. They were commissioned by the Court of Inquiry to investigate.

David was made Director of Safety and Environment in 1985. The late 1980s brought major disaster investigations for the Courts of Inquiry into the King’s Cross Underground Station Fire 1987,



Eur. Ing Dr Anthony William Whitehead
BSc MSc PhD CEng FNucl FIMechE FIET

Piper Alpha Platform Disaster in 1988, and the Clapham Junction Rail Disaster for British Rail. Financial success of the firm resulted in its acquisition by the Robertson Group Plc. and changes in ethos.

Tony was educated at Bemrose Grammar School (Derby) and Queen Mary College (London).



After completing a PhD in Nuclear Engineering he worked on civil nuclear R&D and then at the Admiralty Research Laboratory on submarine signature reduction.

He started David Shillito Associates in December 1990 to continue the same line of forensic engineering with brief occasional excursions into environmental audit and management. Over the last 25 years, with his friends, David has enjoyed work over a wide range of projects: fires, explosions, contamination and pollution incidents, usually for insurance companies. The last of these finished in the High Court in Liverpool in 2015. Having been president in 2007, David is an active member of the IESF and other enjoyments include longbow archery, painting, life-drawing and age related pomposity.

After completing the Nuclear Advanced Course at the Royal Naval College he worked in Bath (with RR&A) on submarine propulsion R&D. Moving to Whitehall he worked on sponsorship of: UKAEA nuclear research and decommissioning; the National Measurement System (NPL, LGC & NWML); Police Science and Technology (PITO & Forensic Science Service). In the Government Chief Scientific Adviser's office; he was Director of Science and Society, and sponsor of the Royal Society, Royal Academy of Engineering, British Academy and British Science Association and then as Joint Head of Science in Government – responsible for promoting the use of science and engineering evidence by Government Departments in their policy development and delivery, and for the GCSA's Reviews of the use Science and Engineering in Government Departments.

Congratulations to each of them!

He then moved to IET as Director of Governance and Policy, in particular promoting engagement between the engineering community and Government Departments.

Errata

In issue no. 37 the notes to Dr Anthony Whitehead should have read as follows.

He is an enthusiastic Church bell ringer and, and since leaving IET, spends more time as a Magistrate (in Adult and Family Courts) and, as a non-Executive Director of Disability Shooting GB and as Chairman of Bookham Rifle Club, promoting target shooting as a uniquely accessible and rewarding recreational activity for people of all ages, including those with a wide range of disabilities.

Tony and Lynette both look forward to playing a full part in the life and work of the Worshipful Company.



Liveryman Don Ives and city colleges take part in the annual sheep drive across London bridge. maintaining the ancient right of Freemen of the City to walk the sheep to market and carry their swords unsheathed.