



THE SWORDSMAN

Issue 37, November 2016
THE WORSHIPFUL COMPANY OF ENGINEERS
(Incorporated by Royal Charter 2004)



THE SWORDSMAN

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CONTENTS

Editorial

The Master – a profile

City events

AGM (Common Hall) and Installation - 26 April
Awards ceremony and dinner – 19 July

Luncheons

Brooch lunch – 27 April
Almoner's lunch - 17 May

Site visits

Sheffield Assay Office – 6 June
Mersey Gateway project – 22 July
British Airways Engineering Base at Heathrow - 18 August

Out of town weekend to Leeds and Huddersfield– 22 to 25 September

Out of town events

Inter-livery clay pigeon shoot – 18 May
Derwent Valley Heritage Way – 21 May
Company golf day – 24 May
Dinner at Hampton in Arden – 19 August

Company news

Court proceedings
Comings and Goings
Personal notes

Addendum

The annual awards and winners for 2016.

Cover photograph: Medium turbocharger, courtesy of Huddersfield University Mechanical Engineering Department

From the Editor

This is my first edition of the Swordsman. I have made some changes to the style and layout but this is only the first step in the evolution of the Swordsman into a magazine with a contemporary house style. I hope you like it!

The Swordsman is a document of record and I feel it is my duty therefore, to record that the last six months have probably been the most momentous for the future of the City and the United Kingdom. One of the consequences of the Referendum result to leave the European Union is that, the engineering profession will be in the front line to provide the wealth generating assets as the basis for the United Kingdom's ability to compete and win in the design and manufacture of world beating products.

We are embarking on a journey that requires genuine radicalism to ensure that we maintain, if not improve, on our place as a world trading power. A radicalism that delivers the promotion of engineering as a career throughout school, that provides generous bursaries for higher education in engineering, enhanced financial rewards for engineers and access to long term financial support for R&D.

Great Britain's success in achieving second place in the medal table at the Rio de Janeiro Olympics and Paralympics warmed the spirits of the British people but we know, as engineers, that many of the medals success was owed in some measure to the endeavours of our colleagues.

The task of editing the Swordsman relies upon the assistance and co-operation of the contributing authors and photographers: to each of them I owe sincere thanks.

The Editor - Raymond Joyce





THE MASTER – A profile of Isobel Pollock-Hulf OBE



The impact of engineering on our lives excites our current Master - Professor Isobel Pollock-Hulf. However, for engineering to have its potential impacts on society, it has to be managed and steered through the political, financial and social contexts that are integral to a professional life. The ability to provide this steer, this management and direction, and yield practical results, defines Isobel's, professional life as an engineer.

With practical skills nurtured in Northern Ireland combined with a natural aptitude for STEM subjects, Isobel headed to Imperial College to study mechanical engineering. After 24 years in multinational chemicals and printing companies her knowledge, skill and experience of quality management, quality control and team leadership led to a senior manager position in DuPont Howson, with responsibility for all products on three sites. Senior Manager positions in glassware and personal products industries followed. Measurement was critical in quality control. It became a growing interest for her and she has a collection of measuring 'rules - around 200 items together with reference books and images.

Meanwhile, she sought complementary pursuits and developed a portfolio of professional

activities and interests, but always with engineering at its core. Alongside her paid professional work she remained close to the wider engineering community through the Institution of Mechanical Engineers, becoming its president in 2012. "Measuring Success" was the title of her Presidential address which also became the theme of her Junior Warden's lecture. "*Measurement should not only be regarded as a tool but also an engineering philosophy with wide application*" was her conclusion.

In 2013 she received the Sir Harold Hartley Medal from the Institute of Measurement and Control, for outstanding contribution to the technology of measurement and control.

Isobel is particularly proud of having a key role raising the profile of the Institution's mechanical engineering Heritage Award scheme, both improving the number of awards and the system for publicising the awards to the public. Her interest in engineering heritage continues as a trustee of the HMS Warrior 1860 Preservation Trust to promote the Warrior to the wider public following the award of a Heritage Lottery Fund grant. She also chairs the History Outreach Sub Committee.

As President of the IMechE in 2012, she travelled widely promoting engineering (presenting the

IMechE Report “Global Food - Waste Not, Want Not” at the United Nations for example). She visited many organisations and experienced the breadth and impact of engineering in all walks of life. From nanotechnology to space exploration; from humanitarian challenges of world poverty hunger and disease through to economic challenges of modern engineering; she experienced directly how engineering helps find solutions to the world’s most serious issues. Increasingly she recognised both the critical role of engineering in decision-making, and the importance of encouraging young people into engineering.

As her reputation grew, so did her involvement in business, politics, public sector, universities, professional organisations, and the professional institutions. She oversaw the revision and improvement of the UK-SPEC on the definition of standards for engineering professional competence; as a member of The Engineering Council she had a key role in relation to quality assurance. The Department of Business Innovation and Skills called on her to chair the National Measurement Office Steering Board, and also to chair the Quantum, Electromagnetics and Time Programme Expert Group (QET PEG) which continue.

She is interested in encouraging young people into engineering. As a successful woman in engineering she is a patron of WES (Women’s Engineering Society) and works with WISE

(Women into Science and Engineering). She was a Trustee of Audi Design Foundation (giving young people grants to develop prototypes) and is active in the Bloodhound project group (whose goal is to set a new World Land Speed Record of 1000mph) to promote STEM to the next generation of engineers. Her direct involvement with Leeds and Huddersfield universities keeps her close to young engineers - supervising design and engineering projects for example, like the annual Formula Student Car team and Knowledge Transfer projects at Leeds. She assists the development of industry / university links generally and each university has awarded her an honorary doctorate, with Leeds also appointing her a visiting professor.

Isobel’s portfolio is diverse and rich, her understandings and insights into different sectors strong, but always she is rooted in what drives her most –the way engineering does, and can, impact on society. It is this richness, this experience, the influence and networks she has, and the particular skills to direct, manage, solve problems and organise, that she brings to the Worshipful Company of Engineers, combined with a determination and charm that enhances the values and objectives that drive the Company forward.

As Master Engineer her theme for her Master’s year is **“Engineering Across Time: Past, Present and Future”**.

Marilyn Wedgwood



CITY EVENTS

AGM (COMMON HALL) & INSTALLATION - 26 April 2016

The magnificent Grocer's Hall, which has been the home of the Grocers' Company since 1426, set the scene for Common Hall 2016 of the Company and the Installation Dinner. The Grocer's Hall witnessed a significant first in the Company's history when Isobel Pollock-Hulf was installed as the first woman to hold the office of Master Engineer.

Isobel explained to the guests that the Grocers are the second oldest of the City Livery Companies. In the 14th century, the Grocers were responsible for the weights and measures of commodities like herbs and spices and these were sold in "gross weight": hence the word 'Grossers'. Measures, standards and precision are close to Isobel's heart as a working engineer as she had chaired the National Measurement and Regulation Office that is now responsible for the standards for weights and measures.

The Past Master's review

In looking back over his year as the Master Engineer, Pat O'Reilly reminded himself that he considered it would be one of consolidating the strategic foundations laid down by Past Masters Chris Price and John Baxter. But, consolidation was accompanied by a very busy the year: Assistant Barry Gasper assumed the Honorary Almoner role and inaugurated the Almoner's Lunch, reconnecting the Company with widows: Past Master John Banyard as Honorary Treasurer, energetically embraced the challenge to deliver significant improvements in the Company's financial systems: Middle Warden Elect, David Johnson's "quick look" at the office systems having turned into a comprehensive transformation, with WebOffice and associated IT improvements: the review and revision of the election process for Wardens: and in concert with the Royal Academy of Engineering the Company co-sponsored the MacRobert Award (in place of the Bridge Lecture), and in November the first of a series of annual lectures to be given by the award winners.

Pat recalled that his first duty as Master was to say farewell to Steve Grundy after nearly 28 years distinguished service to the Company. Thus, turbulence was added to the year, with Steve's departure being followed by rapid change in the secretarial and financial support staff. Pat was most grateful to the Clerk, Tony Willenbruch, for securing the helm in such challenging times. But change had not run its course! Tony had decided to retire and the recruitment process for a new Clerk had been initiated. A permanent offer of employment had also been made to the new Clerk's Secretary, Sandra Watts. In the midst of change, Pat thanked Peter Thompson, Stanley Liu and Jon Murrell for assuming Steve's former duties as Beadle and, of course, to the Honorary Chaplain,

Peter Hartley, for his contribution and much needed prayers.

Pat also spoke on behalf of Christine of the indebtedness to Past Masters and their Ladies for their wise counsel and encouragement, and to the Court for its confidence and backing. He thanked the Wardens for their support and the strong and effective committees. The Programme and Membership Committees, as with the Trust, now have liverymen as their Secretaries in an initiative that has proved successful in ensuring that action is pursued between meetings. The Master Elect, leading the Finance and General Policy Committee, had drawn together the diverse strands of strategy into a very effective platform for identifying priorities and monitoring progress. The Membership Committee had commissioned a series of papers with initiatives addressing the challenge of increasing numbers. The first, increasing the number of freemen, has been approved by the Court and others were not far behind. The Programme Committee Events Hopper is overflowing and, with the help of many volunteers, there had been a record number of well supported visits and activities. All this in addition to the core events run so well by the office. More partners' events and informal suppers are being added on days when otherwise only the liverymen would be having fun! A simple stirrup cup at the end of dinners whenever it is possible without an increase in venue charges, is also being introduced.

Pat said that charitable support is of fundamental to the livery and mentioned the Company's chosen charity, RedR, which received nearly £3,000 in response to his impromptu request at the Installation Dinner for donations to the Nepal Appeal, where the earthquake had

caused so much devastation only three days earlier. RedR was also grateful for the Company hosting a sponsors' dinner at Wax Chandlers' Hall attended by Her Royal Highness The Princess Royal.

Other memorable engagements included the celebrations in the presence of Her Majesty The Queen on the anniversaries of Magna Carta at Runnymede and of Agincourt in Westminster Abbey. He was privileged to attend the lunch at the Mansion House for the winner of the Queen Elizabeth Prize for Engineering and also the Installation at City University of The Lord Mayor, Alderman Jeffrey Mountevans, as Chancellor. However, no invitation was forthcoming to the celebrations of Waterloo, probably as a result of Pat's strongly held view that the importance of airpower to this "close run thing" is invariably overlooked.

Christine and Pat had enjoyed many Company events, mostly with a medical/military engineering flavour. All, of course, so well chronicled in *Swordsman* by Past Master David Scahill and his contributors. In highlighting some, Pat noted he had inevitably omitted other visits such as the fascinating day at Anthony Best Engineering as well as the small, but perfectly well formed, excursion to discover Essex Treasures.

In thanking the Company for a wonderful year he also paid tribute to the patience, flair and inspiration of the 'Mistress Engineer'. Pat's final words were reserved for his successor in expressing his great pride and pleasure in seeing Isobel Pollock-Hulf installed as the first lady Master Engineer.



The Master's maiden speech

Isobel started by expressing how conscious she was of the privilege to be the new Master Engineer.

She acknowledged she was the first woman Master of the Company, but without the benefit of her beloved consort. Isobel knew how much Robin (see his obituary in issue 36 of the *Swordsman*) would have enjoyed being beside her, but she also knew she had the strong support and fellowship of the Company for the task ahead and thanked all members of the Livery and their partners for their messages of support.

Court assistants were told that any one of them might be required for an appropriate occasion, to join her at an event!

Isobel downplayed the significance of her being the first woman Master Engineer. Although she was very proud of the fact, she also wanted it to be thought of as nothing out of the ordinary. It was just a co-incidence that the Election Court meeting this year had been held on International Women's Day!

Isobel's theme for her year would be, "Engineering across time: past, present and future".

The events and visits for Isobel's first six months are reported in this issue no.37.

She will also review the Company's role in the City, taking a long-term view to what the Company might be doing in 50 or 100 years' time and the target of £100 million for the Trust fund.

There was a long 'to-do list' which she said would be a priority in her year as Master, in particular identifying what actions will be necessary to make "measured progress". Isobel called for help over the whole year which was necessary to keep everything moving forward with support of the diligent and resourceful staff in the office. However, she acknowledged the challenge of finding a new Clerk after 7 years of service from Tony Willenbruch who will be retiring in her year as Master.

Isobel's view of engineering as being about teamwork and about friendship, and the Worshipful Company of Engineers representing the very best in both was epitomised by Pat and Christine. In congratulating them both on a year of achievement and progress and formally recording the Company's thanks and best wishes she mentioned some highlights and reminisced.

Isobel had counted about 10 items recorded in Pat's report – from initiating the Almoners Lunch for Friends of the Company through to greater participation in our Court meetings. These were just some of the examples of Pat's lasting influence and his very busy year: not to mention

dealing with all the changes of staff within the office.

Pat's planning had been ambitious and delivered in style. Even while everyone enjoyed an excellent OOT in Bath including a wonderful evening in the atmospheric Pump Room he had chosen a hotel in Bath with a shop opposite the front door called 'Pollocks' – to remind everyone who would be organising the next OOT!

After dinner the new Master Engineer, in recognition of the debt owed by her personally and the Company to Air Vice-Marshal Pat O'Reilly for his wise counsel and steady governance, presented the Immediate Master with a Past Master's badge and a goblet, in the hope and expectation that it should be filled to overflowing for many years to come. And to Christine, for her constant support to Pat and for everything she had done in the last year, Isobel offered the Company's sincere thanks.

But, the new Master had one more duty because it was the Immediate Past Master's 70th birthday! Pat received a birthday gift from Isobel who then led a rendition of 'Happy Birthday'.

A report of Dame Anne Dowling's address at the Installation Dinner

Dame Anne Dowling's address urged all those present to make a priority of encouraging young people into an engineering career. She lamented the fact that out of 16,000 UK engineering and technology graduates only 8,000 go into engineering jobs: such a number will not come close to meeting the demand for 800,000 extra engineers in the next 10 years based on the predicted economic growth.

She said that research shows that young people, their parents and teachers are unaware of the varied and creative range of engineering jobs largely due to the invisibility of engineering at school. The result of this invisibility leads to the wrong choice of subject choices and then they miss out. The number of entrants for A levels in mathematics and physics is stubbornly low at a figure of approximately 29,000.

The Royal Academy of Engineering, she said, has been working with seven major engineering companies and the professional bodies to create a sea-change in the perception of engineering as a career choice and was now ready to spread the word about the Engineering Talent Project. To have the necessary impact the campaign must be seen to be owned right across engineering. The campaign will include a high profile

communications drive, the top challenge being to find the solutions to the challenges facing humanity, notably,

- food and water for all;
- clean affordable energy; and
- enabling an ageing population to live productive independent lives.

Small scale, incremental solutions to the pressing needs of everyday life could also have a huge impact and was also an important message.

Dame Anne highlighted how different aspiration for young people is, compared with a generation ago. Rapper and tech ambassador Will.I.Am pointed out to the RAEng international conference that engineering has to find ways of making itself as exciting as sport, music and celebrity.

The other challenge is to strengthen collaboration between businesses and academic researchers to generate wealth creating innovation. Following her review of research collaboration between universities and business, at the request of the science minister, the RAEng has created the Enterprise Hub in 2013 The Hub

leverages the unrivalled technical and commercial expertise of more than 100 RAEng Fellows to identify the UK's best engineering innovators and cultivate their entrepreneurial

skills and leadership potential.

Since its launch Hub members have set up 38 companies with 90 jobs and have attracted £23m in external funding.



AWARDS CEREMONY & DINNER

The Annual Awards Dinner took place on the 19th July, well hosted by the Royal College of Surgeons in Lincolns Inn Fields.

This year's event was notable for many reasons. The remarkable achievements of the prize-winners are described elsewhere in the Swordsman, but the generosity of many Liverymen has enabled the Company to increase its annual funding for the Awards from £17,000 only five years ago, to £90,000 today. This has also assisted the introduction of a range of new Awards, both for engineering excellence and to note the achievements of outstanding engineering students.

We were also able to celebrate the investiture earlier in the day by Her Majesty of the Order of Merit to Liveryman Professor Dame Ann Dowling, and the recent award by Leeds University of an Honorary Doctorate of Science to our Master.

For the first time, we held the Awards ceremony as a separate event before the meal, and a straw poll indicated firm support for this move. Should

you have strong views either way, then the Court would be pleased to hear them. There were no lengthy speeches at the meal and the toast to the Company was delivered by Major General Alastair Dickinson CBE, Colonel Commandant of the Royal Engineers.

The drinks reception before the meal was held in the Hunterian medical museum but as far as could be seen, this failed to put anyone off the excellent dinner that followed. It also appeared to be the first time that the Company has held a dinner in temperatures in excess of 30°C. Among the Master's many erudite and considered remarks to us, two points received thunderous applause: her statement that gentlemen may remove jackets during the meal and her noting that her kind invitation to a stirrup cap after the meal meant that we could move into an air-conditioned ante-room!

John Chandler

Master's dinner address

The Master said it was not an evening for speeches and it had been intended there would

not be a microphone, until the last minute, to encourage her to be brief.

The Master welcomed Masters from the Armourers & Brasiers, the Carmen, the Marketors, the Fuellers, the Lightmongers, the Information Technologists, the Water Conservators and the Educators.

As one of the younger Livery Companies, the Master said that the aim of the Engineers is very much to be forward-looking and to be part of the professional infrastructure that enables engineers everywhere to tackle new opportunities and challenges that support the profession in making the world a better place. She highlighted the role of the The Engineers' Trust, a charitable fund, in providing support and encouragement across a wide range of activities.

She thanked the chairman of The Engineers' Trust, John Robinson, and his team of Award co-ordinators who take on the difficult task of finding the winners who were being celebrated at the dinner. Representatives from the Engineering Council, Institution of Mechanical Engineers, University College London and City University were also thanked for their role in contributing to selecting the winners.

The Master referred to the earlier Awards ceremony earlier and the great achievements of the award winners including recognition of the key role of engineering and technology in the security and defence. The Company has a special relationship with the Corps of Royal Engineers, and the Master was pleased to introduce Major General Alastair Dickinson CBE, Colonel Commandant Royal Engineers who later proposed the toast to the Company.

Encouraging young people to study engineering and particularly to ensure that young women have the incentives and the support to pursue engineering careers is one of the Master's key messages. She welcomed the President of the Women's Engineering Society, Ms Benita Mehra, and its chief executive, Dawn Bonfield MBE who had been clothed in the Livery the week before.

The evening was about supporting innovation and young engineers, together with the Royal Academy of Engineering. The Master welcomed the President of Royal Academy of Engineering and Liveryman Prof Dame Ann Dowling OM DBE FRS FREng and her husband Dr Tom Hynes. The Master expressed the pleasure she had of dining with the five winning Young Engineers on the night of the Academy's awards evening at the Tower of London. The highlight of that evening was the announcement of the winner of the MacRobert Award for engineering innovation which the Company jointly sponsors with the Royal Academy of Engineering.

The 2016 winners, from the Blatchford organisation, have developed the world's most intelligent prosthetic limb. The Master noted how very appropriate it was that the Awards ceremony was taking place in the Royal College of Surgeons.

The significant contribution to our society made by engineers who turn creativity into innovation and science into reality made the Master immensely proud to be an engineer, because engineers "make things work". She mused that as, the Olympics were soon to dominate our interests for the summer months perhaps we will see again how engineering and technology developments in new materials and improved aerodynamic design will benefit the athletes, especially, the paralympic athletes.

The Master highlighted how the accomplishment of winning an award, was made possible by the support employers and families. In recognition of the hard work and perseverance she extolled the award winners to frame the certificate, hang it up and be proud of it! The Master urged all those present, winners and guests, to tell the rest of the world about the engineering excellence awarded this year by the Company, to consider what they could do to help encourage more people to take up engineering careers, and by nominating people, companies and innovations for the Awards next year.

Details of each of the awards are set out in the Addendum.

LUNCHEONS

The Brooch Lunch on 27th April 2016

The Brooch Lunch is traditionally held on the day after a Master's Installation to pass on formally the consort's badge in the supportive presence of others who have shared in the leadership of The Company. The Lunch, which was held at The Wax Chandlers Hall, was hosted by the Immediate Past Master's Lady, Christine O'Reilly. She welcomed the 18 ladies who attended, mentioning a letter from Joan Clerehugh who was unable to attend, with a special welcome to The Master, Professor Isobel Pollock-Hulf. This was the first time that a Master had graced the Lunch and arose from the uniquely sad circumstances of Isobel representing her late husband, Robin, who at last year's lunch had said how much he was looking forward to the title 'Consort' during Isobel's year as Master and how much he valued the friendships he had made amongst The Engineers.

Christine noted that a particular high point of her year was the Out of Town Meeting in Bath and Bristol where she found the dinners in the Pump Room and on 'SS Great Britain' hugely enjoyable. This was because the Liverymen and their partners are such good company and had given The Master and herself such enthusiastic support and friendship for which they were very grateful.

When Christine passed The Brooch to The Master, she explained that The Brooch was to be held in the safe-keeping of The Company until the group all met up again next year. She wished The Master the very best for the coming year and stated that all those present would support her in any way that they could.

On receiving the Brooch The Master recalled what a wonderful support Robin had been when she was

President of the Institution of Mechanical Engineers: he had been her Denis Thatcher! She thanked Christine O'Reilly who had offered her full support to ensure that business continues as normal with the programme of events for the ladies. She thanked all the ladies of the Company who are the unsung heroes and do so much to spread the word about engineers and engineering. The formal part of the Lunch concluded by The Master giving Christine her replica Brooch.

Margaret Skinner

Almoner's Lunch at the RAF Club

The sun came out for the second Almoner's lunch, which was held at the RAF Club. Although slightly fewer in number than last year, we gathered in the Cowdray Room for a pre-lunch glass of fizz followed by a delicious lunch in the private dining room. The Hon. Almoner, Barry Gasper, welcomed everyone, including the Master, to the lunch and encouraged everyone to spread the word to others, hoping that everyone was now receiving the Swordsman and information on company events.

The Master then added her welcome and outlined some particular events that might be of interest. The conversation flowed. Strangely the men seemed to congregate at one end of the table (more by luck than judgement!) and seemed to stick to more sober topics of conversation but then commented afterwards that the lively chat and laughter seemed to be coming from the rest of the table; a lesson to be learnt there, I think!

Anyway, I can safely say that all had a very enjoyable time and are looking forward to the next such event.

Gillian Gasper



SITE VISITS



Sheffield Assay Office 6 June 2016

Testing of gold in the Goldsmith's Livery Hall was an early form of consumer protection to defeat alchemists and fraudsters in 1238. Taking an item made of gold to be marked at the hall came to be known as a 'hallmark'. We learnt that the role of the modern assay office has not changed very much.

During our visit to the Sheffield Assay Office our small party of liverymen, partners and Peter Elliot's daughter (currently joining the engineering profession after a masters degree in process safety) witnessed the testing of silver chains and pendants bought on e-Bay that had no trace of silver in them!

The problem with highwaymen holding up the gold and silver shipments from Birmingham and Sheffield to London for hallmarking became such a problem that Parliament passed an Act in 1773 establishing the Assay offices in Birmingham and Sheffield. The hallmark sign of the crown for Sheffield was decided, according to

Today's Assay Offices are in London, Edinburgh, Birmingham and Sheffield and they mark 10 million pieces each year. In the case of Sheffield, approximately 90% of the hallmarked items are from abroad because the hallmark adds value to the items owing to the perceived provenance internationally of the UK hallmark system. Only 8% of the items are manufactured in the UK and a mere 2% is made in Sheffield.

The precious metals now include gold, silver, platinum and palladium. However, as interesting as the precious metals and hallmarking were, the oak tables and chairs in the Guardians' Boardroom were admired not least because each of them was 'hallmarked' with a carved wren.

It was an interesting and informative visit that combined history, science and legislation. Brilliant, (to borrow a description for precious stones)!

The Editor



The Mersey Gateway Project

22 July saw a site visit to the largest and most spectacular construction project currently being undertaken in the North of England.

The existing bridge over the Mersey between Runcorn and Widnes has long been a source of major traffic delays in the area. The new bridge will ease traffic congestion and generate new development possibilities for client Halton Borough Council and local industry.

The contract to build the 1km long cable stayed suspension bridge with 1.2km elevated approach spans and 8km of access roads and viaducts was awarded to Merseylink, a multi-national joint venture in April 2014. The JV comprises Samsung from South Korea, FCC from Spain and Kier Construction from UK. The project is due to be completed during autumn 2017.

Of note is the adoption of *insitu* cast reinforced concrete to form the main bridge.

Three pylons, up to 125m high, rise from spread foundations in the river and support a concrete deck constructed using the balanced cantilever method. The concrete decks to the approach viaducts on both sides of the river are being cast *insitu* using a steel former spanning 70m between piers. This former, or Moveable Scaffold System, is hydraulically operated and travels from pier to pier using a launching nose and counter balance. This is the first time such a system has been used in the UK. It has been named Trinity to reflect the three parties to the JV.

Our contingent were treated to an overview of the project before embarking on a tour that included a high level view on the approach spans, crossing the river on a temporary trestle alongside the pylons and viewing construction works at a major interchange viaduct.

Thanks to Merseylink for an extremely interesting tour. We now know it is "much more than a bridge"!

Chris Bennion



British Airways Engineering Base, Heathrow



In August a group of liverymen, including the Master, visited the British Airways Engineering Base at Heathrow.

BA has a continuously evolving fleet of about 270 aircraft including elderly veterans such as the 747. All of them need support which ranges from the routine at each turn-around through the various periodic checks to the complete refurbishment of an aircraft after perhaps 20 000 hours [the 'D' check or 'heavy maintenance visit'].

For this visit, BA allocated some of the 2015 graduate intake to act as guides. They started with a one hour briefing on British Airways and its operations. There are actually three main engineering bases in the UK plus other bases for spares holding. Heavy maintenance visits are undertaken in Cardiff and Glasgow and Heathrow carries the burden of most of the 'A', 'B' and 'C' checks.

Our guides explained how BA tracks maintenance requirements and then works with manufacturers to eliminate the problem by modifying the design detail identified as a root cause.

Just as the fleet requires maintenance, so do the pilots who undertake refresher training in BA's large 'fleet' of simulators which are in use 24 hours a day, 365 days a year.



After the briefing the group was divided into two, one group visiting pilot training while the other visited engineering and then swapping at lunchtime.

In the simulator hall the group was further divided into two, each party of three being assigned to a pilot and one of the 747 simulators. In the following two hours the visitors took it in turns to 'fly' their 747 in what is a truly amazing virtual reality environment. There were surprisingly few total write-offs and some really very smooth landings.

It was interesting to hear Bill O'Riordan's comments, who has built his own simulators at home. His do not have physical feedback so the BA simulators were difficult to adjust to having simulated *g* and flying surface forces, if you forgot to trim them out.

The visit to engineering was in two parts: a visit to the workshops where they repair or make parts to keep the fleet in the air and a visit to the maintenance hangers where aircraft checks are undertaken.

The workshop has some important 'qualifications', including one which allows it to design some parts if necessary. Boeing is about

to bring it into a new collaboration programme in recognition of its excellence.

The use of carbon fibre in aircraft has meant that the workshop has had to adapt to that technology. It repairs parts and has the capability to fabricate completely new parts. From what we saw, a lot of the repair work was the result of lightning strikes, particularly on the radomes, but also on flying surfaces.

We were also shown a sophisticated CNC pipe fabrication system that will scan a failed pipe – whether air, water or hydraulic fluid – and manipulate a new one to match. We were told that the 787's hydraulics operate at 550 bar!

The group on the afternoon visit to the maintenance hangers was lucky enough to witness a 380 in one of the 'hush houses'. Only one engine running but the noise was still considerable. Two aircraft were seen in the maintenance hangers. One was a 777 but only viewed from a distance. The other was a 787 which we were allowed to go on board and get up close to the #1 engine.

At the end of the visit each of us was given a model 787 to take away as a souvenir.

Mike Inkson



HUDDERSFIELD AND LEEDS 'OUT OF TOWN' 22-25 SEPTEMBER 2016

Our Master hosted members of the Company and their partners in West Yorkshire over a long weekend to sample some of the delights of Leeds and its environs and wonder at the technological 'box of tricks' opened for us by the academic northern powerhouse. It was Isobel's opportunity to showcase the universities of Huddersfield and Leeds with which she has close a close academic and research relationship.



Reception dinner at Leeds City Museum

After the challenge of navigating our way through central Leeds, we arrived at the Radisson Blue hotel where the Master, Isobel Pollock-Hulf, gave us a warm and personal greeting. Supported by Ros, leader of the conference team, Isobel presented us with a bag of goodies that included jam, cookies, and chocolate as well as information to guide us through our stay.

Having found our rooms, many of us took the opportunity to take a stroll around the city centre. I had not been to Leeds for some time and was pleasantly surprised.

The city had a busy, young, lively, and relaxed atmosphere with a variety of styles and colour. After our pleasant stroll, we changed for dinner and all met up and strolled to the City Museum nearby, where we viewed the history of Leeds and met many old friends as well as some new ones.

To ensure we exercised our minds while we enjoyed the excellent dinner, Isobel had written a quiz to test our knowledge of the area with 39 questions covering history, people, places and events. As the answers were revealed we learnt a great deal about West Yorkshire!



Bill Bayly

Technical visit to Huddersfield University

Our technical tour started with the 3M Buckley Innovation Centre (3MBIC). Our guide Professor Liz Towns-Andrews, herself winner of the Queen's Award for Enterprise Promotion, described it as a 'spin-in' venture. The 3MBIC hosts the EPSRC Centre and works with corporate and research partners, including the National Physical Laboratory. The Duke of York Young Entrepreneur Centre supports graduates with start-ups and employability skills; SMEs have access to technology for prototype and design capability, from 3D printing to digitally rendering. The Arms and Armour Research Institute has a 3D Micro CT scanning to authenticate - or expose - historical weapons such as swords and pistols. The Centre for Precision Technology covers measurement (for example hip replacement) and manufacture (such as photo-voltaic plastic electronics).

The Institute of Railway Research has a full-scale bogie test rig under construction (which will even be able to simulate leaf fall); their students also participate in the IMechE Railway Challenge Competition. The Turbocharger Research Institute are applying mature technology to new markets. MIAMI (Microscope and Ion Accelerators for Materials Investigation) can assess lifetime radiation damage to materials - in one day. Overall, the state-of-the-art equipment and capability was impressive, deserving of University of the Year 2013.

Jean Billingsley

Non-Technical visit to Huddersfield University

Creativity, archives and care were on the agenda for the non-technical tour at Huddersfield University.

The department of Textile Fashion and Management has links to the Woolmen and Clothmakers livery companies who offer student scholarships. Local cloth manufacturers still sell fabric to 'top end' fashion houses and provide industrial experience and graduate employment. All students are taught the basic skills in knit & weave, embroidery and print then progress to sophisticated industry level machines using CAD and digital printing. One of the

students last year won the UK Global Colour award of the Society of Dyers and Colourists.

The Heritage Quay is a modern interactive exhibition space open to the public connected to the state of the art archive strong room. A huge curved screen linked to the archive provides personal interactive visual access to stored items. Any item can be requested for retrieval. As well as books and documents, items also include Rugby League and cricket memorabilia and the 1910-1940 British dance band collection on Shellac discs.

Human and Health Studies offer locals access to a self-referral podiatry clinic where foot problems can be diagnosed and treated by students under supervision. Income generation from sports teams and athletes was also evident in biomechanics where 3D motor analysis and force pad measurements can diagnose problems and also improve performance efficiency and footwear design.

In the nursing school we were shown high fidelity manikins for practising clinical techniques and clinical decision making, with clear consequences for any errors! All manikins have names and students become attached to them and very upset if their mistakes 'harm them'-a lesson learnt safely!

Yvonne Joyce

The visit to the Royal Armouries and dinner

A coach ride across Leeds City centre and the out of town Company arrived at the Royal Armouries. This millennium regeneration area overlooks Leeds canals and includes modern apartments and educational establishments.

We gathered on the ground floor to admire the tower of steel: a 4 storey octagon decoratively arranged with hundreds of swords, bayonets and breastplates. Upwards to see armour for elephants dating from 1600 and for horses from India, Turkey, China, and Japan. The collection includes foils for fencing and less sporting weapons analysed in police work. If it can be used to fire a projectile or run someone through, it is in the Royal Armouries. An unexpected performance told the story of

the English samurai William Adams with a sword display.

Our Chaplain's grace asked that while surrounded by implements of war we should find peace. Dinner of cheese soufflé and rack of lamb was followed by apple and rhubarb crumble. After dinner, the silent auction raised £1025 for the Engineers' Trust with lots including a box at Royal Albert Hall for Jools Holland, Harvard golf balls, and hotel stays in Prague and Aviemore.

A sterling engine was presented to Bob Cryan following the visits to the University of Huddersfield.

Carol Long

Technical visit to Leeds University

Leeds was named University of the Year 2017 by the Times and Sunday Times Good University Guide. This tour provided an exclusive opportunity to see a world class engineering faculty.

Current best practice in teaching mechanical engineering was outlined by their Head of Department. Courses still involve teaching traditional engineering subjects but now include softer skills that encouraged students to express their ideas, work in teams and apply their knowledge to devise viable solutions. Group projects such as building a water wheel challenged students to construct a device and compare its performance.

The research facilities tour was the highlight of the visit. We were intrigued by studies evaluating replacement hip and knee joints, as several people had working examples or were having to consider such devices! This insight into the different types of joints, their relative advantages, shortcomings and ways of tailoring devices for individual applications, demonstrated the team's profound expertise and gave assurance to everyone.

The ligament research demonstrated the 'art of the possible'. Animal ligaments were processed to clinically remove their cells, so when the substructure was grafted into a human joint it would be populated with a person's own cells to create a 'near-normal' replacement ligament.

Research into the liquid cooling of computers demonstrated the department's

close links with industry. This innovation, to replace traditional air cooling systems with more energy efficient and quieter fluid heat exchangers should facilitate higher computational speeds, whilst providing an alternative source of heat.

This visit was enjoyed by all as it provided a real insight into how universities have evolved to meet the technical challenges of tomorrow. It also gives further opportunities for involving other university disciplines to apply the expertise needed to create novel, commercially viable products.

John and Ros Garside

Non-Technical visit to Leeds University

Just 19 of us began this magic tour, processing through the Classical splendour of the Parkinson Court. An illustrated talk by Laura highlighting the university's literary and artistic treasures in the Brotherton Collection and Library and the Burton Gallery, whetted our appetite.

How amazing to see the First Shakespeare Folio, compiled shortly after his death and thereby saving for posterity at least 18 of his plays without which there would have been no Twelfth Night, Tempest or Macbeth! Lord Brotherton's collections began in 1922 with an Andrew Marvell first folio and after that he'd caught the bug. The equivalent of today's millions was spent on one of the greatest international collections. It is priceless and includes: antique books, medieval manuscripts, letters from great writers, World War I memorabilia, music, bills, ledgers, political minutes, Russian archives, Tudor recipes, Romany history, playing cards. Brotherton's money and philanthropy made it possible and as a Leeds mayor and MP, this is where he and his family built the galleries and library to house it all. Today it has 11 miles of shelving to accommodate it.

Laura picked out a box, a ledger and a lock as representative items. The first had 43 vellum bound miniature books inside. This was a 1617 Jacobean Travelling Library! The second item was an 1836 Register of Burials, one of 26, which provides a sociological survey of the local population. Thirdly, a lock of hair authenticated as belonging to Beethoven! You'll have to see the collection in the Burton Gallery for yourself, with superb

paintings by John Singer Sargent, Henry Moore, and others. Do not miss the amazing Brotherton Rotunda Library with its Art Deco Electrolite in green glass (a type of chandelier) and colour co-ordinated marble pillars around the walls.

Val Howse

Middleton Railway Visit



On Saturday afternoon we visited the Middleton Railway; dating from 1758 it was the first railway to be incorporated under an Act of Parliament, being the forerunner for parliamentary approvals for UK mainline railways. Initially a waggonway, constructed on wooden rails at 4ft 1" gauge, and built for hauling coal along a steep incline from Middleton Colliery into central Leeds. In 1812 it became the first railway to successfully use steam locomotives, operating with a unique rack and pinion traction drive between locomotive and track.

Many changes followed, the rack and pinion arrangements were later scrapped and new purpose built locomotives were introduced using standard traction arrangements; the track gauge was converted to the standard UK gauge in 1881 and subsequently the route was connected to the local mainline railway tracks. Some sections of the line were abandoned over time; however the National Coal Board continued to use the northern section until around 1959.

In 1959, as an off-shoot of Leeds University Union Railway Society, the Middleton Railway Preservation Society was founded, and in 1962 became a Trust with the subsequent creation of workshops, a museum and a private railway.

Our party enjoyed a trip on a diesel hauled, three coach train from the museum to the

top of the incline adjacent to the site of a former colliery. Maximum speed of 10mph was enforced with a number of our party able to enter the cab, before the Master was entertained to a cab ride back to the Museum.

Tony Roche

Dinner at Temple Newsam

Dressed in our best finery we boarded our, now familiar, coaches to make the short journey to Temple Newsam House a Tudor-Jacobean Mansion set in 1500 acres of parkland.

We were received in the Long Picture Gallery, a magnificent room designed to be used as an "indoor garden". There, we were welcomed by Bobbie Robertson the Keeper who gave us a history of the house: five hundred years in fifteen minutes, including its links to Mary Queen of Scots and its unbroken ownership by the Ingram family until it was gifted to the city of Leeds early in the twentieth century. We heard that most recently part of the house had been used for the TV drama series *Victoria*.

Next we made our way downstairs to the Great Hall, pausing to hear the George Pyke pedestal organ clock once owned by Marie Antoinette, and to marvel at the Raby's wine cooler, made from a single sheet of silver and large enough to bath a baby in!

Dinner was served in the Great Hall, the original Tudor Hall of Temple Newsam, and our principal guest was The Lord Lieutenant of West Yorkshire, Dr Ingrid Roscoe.

Junior Warden Barry Brooks made a "Thank you" presentation to our Master which (reflecting Isobel's interests in measurement) included Colonel Bradley's Patent Cake Divider whose instructions include the phrase,

"This is **Epecially the Case**, we may say, with the **Fairer Sex**, whose minds, as is well known, naturally reject the **Complexities of Mathematical Calculation**".

He also announced that Isobel is to be made an Honorary Fellow of the IET.

Norman Dawson

Over the weekend nearly £4,000 was raised for the Engineers' Trust with the help of a contribution of £1,000 from an anonymous donor.



OUT OF TOWN EVENTS

Inter Livery Clay Pigeon Shoot

On 18 May the Engineers' Company fielded a team in the annual inter livery clay pigeon competition organised by the Worshipful Company of Environmental Cleaners. It was the fourth year that the Company has entered the event which is always a great success although, for the first time in 23 years the weather was challenging, in fact it rained and rained!

The team representing the Engineers was John Baxter (captain), Margaret Baxter, Richard Groome and Dave Cooper. The event was held in the splendid setting of the Holland & Holland shooting ground near Northwood, London. This year 117 livery teams, representing 64 livery companies, entered demonstrating the serious nature of the competition.

The stands were laid out with two matching courses and ten stands from each of which eight clay pigeons (or birds as they are known) were offered up. The stands were arranged as an English Sporting layout to

represent some of the more common birds seen in the UK. In addition a "flurry" stand of 80 birds was set up where all guns go for anything in the air with rapid reloading by assistants! As with previous years all of the stands were arranged as "simultaneous pairs" where both clays leave their traps at the same time rather than "on report" where the second bird does not leave its trap until you have discharged your first barrel. This makes the shoot much harder and that combined with a howling wind and near horizontal rain made for a difficult day. Once again our team was consistent with a combined score of 205 which placed us 56th out of the 117 teams entered. The scores were sufficient for us to hold our heads high and high enough not to qualify us for membership of the pigeon preservation society! There were 470 guns and it was impressive to see Margaret come in equal 21st, Dave equal 23rd, John equal 27th and Richard equal 35th.

The event finished with a superb buffet lunch including two very large pig roasts!

Dave Cooper



WCE Livery Walk : Belper to Cromford and Tour of Arkwright's Mill

The third informal WCE livery walk took place on Saturday 21st May 2016, along the Derwent Valley, Heritage Way from Belper to Cromford (Fig 1 and Fig 2). All 22 Liverymen and friends completed the 10 mile walk, with a further two joining at Ambergate station and two members joining for the lunch and the engineering tour of Arkwright's Mill.

An early morning start at Cromford station when all of us occupied the one car train invoked a hearty welcome from the train driver over the PA system. After three stops we reached Belper, where we met our walking guide who led us through backstreets, relating the history of metalworking and cotton weaving workshops, past the historic Belper's weaving mills and associated 18th C weir and alongside millworker's cottages with their separate, purpose designed small-holdings/gardens. For some of our Company, there were trips down Memory Lane, of family members working in the Mills from a very young age.

Leaving Belper, we walked through the beautiful Derbyshire countryside to Ambergate station, arriving with five minutes to spare before the train arrived with additional Company walkers. From Ambergate we joined the canal path for the remainder of the walk, with just a brief stop for refreshments at a half-way café at Whatstandwell, and an opportunity to observe the closing stages of a half marathon as we neared the end of the route. Once back at Cromford, we enjoyed a lunch in the Gothic Warehouse, followed by a tour of Arkwright's first successful water powered cotton spinning mill. The tour guide focused on engineering aspects, explaining that Arkwright's unique achievement was not the spinning jenny itself (patented in 1764 by James Hargreaves), but rather the way he mounted the invention into a water driven frame. This enabled the first continuous spinning process which could be operated by machine minders (mainly women and children), rather than skilled operatives. Once the spinning process was automated, he turned his attention to improvement of the carding process (patented in 1775),

which, in turn, had become the bottleneck in the cotton production process. Although both patents were eventually overturned, his lasting breakthrough was the organisation of the Mill itself, effectively creating the first factory in Europe and transforming cotton manufacture from a cottage industry to a process capable of delivering some 51 metric tonnes (1 million miles) of yarn within Arkwright's two mill houses alone. Production of cotton cloth was never part of the Mill output, and instead continued in the local cottages and workshops.

Our guide explained how the local water sources were critical to the decision to locate the Mill in Cromford, particularly the availability of "slough" - contaminated run-out from the local mines - which ensured the water powering the Mill remained unfrozen throughout the year. The canal itself was mainly used for the transport of heavy mining goods rather than cotton, connecting through to the Erewash at Langley Mill, and then through various water courses to the Mersey and the Trent, as well as Derby, Leicester, Nottingham and Grantham. The transformation to deep mining around 1840 caused the slough water to dry up, imposing severe limits on textile production and the buildings were put to other uses, including a brewery, laundry and cheese warehouse. From 1922 until 1979 the buildings were used for the production of colour pigment for paint and dyes and despite the restoration undertaken in recent years by the Arkwright Society, the effects of severe contamination are still visible on some of the walls. The entire site now enjoys Grade I status and is part of the Derwent Valley Mills World Heritage Site.

To close with some quotes from the day "the choice of walk lengths enabled by the outward rail journey was perfect, the walk was through beautiful countryside in excellent company" and "very nostalgic", "lunch was perfect and the weather was nearly perfect too.

Audrey Canning





Figure 1: Walking Route

Summary

Route Distance: 8.96 Mi Estimated Time: 2:58
 Total Ascent: 755 ft Total Descent: 670 ft

Elevation Profile

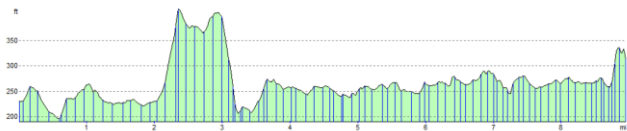


Figure 2: Walk Elevation



Livery Golf Day Ashridge Golf Club

A course in great condition, sunshine, excellent food and warm companionship: what more could a Liveryman wish for? An interesting day out for non-golfing partners while they enjoy 18 holes maybe? Well, all were provided in good measure during the Annual Livery Golf Event held at Ashridge Golf Club.

Twelve men and three ladies enjoyed an 18-hole Stapleford competition in glorious sunshine around Ashridge's wonderful Championship Golf Course whose fairways and greens provided challenge and opportunity against a backdrop of vibrant spring colours. After a delicious 3 course lunch came the results!

Receiving the Engineers Trophy from The Master was this year's winner Jan Lewis, with an excellent score of 41 points, Second with 37 points, winning on countback to Simon Hake was John Ferrie. Ruth Rooley took the Best Lady's prize with 31 points and Chris Price and Simon Hake won the Nearest the Pin competitions. A total of five birdies were recorded.

The Master, Past Masters' Ladies, Margaret Skinner and Gillian Scahill travelled to Woburn Abbey and Gardens. One unusual piece of furniture that caught their eye was a metamorphic table that converted into a set of library steps. They were particularly fortunate to view some of the private rooms, used by the family.

Thanks and appreciation goes to Margaret for organising the trip and providing transportation. The Ladies rejoined the golfers for lunch to hear about their trials, tribulations and successes but not before sampling the Duchess' Tea Rooms!

To attract more participants in this event, it is proposed to hold next year's competition on a Sunday with dinner and an overnight stay giving the opportunity to play a second social round the next day.

John Ferrie



Dinner at Hampton in Arden

Penny Taylor organised and hosted the fifth out of town dinner at Hampton in Arden, near Solihull on 19 August and was attended by 35 company members and their partners and five guests. The dinner has been a very successful event in the past for recruiting new members into the Company. Jean Billingsley who was recently clothed, was introduced by Penny to the Company at an earlier dinner and made a return appearance on this occasion.

The dinner is gaining in popularity as a result of the informal atmosphere and good food. It was enhanced this year by the opportunity to visit Matthew Boulton's house in Handsworth for a guided tour which was very much enjoyed by the 12 who resisted joining in a local carnival.

The Editor

COMPANY NEWS

Court proceedings

In the last two years the Court has continued to progress the Strategy Action Plan agreed during PM John Baxter's year as Master. Surveys of the members were carried out in 2005 and in 2013. The results were used to influence the current strategy.

There are still actions outstanding but the completed actions are highlighted below.

The Court meetings have been extended by 30 minutes to allow more time for debate. Written reports from committees are circulated in advance. On some committees, liverymen now serve as the Secretary which has opened up new opportunities and benefits. Committee members acting as Secretary, alongside extended meeting times, has reduced administration time required of the Clerk. It will be reviewed after one year of operation to determine whether this should be continued or extended.

A review of the election process for the Junior Warden was conducted by Past Master John Baxter and a sub-group of the Nominations Committee. The recommendations have been debated by Court and the first phase actioned with further work being taken forward by Immediate Past Master Pat O'Reilly.

A new post of Honorary Treasurer has been created to improve the financial management of the Company. PM John Banyard was appointed on a fixed term. A bookkeeper has also been appointed to improve financial reporting with greater accuracy and transparency.

The office staff has changed with Sandra Watts replacing Steve Grundy as the Clerk's Secretary & Events Coordinator. A full review of the office systems and office roles is well advanced, and Middle Warden David Johnson has been responsible for the design and installation of a new web-based office administration system (WebOffice).

A Master's Steward and two Assistants are now appointed for 12 months coincident with each Master's year. These appointments are highly valued and will

continue. Appointments will be for more than one year and rotation and progression will be managed

An Honorary Almoner has been appointed (Barry Gasper) who has organised a supporting team and an Almoner's lunch for Friends of the Company has been introduced.

The Bridge Lecture has been replaced with the annual Royal Academy of Engineering MacRobert Lecture & winners discussion at the Royal Academy of Engineering. The Trust fund co-sponsor the MacRobert Award in conjunction with the Royal Academy and the winners are recognised at our annual Awards Ceremony.

The Engineers' Trust publishes an annual report to members which also includes advice about legacy giving.

A comparison has been completed of the Engineering Council classification list of professional engineering Institutions and we have adopted their classifications

Many members are offering suggestions for visits and are active in organising the visit itself. An appropriate ballot system has been devised for use when events are over-subscribed.

The Clothing of the Princess Royal in October 2014 has strengthened the Company's connection with the Royal Family.

For the future there are 3 topics which require priority focus and attention in the short-term.

1. Increasing our Membership
2. Improving the finances of the Company, and
3. Improving the office based administration via Web Office

The next report will have an update on the progress being made on these three topics.

Comings

Welcome to two new liverymen clothed at the Court Meeting on 28 April 2016

Simon Scott Hake

BSc (Hons) PGD CEng FIMMM MICE FFB



Simon Hake is an Engineering Geologist and a Chartered Engineer (FICE, IOM3 & FFB). He joined Wardell Armstrong in 1980 as a graduate and is now Director responsible for Ground and Environmental Engineering and Health & Safety. During his 36 years at Wardell Armstrong, he has undertaken detailed desk studies, site investigations, reclamation, remediation, earthmoving, slope engineering, foundations, quarrying, mining, tunnelling and waste. Frequently, Simon acts as expert witness in a wide range of litigation proceedings involving ground conditions.

Simon is married and has 2 children. He lives near Stafford with his wife Hilary who lectures in Marketing and Law at Staffordshire University. Simon is a keen golfer and is still involved in football. He trained as a UEFA 'B' coach and is the current goalkeeper coach for Brocton FC, in the Midland Combination Premier League. The Brocton U18s team, for, whom his son is

goalkeeper, are the current County champions.

Simon is Chairman of the NSPCC's Birmingham Business Board and he plays a very active role in organising high profile fund raising event in the region including the annual "Laughter Ball". Recently he ran the Great Birmingham Run and encouraged the NSPCC team to third place in the event.

Philip Wright

BA CEng FIET FioD



Philip Wright is the Chief Operating Officer of the Aldenham Foundation and School and Chairman and Director of its commercial arm.

He has over 35 years experience working in product development (hardware and software), telecomms, IT, and 20 years international experience establishing and creating new markets and products.

Welcome to five new liverymen clothed at the Court Meeting on 18 July 2016

Eur Ing Jean Teresa Billingsley

BTech MBA CEng FIMechE CEnv CMgr FCMI

Jean spent her early career in Rolls-Royce with engineering responsibilities including the Industrial Trent Generating Set, then moved to Alstom Power managing engineering programmes for large industrial gas turbines. She spent two years in the Philippines with VSO working for renewable energy and environmental NGOs, re-joining Alstom as R&D Programme Manager responsible for industrial steam turbines, including the development of the new GRT family of steam turbines.



She is currently Director of Dux Consulting Ltd providing management consulting and training services in the engineering sector. She is also working on a book about effective writing for engineers.

She is an Institution of Mechanical Engineers Council Member, and previously Midlands Chairman and a Trustee Board member. She has also served on the Chartered Management Institute West Midlands Regional Board.

She likes to travel, this year to South Korea where she went to the Rotary International convention followed by a tour. She enjoys yoga and walking, and completed the 10 km Two Castles Run in June.

Eur Eng Jaqueline Dawn Bonfield

MBE CEng, FICE, FIMMM, FWES



Dawn Bonfield is Chief Executive of the Women's Engineering Society. She is a materials engineer, graduating from Bath University. She has worked in the atomic energy, automotive and aerospace sectors for AERE Harwell, Peugeot SA in Paris, British Aerospace in Bristol, and MBDA in Stevenage. She has also worked for the Institute of Materials, Minerals and Mining and joined the Women's Engineering Society in 2011, becoming President in 2014. She became Chief Executive in 2015 - the first CEO that the Women's Engineering Society has employed in its history.

Dawn is a chartered engineer, a Fellow of WES, a Fellow of the Institute of Materials, Minerals and Mining, and a Fellow of the Institution of Civil Engineers.

She is passionate about supporting women in engineering, and is founder of National Women in Engineering Day, and the WES outreach activities 'Magnificent Women' and the 'Sparxx' project. Her Presidential theme

was 'women returners' and she is working on a number of initiatives to support women to return to work after career breaks.

Dawn was awarded the SEMTA Diversity in Engineering Award 2016 and was awarded an MBE in the Queen's Birthday Honours List 2016 for the Promotion of Diversity in Engineering.

Richard Folkson
BSc CEng FIMechE ACGI

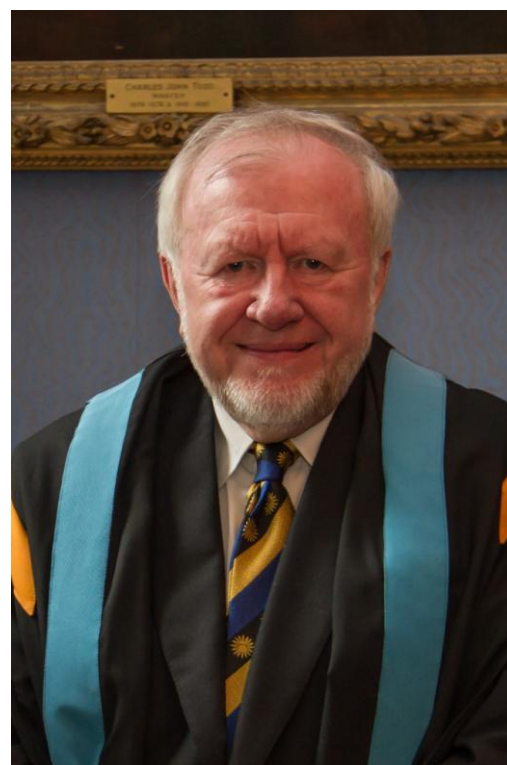
Now a consultant and Royal Academy of Engineering Visiting Professor in Automotive Engineering, he was formerly Chief Engineer at Ford Motor Company, having worked in all areas of product development on body, powertrain and electrical engineering and was project manager for Ford Focus and Transit. He is an assessor of Technology projects for Innovate UK. Richard was President of the Institution of Mechanical Engineers in 2015-16.

Richard is a passionate brass musician playing cornet in Thundersley Brass Band, one of the top Championship bands in the South. He plays trumpet in a big band and has been playing in Brass Band Competitions for over 50years.



Apart from music Richard loves everything on wheels including his Aston Martin DB9, two Triumph motorcycles, a Vespa scooter, five bicycles and two 5inch gauge live steam locomotives with another two under construction in his workshop. Married to Pattie with two teenage daughters, Fiona and Catherine. He runs the local REMAP charity group making aids for people with disabilities that cannot be purchased anywhere else - his latest project is producing a Star Wars Light Sabre handle for a blind man to use on his walking cane to support his passion for the films."

John Ifor Rewbridge Owen
OBE BSc CEng FIET FRIN



John Owen has spent his career in defence research and development particularly of satellite navigation systems, which are now on most smart phones and vehicles. Joining the Royal Aircraft Establishment from Loughborough University he spent several years developing aircraft antennas from HF to microwave, work that involved implementation of prototype designs for flight tests on the establishment's fleet of aeroplanes. RAE was a wonderful place to develop engineering skills!

In the early 1980s he moved to the Advanced Navigation Group to accelerate

the development of the first GPS receivers outside of the US. His work with UK industry resulted in several notable achievements, particularly a NATO sponsored test programme of aircraft systems on the Yuma ranges that demonstrated the vulnerability of GPS to jamming and generated the requirements for protection systems for use in military operations.

As an adviser to other Government Departments his knowledge of GPS vulnerability was key in defending European's stance over future aviation navigation systems at International Civil Aviation Organisation's meetings against the US drive to adopt GPS for global use. When the European Galileo programme commenced he became the UK expert on several working groups that defined the systems parameters; particularly, that Galileo would be interoperability with GPS and the resulting 2004 EU-US Agreement. Working with UK Space Agency he enabled UK industry to exploit their capabilities, notably Surrey Satellite's low cost technology that became the first Galileo satellite and with CGI for system security.

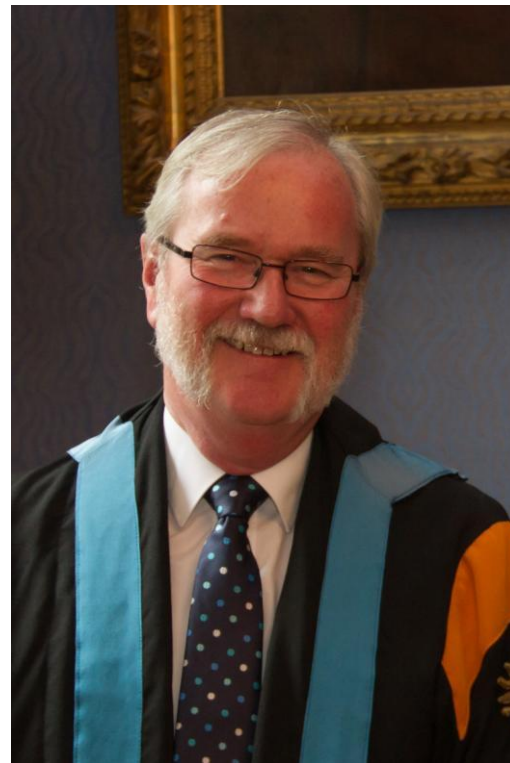
He retired in 2015 but continues to work for MOD and UKSA as a consultant.

Eur Ing Dr Anthony William Whitehead
BSc (Eng) MSc PhD FIMechE FNucl FIET

I escaped (retired) in January 2015 as a Senior Fellow Dstl, MOD specialising in navigation systems; I am now contracted by Dstl as a consulting engineer. After Loughborough University I joined the Royal Aircraft Establishment and the aircraft 'aerials' research group. RAE had an aircraft fleet fitted for experimental test flying of prototype designs, providing a 'wonderland' of opportunities to develop engineering skills that were honed in keeping an ageing MGB on the road, over 250,000miles.

Promotion resulted in a transfer to the Navigation Group to develop GPS receivers with UK industry. By the 1990s the work resulted in notable successes: the first production GPS receivers outside of the US, an anti-jamming antenna system that became the NATO standard and a world-leading signal simulation capability. I lost much hair, as technical lead, for an international test programme of an aircraft

full of prototype equipment flown on a US test range. The trials were the first to investigate the vulnerability of GPS to jamming and the effectiveness of



electronic protection (anti-jamming) systems, work that resulted in me defining MOD's Navigation Warfare programme.

Changes in MOD's R&D organisation resulted in the formations of DRA and DERA. As the Business Group Manager and technical lead for navigation I had contracts across MOD, UK Space Agency, NATS, Eurocontrol, ESA, and the EU. As GPS became the 'de facto' means for position and time I was the UK delegate to working groups developing standards in NATO and ICAO. Following the European Union commencement of the Galileo satellite navigation programme I became the UK delegate at the national expert's working groups that defined several key systems parameters, particularly ensuring Galileo would be interoperability with GPS.

Congratulations to each of them!

Goings

Sir Kenneth Corfield FIMech Hon FIET

Sir Kenneth was admitted as the 47th Freeman in Feb 1984 and a Liveryman in April 1986.

He had a successful career in photographic equipment before he was appointed by Standard Telephones & Cables (STC) as managing director in 1969 and executive chairman from 1979 and was knighted in 1980, for services to exports. In his later career, he was a non-executive director of Midland Bank, Britoil and a numerous other companies. He was chairman of the Engineering Council and vice president of the Engineering Employers Federation as well as president of the Institute of Directors, vice president of the British Institute of Management and a CBI council member

Reverend Michael John West FREng

Founder Chaplain Hugh Rom retired at the end of the Annual Carol Service St Peter ad Vincula in December 1997.

The Reverend Michael West, who was also a founder member of the Company, was welcomed as the Honorary Chaplain at the January 1998 Court meeting and served the Company until his retirement at the Election Court Service in St Vedast alias Foster on 1 March 2011 when he handed the Company's preaching stole to our current Honorary Chaplain Peter Hartley.

Michael was an intensely private family man but a totally outgoing and caring priest in his public ministry.

His memorial service was held at St Mary's Parish Church Horsham on Wednesday 7 September and was attended by Past Master David Bawtree (representing the Master) and Ann, Past Master David Scahill and Gillian and Liveryman Hugh Muller and Mrs Muller.

Barry Brooks, Junior Warden, drew the Editor's attention to the death of **Dr Peter Jost** CBE DSc CEng CSci FIM HonFIET HonFIMechE, 25 January 1921 - 7 June 2016. He had been a liveryman for 26 years between 1984 to 2010. He was highly regarded as the founding father of tribology and was the recipient of professional awards and honours in 15

countries.

Obituary:

<http://www.telegraph.co.uk/obituaries/2016/06/15/peter-jost-mechanical-engineer--obituary/>

Full list of awards:

<http://www.debretts.com/people-of-today/profile/82468/H-Peter-IJST>

Personal Notes and miscellanea

Past Master's active retirement recognised!

John Robinson (75) is the winner of The Times/Sternberg award for 2016, which celebrates outstanding achievement of people over the age of 70.

The award was in recognition of John's role as chairman of the Abbeyfield Society which provides high quality housing and care for the elderly. When he took over as Chairman, approaching 70 years old, the Society was £3m in the red since when its financial health has been restored and is embarking on a new phase of housing construction.

New trustee of the Royal Academy of Engineering

David Hughes was elected to the Trustee Board of the Royal Academy of Engineering in September and would like to thank all those WCE colleagues who supported him.

Company clay pigeon shooting

If any Liverymen are interested in joining the Engineers' team please contact Dave Cooper at dc@lecs.co.uk.

Future Company Walks

The next Company walk is scheduled to take place on 4th March 2017, from the Tower of London to Greenwich Observatory. If you would like further details please contact Audrey at audrey.canning@virkonnen.co.uk.

ADDENDUM

The Engineering Awards

HAWLEY AWARD FOR ENGINEERING INNOVATION

The Hawley Award, established in 2006, is made annually for the most outstanding engineering innovation that delivers demonstrable benefit to the environment, by a resident of the UK who is at an early career stage, holds a graduate or post-graduate degree in engineering or science from a recognised UK university and is a graduate or more senior member of an engineering institution.

Winner 2016 (Medal & £5000 Prize) – Solveiga Pakštaitė

Solveiga Pakštaitė, a Brunel University Industrial Design & Technology graduate, founded her own company: Design by Sol Ltd. As a designer, she believes that ‘user-centred’ and ‘sustainable’ approaches should not be independent mind sets when approaching a problem but that both should be central philosophies when tackling any brief. More often than not, the two approaches go hand in hand to produce more elegant, intuitive and beautiful products that will improve the quality of our everyday lives. She is the inventor of *Bump Mark*, a patent-pending food expiry labelling innovation, spun out of Brunel University, being developed by Central Research Laboratory. It is a bio-reactive solution calibrated to experience decay at the same rate as the food it is labelling to provide accurate, real-time indications of the product’s freshness and will enable radical reductions in premature disposal of food by providing more accurate indication of its “safe-to-use-by” date. Solveiga’s business model is to licence the product and the manufacturing process. Although originally designed for visually-impaired consumers, the benefits of *Bump Mark* to all consumers have been demonstrated in supermarket trials. Considerable reductions in premature disposal of food can be achieved, and wider opportunities for other perishable goods are possible.
<http://www.designbysol.co.uk/bumpmark/>

BARONESS PLATT OF WRITTLE AWARD

Originally established to recognise engineering excellence amongst those pursuing final year studies leading to academic qualifications for entry to the Engineering Council's Incorporated Engineer grade, this Award was refocused in 2013 to those who achieved registration as Incorporated Engineer in the preceding calendar year. Named for the Late Honorary Liveryman and Court Assistant Emeritus, The Baroness Platt of Writtle CBE FREng in recognition of her work in support of the Engineering profession in general and Incorporated Engineers in particular, the Award was first made in 2002. The Engineers' Company acknowledges the assistance of the Engineering Council and its partner Professional Engineering Institutions in selecting the winner.

Winner 2016 (Medal & £1000 Prize) – Sqn Ldr Gemma Lonsdale RAF

Gemma Lonsdale is an engineer officer in the Royal Air Force whose Service has seen her employed at home and in operational theatres. She is currently employed as the Senior Engineer Officer on a RAF Typhoon Squadron, responsible for the availability, capability and airworthiness of the aircraft. She leads a team of skilled technical personnel while also managing significant material and budgetary resources. In previous roles she has reorganised manning structures and rationalised processes to achieve a 55% reduction in time for scheduled maintenance of Tornado aircraft, has been the engineering lead for an inquiry into an aircraft that overshot the runway during an emergency landing and demonstrated awareness of commercial sensitivities, achieving substantial financial savings. As a trials officer, her astute engineering judgement enabled her to design a unique transportation system for a damaged aircraft as well as tie down schemes for operational weapon containers. Furthermore, she made a significant contribution to the flight safety of one of the RAFs aircraft fleet. She holds qualifications in airworthiness, error management and quality control and her leadership of both Service and civilian manpower has underpinned many successes. Enthusiastic, she shows commitment to the engineering profession as a STEM ambassador,

promoting engineering within the RAF to the Air Cadet Organisation and encouraging junior officers to engage with professional institutions. The judges were particularly impressed by her presentation, application of engineering knowledge, leadership ability, management and commercial skills.

STEPHENSON AWARD

The Award is for those who have been particularly successful in encouraging young people to study engineering with an emphasis, but not exclusively, on mechanical engineering. In 1997, members of the Institution of Mechanical Engineers made donations to fund a Worshipful Company of Engineers Loving Cup to mark the Institution's 150th Anniversary. Donations in excess of those needed for the Loving Cup were used to establish the Stephenson Award and further donations were received from members in later years, supplemented by a substantial grant from Rolls-Royce plc. The Engineers' Company acknowledges the assistance of the Institution of Mechanical Engineers and the Engineering Development Trust (EDT) with nominations for this Award.

Winner 2016 (Medal & £1000 Prize) – Caroline Alliston

Caroline Alliston is a professional engineer and technical author with a degree from Cambridge University and twenty four years' experience in industry. Whilst on a career break to spend more time with her two boys, she started a club at their school to enthuse children about science and engineering. She now spends her time running hugely popular workshops for schools, teachers, home-educated children, holiday clubs, scrapstores, Scouts, Cubs and Beavers. She has also written the "Technology for Fun" series of books incorporating her favourite and most successful projects. To give even more children than she can meet directly the opportunity to have fun making things that really work, she provides training and resources to others including teachers and STEM Ambassadors that empowers and equips them to deliver the projects themselves.

WATER ENGINEERING AWARD

The Water Engineering award is made jointly with the International Water Association (IWA) for the best presentation and paper at the annual IWA UK Young Water Professionals Conference.

Winner 2016 (Medal) – Jon Chouler

Jon Chouler graduated from the University of Bath in 2013 with a first class Master's degree in Chemical Engineering. During his degree he completed a research project in New Zealand at the University of Canterbury, Christchurch and had a year placement as leader for rapid changeover processes at Proctor and Gamble. He is currently studying for a PhD at the Centre for Sustainable Chemical Technologies at the University of Bath where his research is focusing on the use of microbial fuel cells for water quality monitoring and energy production from waste water and urine. Jon's presentation and paper described his research, looking to develop miniature Microbial Fuel Cells for water quality monitoring. This technology has promising application for determining the Biodegradable Organic Demand of waste water in real time and for the rapid detection of pollutants such as pesticides, organics and heavy metals in water. The device is cost effective, costing less than £1 to make and can be easily transported, each microbial fuel cell being 2 cm by 2 cm in size. Jon is also actively engaged in promoting science and engineering with the general public, often performing on the theme of his research in schools, festivals and pubs, and in 2015 he won the Vice Chancellor's prize for public engagement at the University of Bath.

MERCIA AWARD

The Award is made annually to a student under 30 for a postgraduate paper describing how engineering techniques are being used for the advancement of medical treatment and provides a medal and bursary towards the cost of a taught or research programme of postgraduate studies in Medical Engineering.

**Winner 2016 (Medal and £500 Bursary)
– Reham Badawy**

Reham Badawy graduated with a first class honours BSc in Smart Systems & Neuroscience from Keele University in 2014. She is now carrying out interdisciplinary research in the School of Engineering & Applied Sciences at Aston University, employing advanced machine learning techniques for medical applications and studying for a PhD in Applied Mathematics. More specifically, she is looking into using non-invasive, cheap and easily accessible smartphones to detect Parkinson's disease long before physicians themselves can confidently detect it. This novel approach was summarised in her paper presented for the Mercia Award. Reham has dedicated her developing research career to improving the quality of life for those with a brain disease using a variety of engineering techniques. Her interests in this research commenced early in her undergraduate studies, her work being recognised even then as 'making an outstanding contribution to the Computer Science department', on graduation, and now continues in her current role as a research associate. She is clearly passionate about her work and also about engaging with the non-scientific community having recently been invited to the House of Commons to present her research.

CADZOW SMITH AWARD

Established in 1996, the Cadzow Smith Engineering Awards were endowed by the Eastern Group plc in recognition of the outstanding services to engineering of its former Chairman, Dr James C Smith CBE FREng FRSE now a Past Master Engineer. The Awards are for excellence on an accredited undergraduate engineering course conducted at one of eleven universities within London and the Home Counties. Besides academic excellence, the recipients of the Awards must have demonstrated self-confidence, professional awareness, leadership and sound common sense.

**Winner 2016 (Medal & £2500 Prize) –
Braiden Zhawi**

Braiden Zhawi is mature in his approach to his work and his career, and has exemplary

communication and interpersonal skills. He impressed the panel by the fact that following completion of his academic studies he has successfully participated in the graduate scheme at Carillion working on contracts for the Ministry of Defence whilst also pursuing his ambition to obtain a commission in the Army Reserve (Royal Engineers). His particular academic achievement has been his final year dissertation which was an assessment of the effectiveness of the Building Information System (BIS) which is now a requirement of contracts placed by MoD. The panel saw him as someone who, overwhelmingly, has the skills and ambition to succeed in his career.

LEETE PREMIUM AWARD

Established in 2012 under the Will of Liveryman Dr David Leete for the purpose of making awards in what Dr Leete called Production Engineering Research but defined sufficiently broadly to encompass the whole field of what is now known as Manufacturing Research, an agreement was made with the Institute for Manufacturing (IfM), University of Cambridge, to provide a "premium" above normal Departmental Training Awards to be awarded to their best new PhD research student in 2013 and in each of the following two years. Eligibility is restricted to UK Nationals whose prospective projects do not benefit from CASE awards and the £18,000 total award is staged over 3 years of PhD study subject to sustainment of satisfactory performance.

**Winner 2013-2016 (£6000pa for 3 years)
– Jonathon Parkins**

The Leete Premium Award, endowed by the late Liveryman David Leete's half million-pound legacy to the Trust, has now provided 3-year awards of £6000 per annum to two production engineering doctoral research students at Cambridge University's Institute for Manufacturing. There was no award in 2015, but we have recently selected our 2016 award winner from a strong field of candidates, to run from October. This evening we welcome back the first winner of the award, **Jonathon Parkins**, who is close to completing his research and has secured a job in industry.

The aim of Jon's research is to develop technology to improve the production rates

of 3-D printed hip implant components. Global demand for hip replacements is in excess of 500,000 per year, but current techniques are far too slow to meet this demand.

The manufacturing process uses a high power laser to melt layers of metal powder which solidify into the required shape. Jon has determined the process limits by building a machine capable of scanning high power lasers at high speeds. He has discovered optimised energy delivery strategies for producing hip implant geometries. The new energy delivery strategies can decrease manufacturing time per part by 30 % or better. This research will be taken forward towards exploitation by Stryker Orthopaedics.

Jon has also investigated new disruptive energy delivery technologies to create a step change in part throughput. Subsequent PhD students will be taking these new principles forward from September.

ROYAL ACADEMY OF ENGINEERING ENGINEERS TRUST YOUNG ENGINEER OF THE YEAR

The new RAEng Engineers Trust Young Engineer of the Year competition, awarded by the Royal Academy of Engineering with support from the Worshipful Company of Engineers, offers five prizes of £3,000 to early career engineers whose achievements are recognised as outstanding.

Winners 2016 (£3,000 Prize):

- **Dr Sithamparanathan Sabesan**, Chief Executive Officer, PervasID - for the PervasID system, which uses battery-free radio frequency identification (RFID) tags to enable accurate tracking of luggage and merchandise over large areas.
- **Dr T Ben Britton**, Lecturer, Department of Materials, Imperial College London – for his work on the engineering and materials science of commercially important alloys vital to the aero-engine, nuclear and energy industries in the UK and overseas.
- **John Collins**, Senior Engineer, Arup – for his work as one of the

youngest top suspension bridge engineers in the country, having worked on projects including the Humber Bridge, Forth Road Bridge and the London 2012 Olympic Park.

- **Orla Murphy**, Acoustic and Audio Engineer, Jaguar Land Rover – for her work as part of Jaguar Land Rover’s Audio Equalisation team and as an active advocate for STEM and women in engineering.
- **Dr Paul Shearing**, Senior Lecturer in Chemical Engineering, University College London – for his work in the application of X-ray imaging to explore energy materials, which has helped understand aircraft battery failures.

<http://www.raeng.org.uk/news/news-releases/2016/june/future-engineering-leaders-win-academy-awards>

ROYAL ACADEMY OF ENGINEERING MACROBERT AWARD

The Royal Academy of Engineering MacRobert Award is the premier prize for UK innovation in engineering. It seeks to demonstrate the importance of engineering and the role of engineers and scientists in contributing to national prosperity and international prestige. It is awarded annually for an outstanding example of innovation and benefit to the community, which has also achieved commercial success. The award honours the winning company with a gold medal and the team members with a prize of £50,000. The Engineers Trust is supporting the Award with £20,000 annually for 10 years.

Winner 2016 (£50,000 Prize) – Blatchford

Blatchford has developed the first ever prosthetic limb with integrated robotic control of the knee and foot; a system in which the parts work together like a human leg. Where previously lower leg prosthetics wearers have had to plan their days meticulously according to the limitations of terrain they can tackle, the smart robotics in the Linx Limb system constantly monitor and adapt to the wearer's movements and the environment, giving users much greater confidence and freedom.

Team members:

Professor Saeed Zahedi OBE FREng,
Technical Director
Nadine Stech, Senior Control Engineer
Andy Sykes, Principal Electronic Engineer
Dr David Moser, Principal Mechatronic
Engineer
Rob Painter, Senior Mechanical Engineer

THE SERVICES ENGINEERING AWARDS

THE SERVICES ENGINEERING UNDERGRADUATE AWARD

Awarded to an officer graduating from the Defence Technical Undergraduate Scheme (DTUS) who has achieved outstanding academic performance and demonstrated clear leadership and commitment to a professional engineering career in the Armed Forces.

Officer Cadet Joseph Solway, a Royal Engineers sponsored bursar in the Defence Technical Undergraduate Scheme, graduated from the University of Birmingham in July 2015 with a First class Master's degree in Civil Engineering with industrial experience. His degree classification is an accurate reflection on his academic ability, the hard work that he put into all 4 years of his university education and his determination to do the best that he possibly could throughout the course. Furthermore, he took a similar approach to all aspects of his life within the Defence Technical Undergraduate Scheme, proving himself to be a genuinely outstanding potential officer.

THE SERVICES ENGINEERING POSTGRADUATE AWARD

Awarded to an officer completing a postgraduate technical degree who has achieved overall academic excellence and contributed most to the advancement of technical knowledge or its application through a research project.

Major Brendan McGourty RE graduated from the Royal Engineers' Professional Engineer Training (Electrical and Mechanical) course in July 2015 achieving the top student award. He achieved

exceptional examination results during the academic phase of his course and produced an MSc thesis of the very highest calibre. Whilst on his 16 month attachment to BP within their Projects and Modifications team based in Aberdeen, Major McGourty successfully delivered a number of extremely complex projects that were at high risk of failure. In doing so he saved the company from the potential loss of many tens of millions of dollars and in recognition of this achievement, he was singled out for a special award by the senior management within BP North Sea Global Operations. For his dedication, consistently high achievement, contribution to professional engineering, and for being an outstanding ambassador for the Corps of Royal Engineers through the delivery of successful engineering outcomes that are far above that expected for his rank and experience, Major McGourty receives this Award.

All three of the Awards above were made on the recommendation of the Operations Director of the Defence Academy of the United Kingdom at Shrivenham, Wiltshire.

THE SERVICES OPERATIONAL ENGINEERING AWARDS

Awarded to an officer, from various Service and Corps areas, who has best made the application of professional engineering judgement or technical innovation to contribute significantly to the maintenance or enhancement of operational capability or effectiveness in any theatre of operations, including the UK. Recommendations for the Operational Awards are made by the Senior Specialist Services Authority appropriate.

ROYAL NAVY

Lt Cdr Victoria Percival's performance as Marine Engineer Officer of HMS DEFENDER (Type 45 Destroyer) has been a fundamental enabler to the ship's success over an extended period culminating in unprecedented levels of systems availability on the current high profile operations in the Middle East. Lt Cdr Percival's leadership has delivered unparalleled sustained power and propulsion performance and ensured DEFENDER has successfully achieved her strategically critical mission. She also worked tirelessly to establish strong relationships with support organisations working in a fiscal and resource challenged

support environment delivering ground-breaking, complex diagnostics and repairs at sea. Lt Cdr Percival is a capable, stand-out Engineer.

ROYAL ENGINEERS

Constructing a portal frame building on a remote hill top site 8000 miles away on West Falkland in harsh climatic conditions is a demanding engineering challenge by any measure. Underlying this were two further challenges: the long-term operational significance of the buildings (new radar sites) to Falklands' defence and exceptionally difficult construction logistics along frail cross-islands' lines of communication. For **Lieutenant Sebastian Cannons RE**, a relatively junior officer, to succeed in leading the site at Byron Heights was a remarkable feat of engineering. In particular, in delivering its foundations amidst testing geology and appalling weather, in step with other sites, far exceeding all expectations, he displayed engineering judgement of the highest order and is most worthy of this Award.

ROYAL SIGNALS

Captain Tim Holmes-Mitra (Royal Canadian Corps of Signals) receives this Award for his development of the Army Cyber Framework, his leadership of his Regiment's Cyber Laboratory and his acceleration of operational cyber capabilities. He used exceptional engineering skill and judgment, re-conceiving cyberspace from first principles, creating a more holistic and accurate model, and establishing a foundation for tactical capabilities in the land environment. His model, bringing Electronic Warfare concepts up to date and with varying levels of technical abstraction allowing engineers and laymen to understand the concepts and opportunities, has accelerated the development of Army tactical cyber capabilities and is proving influential across the Allied military cyber community. Directly responsible for these rapid achievements, the combination of his intelligence, academic background, indefatigable enthusiasm and determined engineering innovation has catapulted Army tactical cyber capabilities years into the future.

ROYAL ELECTRICAL & MECHANICAL ENGINEERS

Lieutenant Ciaron Milne REME immediately deployed to the British Army Training Unit in Canada, having only recently completed his initial training at the Royal Military Academy Sandhurst. He quickly became the engineering lynch pin between the supporting base Workshop in Canada and the Company deployed to rehabilitate a fleet of over 1000 armoured vehicles. Subsequently selected to lead a prestigious Forward Platoon, he performed superbly. Through a combination of sheer hard work, engineering brilliance and innovation his team excelled - completing almost twice as many repair tasks as any of the other Platoons. As an engineering officer and leader, his achievements far outweighed that expected of someone so early in their career. Lieutenant Milne has shown that he is one of the finest engineering officers of his generation and a huge talent.

ROYAL AIR FORCE

Squadron Leader Suzanne Hobbs RAF is the Senior Engineering Officer IX(B) Squadron at Royal Air Force Marham. While deployed in support of Operations, Squadron Leader Hobbs displayed outstanding engineering acumen, tenacity and powers of analysis to identify and resolve a significant discrepancy between the actual release parameters of a key air to surface weapon and the parameters being used to test the weapon prior to loading. Left undetected, the performance of the weapon would have been significantly compromised. Her conclusions and recommendations were subsequently endorsed by the weapon Design Organisation and the necessary change to weapon test parameters embodied, resulting in significantly enhanced weapon performance and improved air safety.

THE DEFENCE ENGINEERING EQUIPMENT & SUPPORT AWARD

Awarded to the person who has contributed most, through application of professional engineering judgement including the use of leadership, management and technical acumen, in the acquisition of new capability or to meet materiel availability targets for

any of the Armed Forces. The recipient can be an individual of any rank or a team from the regular or reserve Armed Forces, the Royal Fleet Auxiliary, or the MOD civil service serving in the Defence Equipment & Support Organisation with a recommendation by Chief of Defence Materiel.

The Capability, Safety and Design Authority Team in support of the Royal Fleet Auxiliary (RFA), have managed an exceptional 8 year delivery programme of enhanced Military Capability upgrades across a diverse range of specialist support, stores, munitions carrying, fuel tanker, landing vessels and medical support shipping. The team has used engineering judgement and technical acumen to deliver ships that can remain compliant with Statute legislation, also remain in Class with Lloyds Register of Shipping, but also carry Military Capability to perform their endorsed roles. The projects delivered by the team have not only allowed the RFA to support the Royal Navy in an extended operational theatre but for some of the ships have allowed the Royal Fleet Auxiliary to operate as standalone assets in lieu of the Royal Navy in order to meet UK national and International interests and commitments. They were

represented by their team leader **Mr David Rush**.

ARKWRIGHT SCHOLARSHIPS

The Worshipful Company of Engineers currently supports 3 Arkwright Scholars undertaking their Sixth Form studies at schools in Greater London as a potential lead-in to higher engineering studies. They are:

2014-16 **Mr Yousef Bennaceur** –
Alleyn's School, Dulwich, London SE22

2015-17 **Miss Tasnim Begum** – St
Marylebone School 6th Form, London W1

2015-17 **Mr Andrew Hughes** – Eltham
College, Mottingham, London SE9

From this year the number of Scholars supported will increase to 4.

