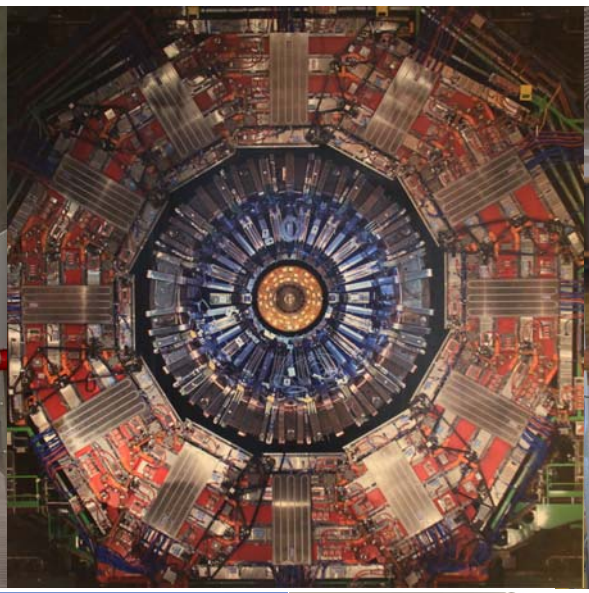
The Worshipful Company of Engineers

(Incorporated by Royal Charter 2004)

The Swordsman Newsletter

Issue 29, November 2012







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FUTURE EVENTS

10th November 2012	Lord Mayors Show and Supper	City and the Wharf
12th December 2012	Carol Service and Dinner	Chapel Royal
11th January 2013	Visit to Sellafield	Barrow in Furness
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15th March 2013	United Guilds Sevice and Luncheon	St Paul's Cathedral
23rd April 2013	AGM and Installation Dinner	Skinners' Hall
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24th June 2013	Election of Sheriffs and Luncheon	Guildhall
9th July 2013	Awards Dinner	Merchant Taylors' Hall
23rd July 2013	Company Golf day	Beaconsfield Golf Club
26th-29th September 2012	Out Of Town Meeting	Belfast

EDITORIAL

The last six months has shown the excellence of British engineering in the many venues and infrastructure for the Olympics as well as magnificent performances by many British Athletes. During this time the Company has been exceptionally busy with formal functions and lectures as well as small local meetings and visits. The visits culminated in the most successful visit to Basel and the facilities at CERN. This has resulted in this edition being the largest ever packed with interesting stories by my willing reporters whom I thank. I would particularly commend the very interesting paper by the Junior Warden on rebuilding and improving the Infrastructure of the Falkland Islands in the aftermath of the War and the achievements of the winners of the Company's extensive Awards.

Raymond Cousins
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HER MAJESTY THE QUEEN'S DIAMOND JUBILEE LUNCHEON Westminster Hall 5th June 2012

In December last year the City of London Rembrancer invited all the City of London Livery Companies to register an interest in a luncheon to celebrate Her Majesty the Queen's Diamond Jubilee.

Together with the overwhelming number of Companies we did so, although in the end about 20 were not involved for their own, different reasons. I should say that of those who I have spoken to, most, with hindsight, would have wished they had been involved. Even so the numbers accepting meant that each Livery was offered half a table for the Master and four guests. The Worshipful Company of Arbitrators were the other Livery Company on our table.

A condition of the gathering stated by the Rembrancer was that the Livery Companies would invite quote "*as wide a cross section of society as possible. Given the range of good causes the Livery supports* (we should choose guests to secure) *a good range of interests and activities (such as trade apprenticeships, training, schools and other educational institutions, a wide spectrum of charitable causes and the Armed Services).*

His guidance also drew attention to "*the importance being attached to maximising geographical spread of invitees and to securing a composition which is seen to reflect a cross section of society, including age, background, and so forth.*"

We selected our guests from amongst those who had won an Engineers' Company Award in 2011. Major Raymund Kolczak, who won the REME Operational Engineering Award and 'ensured an exceptional level of availability of high profile battle winning equipments during a period of unprecedented operational activity in Afghanistan'. James Routley, one of our Arkwright Scholars, formerly of St Paul's School and now studying Engineering Science at Trinity College, Oxford and due to graduate in 2015. Jane Atkinson FREng who shared the Stephenson Award and whose application for Livery has recently been accepted by Court, won her award for being particularly successful in encouraging young people to study engineering. Professor Paul Sherlock OBE was nominated by RedR, of which the Company is a Patron, as a worker who had seen very recent service in disaster support and relief and training operations. He was senior humanitarian representative at Oxfam.

The Master, David Scahill, and Jane Atkinson with the Diamond Jubilee Window in Westminster Hall

We were advised early in May that Major Kolczak was to be invited to join HRH The Duke of Edinburgh on his table, and that his place would be taken by a member of the Royal Household. A couple of weeks later we received news from the Office of the Lord Great Chamberlain that the Company would be privileged to host Prince William, Duke of Cambridge.

Prince William was an easy and relaxed table guest and the conversation was varied - encompassing the state of Prince Philip's bladder infection, how he felt being married to the world's most photographed and talked about woman, a critique on some of the local pubs when he was at Sandhurst, ticket availability for the Olympics, and so on.

He was very interested in learning about the Livery, but prompted, he gave no indication that he would become involved with the Livery movement in the near future.

Unfortunately the Duke of Edinburgh was unable to attend as he was in hospital, but with The Queen were The Prince of Wales and Duchess of Cornwall, The Duke and Duchess of Cambridge and Prince Henry of Wales all of whom sat on separate tables.

David Scahill

Jane Atkinson FREng, Stephenson Award Winner 2011 writes

"An enormous honour and perhaps the highlight of my professional career."

That is my verdict after being chosen by The Worshipful Company of Engineers to join the Queen at one of the key events of her four-day Diamond Jubilee celebrations. With the Master, David Scahill, and his other guests, we were some of the 700 guests from the Livery Companies specially invited to dine with Her Majesty and senior members of the Royal Family at the celebratory Diamond Jubilee lunch in Westminster Hall.

The Master, David Scahill, Jane Atkinson, James Routley and Paul Sherlock OBE

The Prince of Wales, the Duchess of Cornwall, the Duke and Duchess of Cambridge and Prince Harry also attended the meal and The Worshipful Company of Engineers and guests were lucky enough to host the Duke of Cambridge, Prince William alongside The Worshipful Company of Arbitrators and their guests. This seating arrangement happened as Major Raymund Kolczak REME was invited to join The Duke of Edinburgh's table, who unfortunately on the day could not attend. The organisers then decided to place 'one of the household' onto the Engineers' table, and as a result Prince William was lucky enough to be seated with us!

After the House of Commons' speaker John Bercow had said grace the loyal toast was proposed by the Lords' Speaker Baroness D'Souza. Music was played by the National Children's Orchestra of Great Britain during the event.

Conversation with Prince William was varied, beginning with the Olympics (no-one on the table had tickets!); the history of the Livery Companies and the Jubilee Concert (the Prince is a Kylie Minogue fan!). The table talk was light and very entertaining; the Prince was clearly at ease and appeared to enjoy the event as much as we did.

The venue was beautiful. Westminster Hall is the oldest building on the Parliamentary estate. What makes it such an astonishing building is not simply its great size and the magnificence of its roof, but its central role in British history. In and around the hall grew the major institutions of the British state: Parliament, the law courts and various government offices.

The Company's other guest Major Raymund Kolczak

The Luncheon was very British. Guests dined on marinated Uist Island salmon with Lyme Bay crab, followed by saddle of Welsh Cambrian Mountain lamb with braised shoulder of mutton, grilled Isle of Wight asparagus, Jersey Royal potatoes and an aptly named Jubilee sauce all supplied under the expert eye of Anton Mosimann.

The "symphony of dessert" was chocolate delice, bread and butter pudding and berry compote with Sandringham apple sauce.

A Ceylon tea was served made from a bush planted by the Duke of Edinburgh during a state visit to Sri Lanka in 1954 in the Pedro Tea Plantation in Nuwara Eliya.

The event was fabulous; the company, venue and food were all excellent. Thank-you to The Worshipful Company of Engineers for the invitation to this Luncheon of a lifetime.

VISIT TO BRISTOL
15th & 16th June 2012

The Company's second mini-out-of-town meeting (MOOT) was held in Bristol, looking to attract regional members of the livery from the South West. It was pleasing to see a number of local members at the event as well as several from London venturing to the Wild West (a measure of the weather, which was

actually most respectful of the activities). Those coming by train were guided by a gazetteer of the journey, featuring items of interest out of the window to occupy the journey but which failed to report that the journey from Paddington to Bristol Temple Meads meant passing over 291245 sleepers. A total of 30 members, partners and guests attended, gathering at the Avon Gorge Hotel for a drinks reception and an evening dinner in the Clifton Room, overlooking the gorge and Brunel's Clifton Suspension Bridge.

Brunel's Clifton Suspension Bridge

Following lively conversation and a trivial quiz (where the identity of Robert Gunningham was revealed) the evening finally concluded when the bar stalwarts retired, ready for a day of activity. Following breakfast, the group was treated to a tour of the Clifton suspension bridge by Mike Rowland, head of visitor services. Mike provided an exceptionally good commentary of the bridge covering not only the engineering issues but also much about local history and personalities. The wind provided a ground moving experience, but amazingly, not a drop of rain fell during the tour.

The Engineers' Group before their Tour of the Bridge

Members then split into 3 groups, providing each with the opportunity to visit the Clifton Rocks Railway and to take a guided bus tour or explore at leisure. Each group was treated to a 2 hour comprehensive tour of the railway workings by Maggie Shapland BEM (awarded that day) where the passion and tenacity of a number of volunteers seeking to restore a lost relic was clearly visible.

The Clifton Rocks Railway was originally built to allow the residents of Clifton access to Bristol's tramway system having declared trams to be too vulgar for such an up-market district. It was built inside a cliff, being a four-track inclined funicular powered by water. It went bankrupt, fell into disrepair and subsequently became a wartime shelter, barrage balloon repair facility and BBC transmitting station until finally being shut. The present restoration process is seeking to restore what is possible and provide a museum of artefacts reflecting the history of the tunnel over the years.

Inside the Clifton Rocks Railway

The final organised event was a lunch at the hotel, following which some members continued to explore, and others went home, weary but happy. SS Great Britain was reported as a particularly worthwhile visit.

David Johnson & Marilyn Wedgwood

WARDEN'S LECTURE AND LUNCHEON, RAF CLUB 5th July 2012

The 50 attendees from the Worshipful Company of Engineers were treated to an entertaining talk on the many varied aspects of the reconstruction and improvement of the Falkland property and transport facilities by Air Vice-Marshal Pat O'Reilly, CB after the Falklands War. The talk covered the period from hostilities ending in June 1982 to the inaugural landing of a Tristar on a new longer runway on 12 May 1985.

It was apparent that many in the audience were unaware and impressed by the large amount of work which was undertaken in this very short period. The starting point was a beaten Argentine force with some

10,000 unhealthy and unhygienic prisoners held on the Island - yet no peace treaty had been signed. Given the then difficulties of transport to the Island it would have been extremely challenging for the UK to immediately mount another task force. Urgent action was needed to improve transport facilities.

AVMs Pat O'Reilly and Graham Skinner Debating the Finer Points over Luncheon after the Lecture

The UK military and industry had the task of a wide range of clear-up and repair work to be undertaken in terrible weather conditions and then to go on to build a major new airfield with a long road access to Port Stanley. Conditions were aggravated by the dust over a large area created by the rock crushing operations to produce material for runway construction.

A Hercules aircraft from Ascension Island landed on the part-repaired runway reopened only 10 days after the end of hostilities. This was seen as a magnificent achievement by the Sapper repair team. Weather on the Island is unpredictable and flights sometimes could not land and after the 15 hour flight had to return back to Ascension.

The Port Stanley grass airfield was repaired and extended using AM2 panels which were originally developed by the Americans for use in Vietnam. The interlocking panels, made from extruded aluminium, were 2 ft wide in two lengths 6 and 12 ft and were laid by hand. The panels cost £10 million. Unfortunately, despite pegging, the panels tended to creep sideways and had to be pulled back into place using heavy tractors. The runway was extended from 4100 to 6100 ft for Phantom, Nimrod and Hercules landings at full landing weight. Rotary hydraulic arrester gears were deployed.

A new runway, hangers, full airfield facilities, port and access road were built 30 miles from Port Stanley. A short tender process was used to set up an incentivised contract which was let to UK contractors in July 1983. The initial cost of £215 million extended to £420 million to cope with the number of unexpected problems. The aim of the contract was to achieve full operational status in May 1986 with an interim capability in May 1985. The project employed a 2300 strong UK workforce who worked 60 hours per week on a 6 day shift basis. Good pay helped to maintain morale in an area lacking entertainment opportunities. The project went to time and a "prover" flight landed on 2nd May with staff officers arriving shortly afterwards. The inaugural flight was on the 12th May with a formal opening and celebration. Prince Andrew, a Lieutenant in the Royal Navy represented the Queen.

Discussion held after a good lunch revealed that several members in the audience had been involved in the Falklands Island venture in varying forms through their military and civilian jobs.

John Coldwell

Falkland Islands Post-Conflict Engineering Challenges In The Aftermath Of Victory

Air Vice Marshal Pat O'Reilly CB, Junior Warden

Victory in the Falkland Islands conflict was a great military, political and strategic achievement, reliant in no small part on rapid engineering innovations. But while the Union Flag flew once again over Government House, there was still much for the engineers to do, initially, in putting the Islands back on their feet and, more significantly, in establishing an effective posture for defence and deterrence.

While Argentina had clearly been beaten, and the country was in political disarray, only a local surrender had been signed. There was no peace treaty and certainly, as we see again today, no resolution of their claim to "Las Islas Malvinas". As with so many famous British victories, it had been a "close run thing". The Argentinean Air Force had come near to inflicting defeat on the Task Force, and each side had paid a high price in blood and treasure. Deterrence based on only 43 brave Royal Marines defending against an enemy 300 miles away until arrival of ship

born reinforcement from 8,000 miles distance, was no longer a credible option.

Riding high in the polls, Mrs Thatcher was determined to avoid a "Lady Bracknell" moment. Losing the Islands twice would certainly smack of carelessness and the Government decided to spend whatever was necessary to quickly implement a robust solution. The first imperative was to consolidate victory with adequate sea, land and air forces in place, and then to construct facilities for a large garrison, land based air defences and a capability to reinforce in large numbers by air. Implementation was to be in 3 phases:

- Immediately recover Port Stanley and sufficient of Stanley Airport to operate a Hercules "Airbridge" to the UK via Ascension Island.
- In the short-term, fully recover, reinforce and extend the airfield, and improvise effective ground based air defences.
- As soon as practicable, select a location and build a military base centred on a "strategic" airfield operating wide-bodied jets.

Various parts of the Islands had suffered some damage during combat and occupation and the Royal Engineers set about putting it right. While elements restored the outlying settlements, effort was concentrated on Port Stanley where the damage was greatest. Much of this was the result of sabotage by the Argentineans in the hours before and, in some cases, after the cease fire. The town was a shambles, with the task of restoration aggravated by large quantities of abandoned weapons, by many Improvised Explosive devices (IEDs) and by the extremes of the Falklands weather. Normally the home of about two thirds of Island's 1,600 population, the Capital was now supporting a further 5,000 UK Servicemen (no women in these pre-enlightened times) and in excess of 10,000 Prisoners of War (PoWs). Apart from anything else, this presented a serious public health hazard and thus an imperative to restore the sabotaged water works and pumping station, repair the broken sewers and reinstate the electricity supply and overhead distribution as soon as possible. There was no water for the first 24 hours, hydrants having been left open by our visitors, and the Sappers' impressive achievement in restoring all services in less than two weeks was crucial.

Some of the Prisoners of War

RAF STANLEY—INITIAL OPERATIONS

Three miles from the town, the highest priority was given to Stanley Airport, shortly to be designated RAF Stanley, and to the achievement of a minimum capability for Airbridge operations. Work began 3 days after the surrender but only after necessary mine clearance by the Sappers and the RAF EOD Sqn. In and near the town, the mines were largely well marked and mapped, but less rigour had been applied around the airfield and those buried in the beaches on the coastal approaches had a disconcerting habit of moving. For a time, Argentinean Sappers, all volunteers, helped with clearance – by popular demand, the Officer I/C was usually in the second position as these were double initiation mines. It was eventually realised that use of prisoners, however willing, was contrary to the Geneva Convention and it was discontinued. This was shortly followed, in the light of injuries to our own people, by suspension of all clearance unless operationally essential. The minefields still exist today behind barbed wire penetrated by only the occasional sheep determined to demonstrate their lethality.

Originally a grass strip, Stanley Airport's runway (4,100 by 150 feet) had been built by a British contractor in the 70s and intelligence on its construction was provided, before it was attacked, by courtesy of the Engineer and Railway Staff Corps. A 60 strong corps of the Territorial Army, composed exclusively of unpaid officers of major to colonel rank ("all rank and no file", as they would have it). The Middle Warden is one of their colonels. The Corps brings together technical experts, generally at executive level, to provide advice to our Armed Forces in key engineering disciplines. Fortuitously, one of

their number, a senior partner with the consulting engineers that designed and oversaw the build, was able to provide not only details of its construction but valuable information on where surplus equipment and materiel had been disposed of locally. Ironically, the airfield was developed to allow the Argentineans to provide a short-haul Fokker aircraft service to the mainland. The local manager was an Argentinean Air Force officer in civilian clothes, accommodated in the second best house in the Islands – imported by the airline from Scandinavia. The downside was an intelligence opportunity afforded the enemy but the upside was excellent quarters for the first Commander British Forces Falkland (CBFFI) when he took post after the conflict.

Typical Falklands Weather

The airfield was in a worse state than the town. Famously, the runway had been "cut" by one large crater produced by the stick of bombs dropped obliquely along its length from a Vulcan at medium-level. Unprecedented in its reach, the aircraft had used multiple air-to-air refuelling (AAR) in an 8,000 mile return sortie from Ascension. The Chief of the Air Staff was thereafter affectionately known as "One Bomb Beetham". Four smaller craters had been achieved by Harrier attacks and there were about 1,000 scabs, shallow indentations from 2 to 60 cm in length, produced by missiles, canon, shrapnel etc. Again, abandoned weapons and munitions, booby traps and IEDs made life very difficult but the most noxious hazard resulted from the unfortunate decision to make the airfield a holding area for the 10,000 PoWs. The conscripts, in particular, were in a very sorry state – poor diet, inadequate cold weather clothing and an unforgiving Falkland's winter placed most of them on the sick list in a very real sense. Thoroughly demoralised, they took their revenge on their captors by discharging from every orifice with the aim of contaminating, as far as possible, all essential buildings, facilities and equipment. On his arrival in theatre, General Thorne, the first CBFFI said "Much had been said about the conditions when the war ended, but no amount of TV coverage or MoD briefing could have prepared me for the squalor, chaos and horror of what we saw"

In these very challenging conditions, 3 days after the surrender, work started on the immediate imperative of establishing the Airbridge. These Hercules AAR operations to Ascension were to prove essential in allowing high priority movement of personnel, critical equipment and some urgent medical cases. "Half-runway width" was adequate for this purpose and the northern length, not including the major crater, was tackled by the Sappers. Some redundant Aluminium Matting (AM2, described later) was used to achieve flush repairs to other craters, and numerous scabs were made good. The RAF's Tactical Coms Wing provided communications, radar and airfield aids. Its Tactical Supply Wing provided aviation fuel using Emergency Fuel Handling Equipment supplying large rubber pillow tanks via a pipeline through the minefield - laid gingerly in its shifting sands by some very brave Sappers.

Amongst the Debris of War!

The RAF Harrier GR3s were moved across to Stanley from San Carlos where an effective Forward Operating Base had been established during the conflict, notwithstanding the loss of most of their support equipment when the Atlantic Conveyor was sunk. This redeployment allowed the beginning of a progressive release of Naval air assets, starting with the departure of HMS Hermes. Although at the same latitude south that London is north, the Stanley weather is more extreme and the atrocious conditions made things extremely difficult for the Harrier rebasing. The Rhub hangars, aluminium structures with a rubber covering for aircraft protection, and the Prefabricated Aluminium Planking for Short Take-Off/Landing strips, were both no match for the very severe gales. A number of Harriers were damaged before everything was adequately anchored but this

was kept a closely guarded secret until "battle damage repairs" had been carried out.

A Harrier's Nose broken by the Hanger

The final requirement, in order to guard against "Foreign object Damage", was to remove the many thousand items of debris from the airfield. In the absence of runway sweepers, the PoWs were somehow allowed to believe that they might be repatriated by air and that volunteering to help would be in their interest. It is a cruel world – they were evacuated by sea a few days later. Fortune lay elsewhere, and only 10 days after the end of hostilities, on 24th June, the first Hercules landed to rapturous applause, a magnificent achievement in the arduous conditions.

Not quite the Protection the Harrier Needs

Operation of this limited capability continued for 3 weeks, until a temporary closure of the airfield on 15th August, in which time 70 Hercules and 500 Harrier sorties took place. Severe weather continued to pose great difficulties and it was necessary to manually chip ice from the short runway to guarantee safe Airbridge operations. Working parties were briefed to stand clear when aircraft were taking off or landing, but on one sad occasion a party of soldiers failed to do so, expecting a Harrier to pass well above them on take-off. As the aircraft left the ground, both of its Sidewinder missiles fired and, although not armed, the missiles with their sharp fins cut 8 limbs from 6 Welsh Guardsmen and one Sapper. Still very much combat ready, those nearest rendered effective first aid, helicopters were scrambled and fast delivery to the hospital ship in the bay was decisive in avoiding loss of life. The missiles had been inadvertently "jettisoned" when the pilot had left the switches in the wrong place and operation of the "weight on wheels" sensor had completed the circuit. However, the root cause was the ad hoc nature of the Sidewinder installation, rushed onto the aircraft for the Falkland conflict, without the usual rigour in Ordnance Board scrutiny and standardisation of cockpit switch layout. There was a war to be won, but this was a sobering reminder of the engineer's responsibility for safety of design in all circumstances and of the wisdom of revisiting, as soon as practicable, installations carried out under Urgent Operational Requirements.

RAF STANLEY—SUSTAINED OPERATIONS

The temporary closure, a "secret" inadvertently leaked by the Press, was necessary to allow work to start on the short-term priority of creating an island-based air defence system, the central element of which was a runway recovered to full 150 ft width, extended from 4,100 to 6100 ft and strengthened by a factor of 50%. It was also to become, in effect, a static aircraft carrier, albeit with no capability to steer into wind but with the installation of 3 (later 5) Rotary Hydraulic Arrester Gears (RHAGs). First used in rudimentary form on ships as early as 1911, RHAGs dissipate the energy of aircraft such as the Phantom when landing and engaging their tail-hook with a cable stretched across the runway. The system, the serviceability of which is critical for landings at full weight in adverse conditions, will absorb 65 mJ in restraining a 50,000 lb aircraft landing at 130 knots and will bring it to a halt in 350 ft. Other improvements in airfield facilities included: dispersal areas with Rhub hangars for the Harriers and the newly arriving Phantoms; an engineering complex using the larger Spandrel hangars; a perimeter road; upgraded electrical power supply and distribution; and improved fuel storage and handling facilities. The latter relied on a heavy, supposedly obsolete fuel pipe that had been sentenced for disposal in a Vice-Quarter Master General's Review. Instead, it had been "squirreled" by the staff at Long Marston and loaded, at the last minute, onto one of the ships carrying plant and equipment south. The pipe was later returned to the UK for future use - the VQMG post has been disestablished. The first step in developing the airfield was to apply durable repairs to all the damage on the runway, including the Vulcan crater which the Argentineans had optimistically filled-in using empty oil drums. Next was the need to

extend the runway by 2,000 ft over what proved to be a very unpromising combination of peat and sand, with a high water table demanding an extensive drainage system. The challenge was made more interesting by a generous concentration of Vulcan and other bomb craters, and by more unexploded ordnance. Massive amounts of aggregate were required to be produced from the very hard Falkland rock, and the project therefore depended crucially on the serviceability of the two imported Rock Crushers. CBFFI's Daily Briefing concentrated less on military assets than on the health of critical items such as the crushers and, later, the RHAGs. But continually at the top of the list were the sewage extraction trucks, which had been retired by Manchester Council in 1951, at the end of a long life, and placed in the Contingency Reserve. The self-evidently important role of these WW2 veterans was sustained only by enormous engineering effort and ingenuity, with the frequently required spares all manufactured in theatre.

AM2 Matting for the Runway

The key to rapidly achieving a runway of sufficient strength and durability was to cover it entirely with AM2 matting, a material developed from a form of matting first used for improvised airstrips by the American Forces during the Vietnam War. Fabricated from extruded aluminium, the honeycomb panels are 1½ in thick and come in 2 ft widths of 6 or 12 ft length. Requiring only a reasonably flat, firm surface, they are laid manually with "claw up/claw down" connectors allowing the long edges to be interlocked in a rotating motion. With commendable foresight, the need to station a fully capable Air Defence aircraft in "post-conflict" Stanley was identified at the outbreak of hostilities. The requirement, to be satisfied by the Phantom supported by the Hercules converted to the tanker role, called for a strengthened and extended airfield and thus the urgent procurement of £10m worth of AM2 from the States. The stock was diverted from the Marine Corps, who generously moved it to the Eastern Seaboard for shipment to Marchwood where it was divided into in two loads and consigned to the South Atlantic as part of 9,000 tons of airfield construction equipment. In the meantime, personnel flew to the States to be briefed on laying AM2 and a quantity was flown to the UK for the Sappers to undertake trials and pre-deployment training.

The trials at home had suggested that teams could work 3 hours on and 6 off, but the extreme conditions and the time expended in transit to and from the accommodation ship, SS Rangatera, forced the adoption of a 3 on 9 off shift pattern. With the exception of 30 hours lost to appalling weather, the gruelling work continued round the clock with teams of Sappers reinforced by "volunteer" working parties from HMS Illustrious and the Queen's Own Highlanders. On 28th August, less than 2 weeks after its closure, the runway was reopened at sufficient length to resume the Airbridge. With no lessening of pace, work continued on the extension of the runway, the RHAG installation and the other constructions until, on 18 October, the first of 9 Phantoms landed, again to rapturous applause. Just 2 months after the temporary airfield closure, RAF Stanley had a powerful Air Defence capability, a remarkable achievement in the face of mud, snow, sleet, high winds, freezing temperatures, bomb damage and unexploded ordnance.

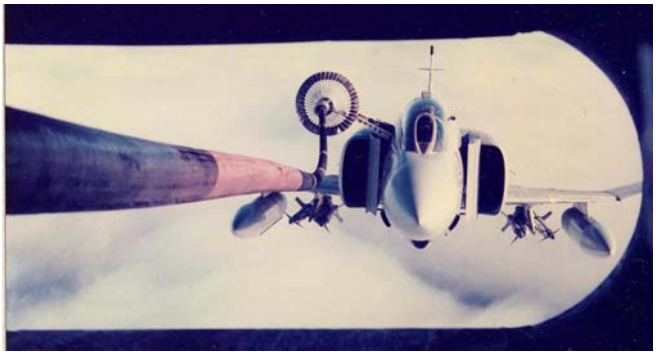
Radar Station on Top of Mount Alice

With the Phantoms operational, HMS Illustrious sailed home, leaving 2 Air Defence frigates on station until the Falkland Island Air Defence Ground Environment (FIADGE) had been created. FIADGE provided a "radar picture" and a fighter control capability, integrating three mountain-top radar stations, the first on Mount Kent, on East Falkland, and the other two, a little later, on Mount Alice and Byron Heights on West Falkland. As inhospitable as they were inaccessible, the conditions were worse than those at sea level. The construction was again carried out by the Sappers, with each site requiring 700 ISO container loads of equipment to be carried up by Chinook. Operating round the clock, the teams on these sites generally remained in place for their 4-month South Atlantic

Tour, no doubt dreaming of the mythical flesh pots of Stanley.

A Hercules on the Airfield in Typical Bad Weather

RAF Stanley remained very busy until early 1987 when, with the removal of the temporary structures and military paraphernalia, it reverted to being Stanley Airfield, retaining only its extended runway. The AM2 proved a great success, but the constant pounding resulted in it deforming and attempting to "walk down" the runway. Operation Bender had to be carried out, every 6 weeks or so, in which the Sappers used heavy vehicles and chains to drag it back into place – a process that originally took 36 hours but was eventually driven down to 12. The Harriers returned to UK in April 85 but Phantoms, Hercules and Nimrods continued to operate from the station, with Chinooks and Sea Kings operating from near-by Kelly's Garden and Navy Point. Engineering support for all aircraft types, and for the extensive ground engineering requirements, came from RAF Stanley. It was challenging working from Portacabins, ISO containers and, in particular, from light Rhub and Spandrel hangars that put up little resistance to the ingress of icy ground water and the equally chill Falkland wind. Unique challenges were posed in supporting large aircraft for which there were no hangars. An otherwise simple jacking operation on a Hercules called for close teamwork involving personnel working on other aircraft nearby. They would immediately down-tools in response to the Met Man's klaxon and race to get the Hercules off jacks when, all too frequently, the wind threatened to change speed and direction and seriously damage the constrained airframe. There being no metalled surfaces, the busy roads and hardstandings on the station consisted of crushed rock, constantly replenished by the Sappers, with the consequence that in the prevailing weather everything suffered a coating of copious quantities of grey dust/slime. But morale remained high, not least as a result of "military" humour. One accomplished artist painted an illuminated scroll in the Victorian fashion with the opening lines "When The Good Lord painted the blue of the sky and the green of the fields…" Capturing the essence of the place, his closing line was "Stanley is where He washed His brushes".



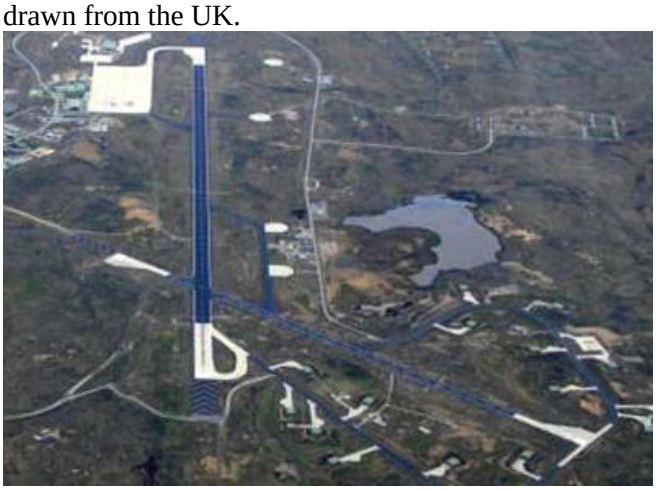
A Phantom Refuelling in Flight

THE STRATEGIC AIRFIELD

The project to build a "strategic" airfield was developed in parallel with the activity at Stanley. Lord Shackleton was invited to revisit his 1976 report on the future needs of the Falkland Islands and, not surprisingly, reiterated his earlier recommendation to build an airfield capable of handling wide-body jets. The Royal Engineers, already in situ, were commissioned to examine possible locations and eventually reduced these to two options for presentation to the Cabinet. Either the existing airfield at Stanley was to be developed or a new airfield constructed on a truly "green field" site, some 30 miles west of Port Stanley, on the plane near Pleasant Heights,. After much debate, the latter option was selected and named, somewhat incongruously, Mount Pleasant Airfield (MPA). The choice was complex, with the remote MPA option more difficult and more expensive, albeit that Falkland Island land is always priced simply in accordance with number of sheep it could support. The deciding factor was minimisation of disruption, both to the defence posture at Stanley and to the town's population, who would have been swamped by the workforce had it been accommodated there. The Cabinet favoured the idea of the Sappers building the new airport but, while they had shown that there was no challenge to which they would not rise, the scale of the project was simply too great and the Army Board persuaded the Government to go out to tender.

MPA was to be built on a barren, inaccessible site, 7 miles north of Mare Harbour, a grand name for a very small fishing inlet in East Cove. In order to haul plant and material to the site, a road would be required to connect the airfield with the coast, and another road was needed for transit to and from Stanley. Initially, the 100,000 sq m site was to include an 8,500 ft primary runway, an intersecting 5,000 ft secondary runway, 25 miles of internal roads and 127 buildings

ranging from a Tristar Hangar through every type of technical building to messes and barrack accommodation. It would also be necessary to develop Mare Harbour as a facility worthy of the name and to include there a large fuel storage facility. A separate contract was to be let for airfield aids and communications, much of it involving the installation of Government Furnished Equipment. After allowing only 6 weeks for the tender process, the £215 m contract was awarded to the Mowlem Laing Amey Roadstone (MLA) consortium but with follow-on Army and Navy contracts awarded to the losing consortium, Wimpey Taylor Woodrow (WTW). In all, £420 m worth of contracts were let and broadly delivered on time, the first being announced the day after the Conservative victory in the July 83 General Election. It was assessed that the cost of construction in the Falkland Islands was 90% more expensive than it would have been at home, as a result of the need to import virtually everything accept rock and water, and because of the premium paid to satisfy Mrs Thatcher's insistence that the workforce should be exclusively drawn from the UK.



The New Strategic Airfield

The timescale was demanding, with an interim capability for wide-body operation required by May 85, full operational capability by May 86 and completion of residual activity by February 87. The first two ships, MVs England and Merchant Providence, sailed in late September 1983 with the initial tranche of plant and material, and with the "Pioneer Workforce", arriving in East Cove in October. At first, the heavy equipment was floated off the ships on pontoons and manhandled ashore. But the Merchant Providence was quickly configured as a "Jetty Head" vessel, rigidly attached to the shore by steel pipes over a metre in diameter and by a Bailey bridge capable of supporting the largest of vehicles carrying cargo on to a quayside constructed for the purpose. More than a quarter of a million tons of cargo was hauled across its decks before it was returned to sea-going service at the completion of the project. In all, some three quarters of a million tons of material was moved by 6 merchant ships in 35 sailings, mainly from a dedicated birth at Avonmouth. Much of it, in ISO containers, was offloaded directly to its required location by Chinook. Once ashore, the pioneer workers set about establishing the harbour and building the "Pioneer Camp" which remained in place until it was dismantled April 84. However, in November 83, the priority was building the temporary access road to the airfield; bulldozing, blasting and quarrying the required rock as they forged their way north. By Christmas they had reached the perimeter and on 31 December the first turf was ceremonially cut by CBFFI driving a digger with a "Two Star" plate.

MV Merchant Providence secured as a Jetty Head

The "Pioneers" were soon reinforced by the main workforce, rising at its peak to 2,300, more than half as much again as the indigenous population and appreciably more than the peace-time military presence. With the UK in recession, over 25,000 men had applied for the work, many unsuitable and others without passports. Given the short-fuse with which all were operating, even the sifting and interview process was highly pressured but the result was rewarding. Men worked for good pay and, crucially, a bonus paid only at the end of the engagement. All put in a minimum of a 60 hour, 6 day shift with overtime when required. The bonus system concentrated the mind, and while no one wished to be sent home, there was spontaneously high morale and very good discipline arising from the sheer satisfaction of working hard, doing an important job in demanding circumstances, and against a very tight timescale. As with the military, the contractors tended to amuse themselves and respect the Islander's wish for a quiet life – the very reason they were there.

The purpose in seeking an interim capability to operate the RAF's wide-body aircraft, the Tristar, was to do away with the loss of time suffered by all but the most senior military personnel in the 2-week sea crossing, to

and from Ascension, which effectively increased a 4-month tour to 5, and thus called for 25% more manpower. The contract required that, from the beginning of May 85, the RAF had use of the main runway (given a few hours' notice) and "ownership" of the Tristar Hangar, half of its apron, the shell of an ATC Tower and the Fire Station. Additionally, provision was made for adequate electrical supplies and for road access to Stanley for passenger movement and to Mare Harbour to tank fuel in advance of completion of the pipeline. The challenge of operating a small airline from a building site should not be underestimated and it was essential to achieve close cooperation between MLA, the government's Property Services Agency (PSA) and the Military. As the only significant piece of real estate available, the Tristar Hangar became the home of a mini-RAF station with every function replicated in a "Portacabin City". It was squeezed into the hangar while leaving just sufficient clearance for the aircraft had it been necessary to bring it under cover. The requirement encompassed multiple engineering facilities, administrative and logistic functions and the passenger, security, customs and freight/ baggage handling tasks associated with hundreds of passengers transiting in each direction. To further concentrate the mind, the hangar was handed over only three weeks before first landing and the road connecting MPA to the personnel and engineering resources of RAF Stanley opened with only three days to spare.

A Tight Squeeze

On schedule, but without any publicity, the first landing, or "Proving Flight", took place on 1May 85, 16 months after cutting the first turf and less than two years from the Invitation to Tender. An achievement, in its own way as remarkable as those at RAF Stanley nearly three years earlier, it was greeted with an enormous cheer by the two and a half thousand ecstatic witnesses, mostly the contractors who had built it. Until the last few minutes, the runway had been covered by oil drums, not to thwart an Argentina attack, but to ensure that the honours went to 216 Sqn rather than an enterprising Islander. The "Inaugural Flight" took place on 12 May and, after three days of celebrations, the aircraft departed for UK via Ascension on 15 May. It carried the returning the Secretaries of State for Defence and for the Environment and the Chief of the Defence Staff, and many others, including the author, who had enjoyed a longer stay. At the Official Opening, The Queen was represented for the first time by Prince Andrew, a veteran of the conflict. He was grudgingly released, for the briefest time, by HMS Brazen on which he was serving as the "Brazen Hussie" helicopter pilot. The frigate's scheduled return to the UK had been slightly delayed by the ceremony and in an act of Senior Service whimsy it sailed north in strict accord with the day's programme, knowing it would inevitably run late, causing Lt Windsor RN to miss most of his lunch in a scramble to re-join before the Hussie was out of range of the ship.

First Tristar Landing

While it would be a year before the airfield would assume the full defence mantle from RAF Stanley, the opening of MPA in May 85 marked the key moment in which a new and enduring conduit was established between the UK and its loyal dependency. The defence posture was changed for ever and the issue became not whether our country would continue to be able to assemble a task force capable of rescuing the Islands, which is arguable, but whether it had the commitment to ensure that its strategic airfield remained in the UK's control. That commitment has been demonstrated by successive British Governments and today strong forces remain in place, spearheaded by the Typhoon. Equally important, with the opening of MPA, the Islanders enjoyed a new, closer relationship with their mother country and, thanks to General Galtieri, they would never again be dependent on the fickle favours of Argentina. At its simplest, tourists would visit with ease and a sick child could now be in Great Ormond Street in 48 hours.

Just as winning the war had been a great national achievement, delivering the peace was a great achievement by British engineers, of many disciplines, working closely together in the Country's interest.

AWARDS AND LIVERY DINNER CARPENTERS' HALL 10th July 2011

So, yet again enduring the wettest drought since records began, the Company met up for the Awards Livery Dinner in the splendid Carpenters' Hall.

Although the 26th Livery Company has been present on the site since 1429, the current Hall was finished in 1960 and much of its internal architecture and the Banqueting Hall in particular, is an exemplar from this period. As one would expect, the building celebrates the use of wood and apparently eighteen different types of timber were used in its construction. The ceiling of the main dining room is very impressive and certainly a testament to the trade.

Amongst our Company are of course the Civil Engineers, and it was interesting to learn that the Carpenters were once the senior construction trade Company following the granting of their Royal Charter back in 1477. This status and influence diminished following the Great Fire of 1666, when other less combustible materials rapidly became the trend!

So it was in these grand surroundings that we assembled for the annual awards. Bathed in light coming from the stained glass windows either side of the top table, The Master, Mr David Scahill, welcomed the guests and described some of the events that the first three months of his Master's year had already witnessed, notably hosting Prince William at the Diamond Jubilee Lunch that was held in Westminster Hall.

Of course the main purpose of the dinner was to present the Engineering Awards in recognition of excellence in our field. With his usual aplomb, Wing Commander Tony Willenbruch, The Clerk, opened with the customary but convoluted instructions, designed to confuse even the most seasoned awards recipient. Nonetheless, he offered good advice recommending that the winners should simply follow the person before and just hope they had got it right!
The awards then followed and we were honoured by several distinguished guests being able to present the awards in person. During this time we were treated to a brass quintet, sat above us in the musicians' gallery, playing "the appropriate" military music; air, sea or land.

Our guest speaker was Sir Alan Rudge CBE, one of our Liverymen. He spoke passionately for the need to halt the decline of UK manufacturing. It was interesting to hear that a modest increase in manufacturing of 20% would close our burgeoning trade gap with the rest of the world and this represented our most credible solution to prevent a decline in the standard of living. In terms of improving the trade balance could we think of a way of exporting some of our weather?

The Carpenter's Banqueting Hall was a fitting place for the Awards Dinner. Behind the top table there is a beguiling and intricate carving of a tree. It seemed, to me at least, that it was rooting, branching and flourishing for ever.

James De Waele

THE ENGINEERING AWARDS

Fiona & Nicholas Hawley Award: Excellence in Environmental Engineering

The Fiona and Nicholas Hawley Award was established in 2006 and is made annually to recognise excellent work in "Engineering for a Better Environment" by a resident of the UK, under 30 years of age at the date of submission, who holds a graduate or post-graduate degree in engineering or science from a recognised UK university, or who is studying for a post-graduate degree at such a university. The Hawley Award is aimed at inspiring younger engineers who can best demonstrate the application of proven technology, which they have developed, to make positive improvements to the environment.

Winner 2012 (Prize £5000) – Christopher Vagg

Christopher Vagg is a post-graduate engineer conducting research at the University of Bath. His paper, "A Driver Advisory Tool to Reduce Fuel Consumption in Light Commercial Vehicles", gives an excellent demonstration of a practical application of known technology through the provision of a simple and low cost device that enables drivers of light commercial vehicles to achieve significant savings in fuel usage (>7%), CO_2 emissions and related maintenance costs by encouraging the adoption of improved eco-driving; Chris designed and developed the system logic as part of this tool.

Baroness Platt of Writtle Award

The Award has been established to recognise engineering excellence amongst those pursuing final year studies leading to the academic qualifications for entry to the Engineering Council's Incorporated Engineer grade. The Award is named after Court Assistant, 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 consists of a prize, medal and certificate. The Award was made for the first time in 2002 and The Engineers' Company wishes to acknowledge the assistance of the Institution of Engineering and Technology in selecting the Award winner.

Winner 2012 (Prize £1000) – Peter Hutyan

Peter Hutyan is studying for a BEng in Motorsport and Powertrain Engineering at Coventry University. He has shown outstanding ability in practical engineering, never settling for the average and always seeking to make the design assignments in his course more challenging. On his industrial placement at Audi's engine development centre in Hungary, he redesigned software for evaluation of oil consumption, and worked with an Italian supplier to resolve failures of chain drives. He has also made a very significant contribution to Coventry University's achievements in the Formula Student competition, taking part in every year of his course. He has led numerous student projects, completing all tasks on time and with successful results. With an excellent academic record, achieving a first class average every year of his course so far, Peter is expected to graduate with first class honours.

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 2012 (Prize £1000) – Becky Adams

Becky Adams holds the position of Graduate Manufacturing Engineer at Perkins Engines, Peterborough. The passion and support that Becky shows for engineering is a virtue that she has shared with hundreds of students at local schools through her support of numerous programmes and activities including Imagineering, First Lego League, Go4 Set and National Science week. She leads from the front in engaging young children in seeing engineering as fun and a worthwhile career choice. In addition, she has helped some children with learning challenges to develop significantly more than the standard curriculum would have achieved. Becky is a great role model to young people in both primary and secondary schools throughout her region providing invaluable coordination for her fellow volunteers.

Winner 2012 (Prize £1000) – Dr Carlo Maselkowski

Dr Maselkowski is an inspirational Physics teacher at St Birinus School Oxford who has shown great enthusiasm in encouraging his students into all fields of engineering through various schemes and projects with the Engineering Development Trust. He has been instrumental in organising promotional events to encourage a wide range of schools

and companies to become involved in Engineering Education Schemes. Carlo has also organised various open industry visits for a vast number of students to Companies that cover a wide range of engineering disciplines. He has also been involved in promoting schemes for his students to provide them with valuable engineering experience after leaving school, promoting the EDT "year in industry" scheme providing them with year long placements in engineering companies.

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 2012 (Medal) – Dr Eoin Syron

Eoin Syron graduated from University College Dublin with a BE (Bachelor of Engineering) in Chemical Engineering in 2003 and a PhD in Chemical and Bioprocess Engineering in 2007. He has over eight years' experience working on both conventional and ground breaking biological wastewater treatment processes. Eoin has been involved with the design and specification of both biological and physical-chemical treatment processes for industrial and municipal wastewaters, and has worked throughout Europe and North America. He is now a Post Doctoral Researcher in the School of Chemical and Bioprocess Engineering at University College Dublin where he is currently working on Bubbleless Aeration for secondary wastewater treatment and investigating the dramatic energy savings associated with this technology. The title of his presentation for the International Water Association Young Water Professional's conference was: "Bubbleless Aeration: How to dramatically reduce energy consumption in aerobic biological wastewater treatment".

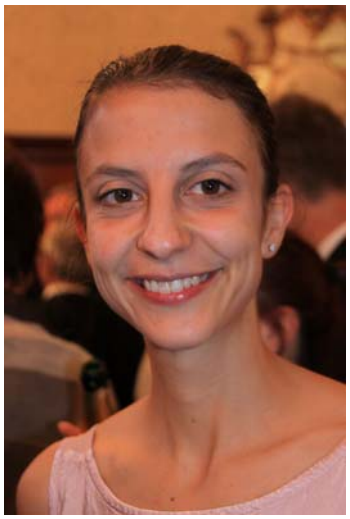
Unfortunately Dr Syron was unable to be present

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 2012 (Medal and Bursary) – Dr Lara Barazzuol

Lara Barazzuol graduated with a Bachelor's degree in Biomedical Engineering in 2006 and a Master's degree



in Bioengineering in 2008, both at the University of Padua in Italy. Having recently completed her PhD in the Ion Beam Centre, Faculty of Engineering and Physical Sciences, at the University of Surrey, her research explored novel treatment options for patients with high-grade brain tumours, with a particular focus on using targeted agents combined with conventional chemotherapy and radiation therapy. The work included the development of a multiscale mathematical model that is able to assess and suggest treatment strategies for new clinical trials. Lara's previous awards include the 2011 nomination for PhD student of the year at the University of Surrey, a 'cum laude' classification for her Master's degree – the highest achievable grade and a Marie Curie fellowship for early stage researchers in the Particle Training Network for European Radiotherapy.

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 and now a Past Master. The Awards are for excellence on an accredited undergraduate engineering course conducted at one of the 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 2012 (Prize £2500) – Alexander Karapetian

Alexander is a final year student in the Department of Computing at Imperial College London. As a software engineer, he applies mathematical ideas to computing. He has a particular interest in cryptography and was able to describe complex mathematical and philosophical concepts in clearly understandable terms. He has held two internships at Apple: in the first he designed an 'app' which is used by customers in Apple stores and in the second he took on the management of first time internees. In this role he demonstrated a clear understanding of, and sensitivity

to, the people issues of working in a team and ensuring that objectives are met. He also demonstrated these 'people' and 'communication' skills in his role as science editor of the college newspaper Felix including the production of a week of daily editions.

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 Jordan Sorabjee joined the Defence Technical Undergraduate Scheme in 2008 to study Civil Engineering at Loughborough University. An outstanding young officer in every regard, Jordan graduated with a First Class Honours Bachelors Degree. He also excelled in a wide range of extra-curricular activities including sport, fitness, leadership, and the broader application of his innate engineering know-how. In addition to completing a challenging project investigating 'The recovery of renewable energy from wastes', he organised and led a team on a 192 mile charity trek, raising over £1000. Sponsored by the Royal Engineers, Jordan commenced his Initial Officer Training at the Royal Military Academy Sandhurst in September 2011.

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 Ben Howarth Royal Signals was a student on the Communications and Information Systems Management MSc course at the Defence College of Communications and Information Systems at Blandford and graduated in 2011 with a well-deserved distinction. His Final Project was on the topic of the migration to Internet Protocol version 6 (IPv6) from version 4, IP being the addressing scheme across the internet. It was very timely as this issue has now becoming an urgent concern throughout the Ministry of Defence (MoD). Through his analysis it became evident that commercial and other armed forces' communication systems were rapidly migrating to IPv6 and MoD equipments also needed to change to maintain interoperability. The Network Technical Authority at Defence Equipment & Support report that this has re-ignited the discussion and his work is informing this high-level debate.

Both of the Awards above were made on the recommendation of the College of Management and Technology, part of the Defence Academy of the United Kingdom at Shrivenham, Wiltshire.

The Services Engineering Training Awards

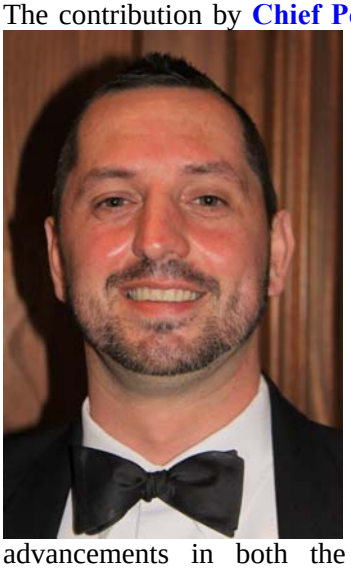
Awarded to a Warrant Officer or Senior Rating / Non Commissioned Officer of each of the three Services for outstanding achievement in initial or continuing engineering training, measured through leadership and the professional inspiration given to others.

Nominations are invited from: Defence College of Electro-Mechanical Engineering, HMS SULTAN; Maritime Warfare School, HMS COLLINGWOOD; Defence College of Communications and Information Systems; The Royal School of Military Engineering and Defence College of Aeronautical Engineering. Winners are selected against the criteria by The

Services' Awards Panel of The Worshipful Company of Engineers.

Royal Navy Award

The contribution by **Chief Petty Officer Phillips RN**



to delivering Phase 2 Air Engineering Technician (AET) training has been unprecedented. With gapping in both the Lieutenant and Warrant Officer 2 posts, CPO Phillips passionately embraced the significant increase in his responsibility as the second in command of the Phase 2 unit. He has driven advancements in both the technical and military training. His efforts have included a complete validation of the AET course, improvements to the command and leadership training and introduction of staff internal training packages. His greatest achievement has been motivating the instructional staff, disillusioned by the fluctuation in trainee numbers and the Strategic Defence & Security Review/redundancy announcements. As a result of Phillips' personal effort, despite the imposed gaps in training, the unit has seen a reduction in premature voluntary retirement, back classing and DUDT rates, and an overall improvement in the quality and morale of the trainees.

Army Award

Staff Sergeant (Artificer) McNeill REME has been

instrumental in developing and delivering training for Urgent Operational Requirements for current operations. He is exemplary in all aspects of his service and his wider contribution. As a professional engineer he has provided real benefit to current operations, as an instructor he has ensured the continuing high standards of technicians within the field force and as a role model he is unsurpassed. His selfless commitment to excellence has been an inspiration for the cohort of young engineers bound to repair new equipment on demanding operations.

Royal Air Force Award

Chief Technician Tennison RAF is an extremely

dedicated and professional instructor who has shown tireless commitment in the development and implementation of the new Technical Engineering Asset Management Training Course. Always proactive, he was the driving force behind ensuring that the new training course fulfilled all of the Trade Sponsor's requirements; he impressed his superiors with his outstanding leadership style and his ability to produce excellent results within stringent deadlines. Totally committed towards his teaching he recognised the professional development opportunities in his colleagues and students, offering them advice and assistance towards gaining civilian recognition of their engineering qualifications by registering with both the Society of Operations Engineers and Institution of Engineering and Technology award bodies. Versatile and dependable, his enthusiasm, and motivational leadership style have been exceptional within Engineer Development Flight. He is truly a person who takes the lead and sets the standards and work ethos for others to aspire to.

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 Operational Engineering Award

Called the "Thunderer" award to sustain the heritage of this name within The Worshipful Company of Engineers

Lt Cdr Wayne Stafford RN has played an extremely

significant role, giving an outstanding operational engineering performance, in three separate operational theatres in a time span of just 12 months. His efforts have already merited a Commander Joint Operations and CINCFLEET commendation for Afghanistan and Operation ELLAMY respectively but his recent efforts on a strategic intelligence gathering mission, as the Weapons Officer, onboard HMS TIRELESS are equally worthy of recognition. During this time he directed the repair of mission essential equipment through innovative techniques enabling the submarine to remain on task to complete her mission. Throughout he has applied direct leadership, profound engineering judgement and innovation to solving technical problems.

Royal Engineers Operational Engineering Award

Captain Sean Donoghue RE has played a vital role in

enabling the alternative Air Line of Communication for operations in the Middle East and Afghanistan. Responsible for all the technical aspects of a £1.95M, 6-month project to construct key components of the UK airhead in Oman, he had to draw on every ounce of his intellect, skill and experience to overcome the myriad of technical challenges he faced. Long lines of communication, unique contractual arrangements, punishing environmental conditions and very tight timelines all added to the complexity of the task and he worked tirelessly, without respite, to find solutions to seemingly insurmountable problems. The completed infrastructure is a shining example of engineering excellence and represents a lasting legacy of the very best the Corps can deliver.

Royal Signals Operational Engineering Award

As Officer Commanding, Helmand Information

Communication Services Signal Squadron during a period of significant change and increased demand, the technical skill and professional judgement of **Major ASF Hutton R Signals** was pivotal to the successful provision of information to all supported commanders in Bastion, Leatherneck and Helmand. Commanding a Squadron of 150 soldiers and airmen, he identified critical information services, historically fragile, where faults have severe operational consequences. Under his leadership, his unit applied outstanding technical innovation which impacted positively on the campaign, resulting in vastly improved Force Protection and increased targeting ability. For his relentless pursuit of technical excellence, he receives this award.

Royal Electrical & Mechanical Engineers Operational Engineering Award

A bright and dedicated Engineering Officer, **Major Jamie Hayward REME** worked

extremely hard to enhance operational capability in Afghanistan and achieved outstanding results. He consistently exceeded the expectations of the combat elements of Task Force Helmand in his willingness and determination to project REME engineering effect to where it was most required across Helmand; directly ensuring that the equipment and vehicles employed by the Task Force remained in service throughout the tour of duty. Not content to simply accept the status quo, he has used his engineering judgement to analyse and recommend improvements to the way in which equipment is supported in

Afghanistan that will have a lasting impact on operational capability long into the future.

Royal Air Force Operational Engineering Award

Flight Lieutenant Gary Lewis RAF was a lynchpin in the Tornado Force's support to Op ELLAMY. At RAF Marham, Gary was pivotal in the set-up of the Station Operations Flight, rapidly drawing together disparate elements into a cohesive team. Under his exceptional leadership, the Flight maintained operational focus, despite not being deployed, to deliver outstanding operational capability where none existed before. Following, as it did, his tour on IX(Bomber) Squadron where he was responsible for the delivery of maintenance to support the first operational Storm Shadow sorties from the home base that were central to the success of the campaign, and his leadership of the forward deployment of the engineering team to Gioia Del Colle, Flt Lt Lewis's overall performance makes him a most worthy recipient of this Award.

The Services Engineering Support Award

Awarded to a serviceman who has contributed most, through the application of engineering skills including the use of leadership, management and technical acumen to meet materiel availability targets for any of the Armed Forces. The recipient is normally chosen from the Defence Equipment & Support Organisation with a recommendation by the Chief of Defence Materiel.

This award recognises the role of **Group Captain Paul Ridge RAF** in leading the Manoeuvre Support Team and especially in the delivery of counter–IED (Improvised Explosive Device) systems to our Armed Forces on operations. His engineering leadership of the team exploited the very best of their wide skills and experience. Faced with an ever-evolving threat from IEDs in Afghanistan, he took the lead in working with suppliers to exploit new technology and introduce innovative solutions. Equipment for different roles was delivered at an exceptional rate and frequency throughout the year. Paul Ridge and his team were completely committed, working long hours to drive innovative programmes to integrate these capabilities. There is absolutely no doubt that many lives have been saved as a direct result of the efforts of Paul and his team.

ARKWRIGHT SCHOLARSHIPS

The Worshipful Company of Engineers currently supports 2 Arkwright Scholars undertaking their Sixth Form studies at schools in Greater London as a potential lead-in to higher engineering studies. They are:

2010-12 **Miss Sarah Laughlin** – Colfe's School, London SE12

2011-13 **Mr Wim Geberbauer** – Graveney 6th Form College, Tooting

The Master's Speech

Wardens, My Lord, Masters, Prime Warden, Ladies and Gentlemen welcome to Carpenters' Hall for our Annual Awards Dinner and Presentations.

I would like to thank the Master Carpenter for the use of this wonderful Hall, and all who have been involved in its preparation, for the warm reception, for the excellent food and wines, and to the Live Brass Quintet for their assiduous attention to getting all of the military music, with the right notes, in the right order, at the right time – well mostly.

We welcome the Masters or Prime Warden of the Armourers and Brasiers; Glaziers; Shipwrights; Tin Plate Workers; Fuellers and Educators together with the Immediate Past President of the Society of Environmental Engineers; and the President of the Institution of Mechanical Engineers who is one of our own: Court Assistants Isobel Pollock. We also welcome the guests associated with our awards winners: The National Director of the Arkwright Trust, and Brigadier Steve Hodder representing the Chief Royal Engineer and to the distinguished list of other senior military guests. A very warm welcome also to the Deputy Vice Chancellor of City University.

I would also like to welcome all the other guests here tonight, amongst whom are my personal guests: the

"outlaws" of Gill and me - that is the other four people who have provided the complementary genetic make-up of our jointly shared three and a bit grandchildren; to John Burns and Elaine, and to Doug and Eryl Gadd. Those of you who attended my Installation will no doubt recall my embarrassment at the Installation Dinner listening to my principal guest Tony Collins talking about what he referred to as the major contribution I had had in his professional career? Well without wishing to cause Doug the same embarrassment, I would like to acknowledge that Doug had the same effect on my early career and I welcome him here as a former boss and friend.

Much has happened since I was installed as the 29th Master Engineer nearly 3 months ago and if the next 9 months of my Master's year goes as quickly then it will be finished by about a week on Wednesday!

I would like to reflect on a few of my experiences. I was most fortunate to be Master Engineer for the Queen's Diamond Jubilee celebration and had the privilege to host Prince William at the Diamond Jubilee Luncheon held in Westminster Hall together with four of the Company's 2011 Award winners.

It did our Livery great honour to be selected to host the Prince, not only as a guest on our table, but also because the originally invited guest he replaced, Major Raymond Kolczak, was invited to join the Duke of Edinburgh at his table. Sadly the Duke spent that time in hospital so Raymund did not have the benefit of his elevation but his loss was our gain in the accolade offered to the Worshipful Company of Engineers.

Recently, Court Asst David Cooper, invited Gill and me to a Year 2 engineering challenge for the schools in Eastbourne to emulate the Diamond Jubilee River Pageant by making a boat from string and sealing wax, and then pitting them against the other schools' designs for functionality, stability, and speed powered only by the wind generated from Bellows or a bicycle style pump both of which were also designed by the seven year olds.
What struck me most was the sheer delight and entertainment that those little ones got from experiencing, possibly for the first time, the enjoyment of structured engineering thought and its fulfilment much, I am sure, as was in their time experienced by the likes of Brunel and Whittle, or is being experienced by world beating companies such as BAE Systems or JCB which the Livery will be visiting this year.

I suppose the achievements of year 2 school children and successful UK multinational engineering companies are at the extremes of what we are actually celebrating this evening. However right in the middle, being recognised for their outstanding achievements in their chosen engineering roles, are our award winners.

Major Ben Howarth was so excited about his Award that he gave the Master and Sir Alan Rudge a big hug

Our Award winners represent all that is good, all that is special, all that is truly honourable in our professional endeavours and we welcome them most warmly. I would like to contrast this with some of the less savoury personalities reported in recent weeks in our banks. I'll not dwell on the darker issues, but I will use the words of others to draw the contrast between the two groups.

On this year's Armed Forces Day, Gen Sir David Richards Chief of the Defence Staff pointed out that it was warming to the whole of the services to receive thanks from the people of Great Britain for the work they do, but pointed out significantly it was also the opportunity for the Armed Forces just say to say "thank you" for the support they receive from the country. Compare this with the public statement made by Sir Mervyn King, Governor of the Bank of England, a couple of days earlier, as he hit out at "excessive levels of compensation, shoddy treatment of customers, and deceitful manipulation of one of the most important interest rates".

I have mentioned the Queen's Diamond Jubilee, it would be a cheap shot to mention the other Diamond –

Bob Diamond, who recently resigned, except to suggest we should keep a sense of proportion, so my third quote is from Shakespeare's Julius Caesar. Marc Anthony said "The evil that men do lives after them. The good that men do is oft interred with their bones".

The Master and Sir Alan Rudge at the start of Dinner

We need to bear in mind that over the last couple of decades when the likes of Sir Anthony Bamford of JCB, Sir Richard Evans and Mike Turner of BAe Systems and Sir John Rose former CEO of Rolls Royce turned our leading UK manufacturing companies into world leaders, a number of recently deposed senior bankers presided over an unprecedented expansion and success in the financial services industry to make the UK and London also pre-eminent in the world.

I do not condone nor try to excuse wrong behaviour, but one thing is certain: even the strongest institutions are at risk if their foundations are continuously undermined by the outrageous party political point scoring we have experience in recent days. The other world financial centres must be rubbing their hands with glee!

I would now like to introduce my guest speaker for tonight. I use the "guest" advisedly as Sir Alan Rudge is in fact one of our Liverymen but as this is the first function that he has attended since his clothing in 1998, I think the paint is still insufficiently dry to welcome him as a guest, my most welcome guest.

I first met Sir Alan about five years ago at the Annual ERA Foundation Lunch of which he is Chairman. His clarion call nationally for the need to recognise the importance of manufacturing industry and to nurture it has been long, loud and clear. Rather than accepting the politicians' easy rhetoric of the UK being a "post industrial" nation, Alan has emphasised the critical role that manufacturing industry has, and will continue to have in the wellbeing of the UK economy, only 10% of GDP but 50% of all exports. I look forward to hearing you share your expert opinion with us shortly.

Sir Alan Rudge has served on 23 Boards - from start ups to FTSE 100 companies. He is the Senior Independent Director on the Board of Experian Group Limited and Chairman of the Board of Management of the Royal Commission for the Exhibition of 1851. Sir Alan is a former Chairman of the EPSRC, a past President of the Institution of Electrical Engineers and a former Chairman of the Engineering Council. He is a sailing fanatic having just competed in The JP Morgan Round the Island race on 30 June 2012.He is married to Lady Jenny, has one son and one daughter and three grandchildren.

The Master, David Scahill with Gillian and Sir Alan and Lady Rudge

Sir Alan, we look forward to hearing your response on behalf of the guests. But first, can I ask members of the Worshipful Company of Engineers to rise and drink a toast to our guests. "Our Guests"

Speech by Sir Alan Rudge

David asked me to speak this evening, because of our shared concern on the decline of manufacturing industry in the UK and its impact on the economy. David is a very experienced industrial manager and he knows better that most when things are not right in the industrial sector.

A sector he once roamed, and partially ruled – not with a rod of iron – but with some inspired team leadership. (I learned from an ex team member that he was a great leader, but first thing Monday morning could be something of a trial.)

The bulk of David's industrial experience was gained in GEC where his boss for many years was Arnold Weinstock. This provides some insight into David's

abilities, since nobody survived long with Arnold unless he was able to deliver good results, regardless of fire, flood, wind or storm. From GEC David held a number of senior management roles in international companies, which have provided him with extensive industrial experience. His insights are firmly based upon real-world experience.

However, I suspect that David's concerns on manufacturing and the economy may be triggered from a source similar to my own. That is, the arrival of grandchildren. When I think of the mess I am leaving for my grandchildren I feel a tinge of guilt. I was born into a powerful British Empire and I could be exiting from a small overcrowded island with a frustrating national football team and a crumbling economy, and it crumbled on my watch.

This thought has stimulated me to do some detailed homework on the economy, and manufacturing in particular. And then a lot of lobbying to try to get key messages across to many opinion-formers and politicians who appear to be ignorant of industry and interested in very little outside of politics and the City.

Grandchildren can have a marked influence on the behaviour of men, and senior managers are no exception. A colleague was on a plane with a number of empty seats and observed a senior executive type making his way up the isle. As he passed an empty seat he would lean over to the adjacent passenger and ask, "Do you have grandchildren?" When the answer was yes he would nod and pass on. Once, then twice, he repeated this strange performance. Eventually he reached an empty seat adjacent to a somewhat younger man. "Do you have grandchildren?" he asked again. "No" came the reply. 'Oh good" said the senior executive "I'll sit here and tell you about mine".

So why are we concerned about UK manufacturing industry and the economy. Up until the early 1990's Britain was the 4th largest manufacturing nation in the world. Today we are 9th and on the way out of the top ten; encouraged by a defeatist attitude, more aimed at managing the decline than trying to reverse it. Over the past few decades Governments and economists alike have told us repeatedly that this is as it should be; 'Britain is a post-industrial nation'. Financial and business services are the future, making things is definitely old hat!

The puzzling thing about this misguided theme is the Government's lack of interest in its own trade figures. Our trade balance with the rest of the world, and the balance of payments that goes along with it, are among the best indications of whether the nation is earning its keep. If our trade is in deficit then we have to borrow or sell assets to make up the difference. There can be good reasons for running a deficit for a while – if the borrowed money is used to invest in wealth-creating activities for example. But the case is less compelling if it is used to finance consumables and holidays in Europe – to maintain a standard of living we cannot really afford.

It will not surprise you to hear that the UK has been running a serious trade deficit for many years now, and we have had to sell assets and debt continuously over the period to balance the current account. In terms of goods, the last time our exports and imports were close to balance was in 1998. Since then the deficit has increased every year until the banking crisis in 2008, when there was a slight blip before the downward trend continued. This deficit is now of the order of £100 Billion per year, (equivalent to two and a half times the Defence Budget). And more than half of this is due to the deficit in the trade of manufactured goods. We import a huge amount of goods more than we export, and the situation is not improving.

In theory we pay for this deficit in goods with earnings from our service industries and dividends from investments abroad. The truth is that while we have a surplus on our trade in services, and some investment income, it is not nearly enough to cover the deficit on goods. A net deficit of between £25 and 40 Billion every year has to be balanced out by borrowing or selling assets. With the additional burden from the banking crash, our interest payments are now of the order of £50 Billion per year and growing, while more than 2000 UK companies were sold to foreign owners in a decade. Put quite simply we have not been earning our living and the underlying problems, pre-date the banking crisis, and have been evident for a long time.

The imbalance of trade in manufactured goods generates most of the deficit. Yet manufacturing still provides one half of our total exports and three quarters of the total business R&D. Without it we are really in trouble. We have many excellent manufacturing companies, large and small, but not

enough to generate the level of real wealth necessary to maintain our current standard of living.

I am sometimes accused of being too depressive on this topic. But to provide solutions you have first to recognise that you have a problem and understand its scale. In the past neither Governments nor most economists have been willing to accept there is a problem let alone understand it or take appropriate action. However, I believe this is now changing, perhaps helped by the intensive lobbying and the financial facts coming home to roost.

So what can be done to rescue the UK economy without a major fall in our standard of living? If, we seek to close the trade gap there are three options, or some combination of the three. We could increase our financial services by 100%. Or we could increase all our knowledge-based services by 150%. Another alternative is to increase our manufacturing output by 20% (i.e. exports up by 10% and substitution of imports by another 10%). The former two are almost certainly not feasible even if such an unbalance between productive industry and services was desirable. A revival in manufacturing clearly offers the best prospect. But it demands a high priority, resources and positive action. It will not just happen of its own accord.

What is required is an integrated industrial strategy, with manufacture at its core. Led vigorously from the top of Government and imposed across all of the Departments of State.

A situation where one Department of State is trying to help industry, while another is busy increasing the cost of energy, and yet another reducing capital allowances for small businesses, is just not good enough. But this is what we currently have. This is not the time or place to get into the details but it is not difficult to identify more than 30 factors which if they were optimized within an integrated industrial policy would transform the prospects of UK manufacturing industry.

The engineering community is the key in this and we need to be heard in the economic debate. In the past the engineers have been happy to follow a strategy not dissimilar to that which David applies to his golf……

He maintains a low profile at the outset, but just watch out if you plan to compete in the Livery Golf Competition.

This is fine but unless we raise our voices in the economic debate, there is not going to be a game for us to win.

So let me leave you with a mantra that David and I strongly endorse. A mantra that needs frequent repetition from all of us.
Manufacturing matters. The economy cannot be viable without it. We do it successfully but we need more of it. This is not an option – it is essential.

Finally, for the environmentalists, let me emphasize that **if you want to save the environment then save the economy first** – impoverished nations are unable to save anything.

Please join me in a Toast to the Worshipful Company of Engineers, may it flourish Root and Branch for ever.

Submission for the Hawley Award
A Driver Advisory Tool to Reduce Fuel Consumption in Light Commercial Vehicles by Christopher Vagg

INTRODUCTION

One of the most important factors influencing fuel consumption is driver behaviour, and suitable driver training in eco-driving techniques has been shown to reduce fuel consumption by 10% on average. However the effects of this training can be short-lived as drivers tend to slip back into old habits; this can be addressed by continuous monitoring of driver behaviour. This report presents a driver advisory tool which encourages eco-driving, and its evaluation in the field. The system, developed by the University of Bath and Ashwoods Automotive Ltd, is aimed at fleet operators of light commercial vehicles. A device which can be retrofitted to vehicles to save fuel has the potential to reduce vehicle CO_2 emissions and save money, therefore making commercial sense. The Author was responsible for the design of system logic, and the device is currently commercially available through Ashwoods Automotive.

DEVELOPMENT

The logic for the system was developed in the Matlab/Simulink environment, using Real-Time Workshop to build automatically generated C code. By considering the Inertial Power Surrogate (speed times acceleration) the core algorithm is able to identify

behaviour which is likely to increase fuel consumption. A moving of average of the Inertial Power Surrogate (IPS) is fed back to the driver via a series of LEDs mounted inside the instrument cluster, and this signal is used to assess driver behaviour. Three thresholds are in place such that the level of IPS triggers two audible Warnings before a Violation is finally issued.

As well as considering inertial power, the algorithm also enforces the advice of the Gear Shift Indicator (GSI) to encourage earlier upshifting behaviour. Since many modern vehicles are equipped with GSIs the vehicle's own gear shift signal was used where available. For vehicles where a gear shift signal was not available a simple GSI was implemented. The advice of either gear shift signal is conveyed by a light, as well as a short beep when the light activates, which triggers warnings if ignored. Fuel saving is therefore encouraged by reducing the power demand and by operating the engine in a more efficient region. Visual feedback is augmented by audible warnings, which avoids the need for the driver to concentrate on the display. Reports on driver performance are made available to the fleet manager so that safe, fuel efficient driving can be encouraged.

RESULTS

Trials of the system ran for 4 weeks, comprising 2 weeks of baseline data collection followed by 2 weeks with the system active. During the baseline phase the device acted purely as a data logger. At the start of the second (active) phase each driver was briefly familiarised with the display and the key features of the system, but no eco-driving training was given. The trials included 15 vehicles from 7 companies, and covered a total of 39 300 km during more than 1 100 hours of real world driving. In general these companies were operators of large fleets of light commercial vehicles in urban environments, typically providing delivery or technical support services.

Values for several key parameters with and without the system fitted are shown in Table 1. These values are the weighted averages for the 15 vans and so account for their differing levels of use, therefore representing the changes that would be expected in a large population of vehicles. The key finding is that the introduction of the system corresponds to a reduction in fuel use of 7.6%. It is also noteworthy that average throttle position and engine speed have reduced considerably. Results also show a considerable range in savings between drivers, with the maximum being 12%.

Table 1 – Average values for several key vehicle parameters during the trial, weighted by vehicle usage.

	Average Fuel Cons (L/100km)	Throttle Position (%)	ω_{engine} (rpm)	Engine Load (%)
Baseline	9.7	17.5	1575	36.7
Live	8.9	15.5	1412	39.6
% Change	-7.6	-10.9	-10.4	+8.1

Figure 1 is a histogram comparing engine speed probability density with and without the device; the idle condition has been removed for clarity. The change in driver behaviour is striking – with the system fitted the driver spends significantly more time at lower engine speeds, upshifting earlier.

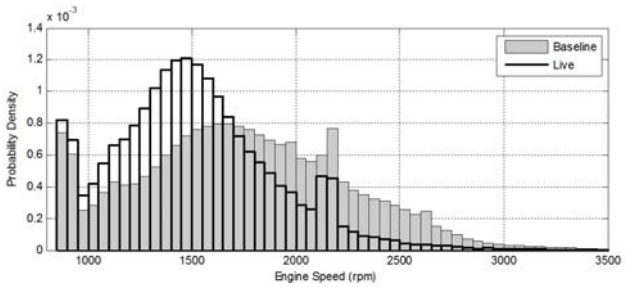


Figure 1 – Engine speed probability density before and after the device was activated. Note the considerable shift towards lower engine speeds when the device is active.

CONCLUSION

This report has presented the development and evaluation of a driver assistance system to facilitate a reduction in fuel consumption. When applied to a test fleet of 15 light commercial vehicles the fuel consumption of the fleet was reduced by 7.6%. These savings were achieved by enforcing the advice of a GSI, thereby reducing the average engine speed, and by encouraging drivers to accelerate more gently. The device presented here is relatively simple, allowing easy integration into vehicles (through the CAN-bus) without the need for dedicated sensors. Furthermore the device is safe for real-time use as it does not require the active attention of the driver and adds minimal cognitive loading.

Based on statistics published by the Department for Transport, if the device developed here were fitted only to commercially owned light vans in Great Britain approximately 482 kt CO_2 emissions could be avoided each year. It is also expected that changing driver behaviour would yield financial and environmental benefits from reduced wear and tear on vehicles, as well as a reduction in accidents, though larger scale studies would be required to confirm this.

VISIT TO JCB ACADEMY AND FACTORY, 17th July 2012

A group including the Master David Scahill arrived at an 18th century mill in Staffordshire which originally was one of the Arkwright manufacturing sites and thus reputedly the fourth 'proper' factory in the country. The mill continued to produce textiles until sold by Courtaulds some 20 years ago when it was bought by the JCB construction machinery company as a potential site for light manufacturing. For many reasons this did not materialise and the building stayed in the ownership of JCB waiting for a good use to come about. The good use certainly did come about, and what the group from the Worshipful Company were about to experience will, I am sure, leave its mark for some considerable time to come.

Part of the Old Mill and Part of the New School Building with the River Dove in the foreground which Powers an Archimedes Screw in the Old Mill Race Providing 80% of the Electricity for the School

We had all arrived at the JCB Academy, a University Technical College and a completely new School, designed to take students at the age of 14 to 19 and give them a first class education with an unashamed technical slant. When the previous Government promoted the concept of Academies which would have strong Industrial links Sir Anthony Bamford saw this as a wonderful opportunity to do something of value with this building. Opening its doors to the first intake of students in September 2010 after much planning and negotiating with Government departments, the JCB Academy has now already established itself as a jewel in the educational crown.

The morning began with the principal, Mr Jim Wade, giving us an insight into the general philosophy of the school, which was followed by Bob Pendlebury, who is the retired Technical Director of JCB, giving the group a perspective on the relationship between the

Academy and industry. Bob (left) has been involved with the school since the very beginning and is currently a Governor with a clear enthusiasm for high quality technical training and was thus thoroughly qualified to give this insight. As this first half an hour came to a close we were introduced to our guides for the Academy tour, not as one might expect to be given by a member of staff but by young students of the Academy which is seen as part of their development. What they may have lacked in years was not at all evident as they showed the two groups around the building answering questions with a maturity way beyond their age (just 15) and impressing the groups beyond expectation. The School is supported by many leading companies whose staffs come in part time to mentor and lead practical projects.

What the visiting group experienced for the hour long tour was truly inspirational, the technical equipment, quality of the environment, the overall look and presentation of all the students seen was simply impressive. The usual day worked in the school is more in tune with that which will be found later in their working life thus preparing the student for life in the real world not some imagined world of work. We were taken through IT rooms, science labs, machine shops all with the correct safety equipment easily available and again our superb guides demonstrated an enthusiasm which was totally heart-warming. If they do ultimately move into industry then this country has nothing to fear for the future.

One of the School's Machine Shops

All too soon our visit to school was over and after a quick lunch the group moved less than a mile to the main JCB factory for the afternoon tour to see the famous JCB machines in the many stages of manufacture. The trip began with a short promotional film after which it was difficult not to want to buy a machine.

Some Early Bamford Machines

We were then led by two JCB guides into the 'History of JCB' exhibition, a fascinating and beautifully created walk through the development of the company from the early post war years to today. Although JCB now has manufacturing in many countries including USA, India, China and Europe, it is still very much a British company and proudly displays the sign 'World Headquarters' on its building in Rocester. Coming as it has from a one man concern 67 years ago to what is now one of the foremost manufacturers of construction machinery in the world, and still being a family owned concern, is surely a testament to what can be achieved in this country.

A Traditional Work Horse

The afternoon continued with a splendid walk through the manufacturing facility (no cameras allowed) where we watched steel being cut, shaped, welded, stress relieved, shot blasted, painted and assembled appearing finally as the immaculate yellow digger so familiar to us all. JCB are rightly proud of the fact that they produce a very large proportion of the parts of the machines they sell, including their own engines and transmissions.

Dancing Machines

Another First For The UK
The World Land Speed Record for a Diesel Engine

The day concluded with a group of tired but thoroughly stimulated Liverymen who had seen an education style which should be spread the length and breadth of the UK and a British manufacturer doing it right, taking on the world and winning and the offer of a delicious cream tea.

Ian Morris

ANNUAL GOLF DAY BEACONSFIELD GOLF CLUB 24th July 2012

Engineers' Golf Day 2012 (or the Mystery of the Shoes)

Tuesday 17th July, one week before the Company golf day, the rain is teeming down solidly all day. Even the hardiest golfer would have trouble enjoying a round today. Players landing in bunkers would more likely need a snorkel than a sand wedge. Say a little prayer for a week hence.

The Club House from the 18th Fairway

Tuesday 24th July – the power of a wee prayer! Dawns a glorious day for golf with temperatures forecast to top 28 degrees centigrade, (82 in old money). In fact it actually exceeded the forecast maximum. 24 intrepid golfers arrived for bacon rolls and coffee before taking on the challenges of the Beaconsfield course. The course was in beautiful condition and quite lush from the rain over the previous weeks. As many of us discovered, this made escaping the rough a real challenge. The first group of 3 teed off at 10.45 with others following at 8 minute intervals. With admirable engineering precision every group teed off either on, or slightly ahead of time.

Enjoying an Early Dinner

The heat was undoubtedly a factor for many players and most completed their rounds looking quite tired. Phillip Edwards was taken ill with heat exhaustion part way through his round and had to be taken off to hospital. Fortunately the news came through while we were at dinner that he had recovered and was not expected to suffer any long term effects.

The golfers were re-joined for dinner and the prize giving by the Day Tourers. In the absence of the Master, who had unfortunately to travel to Canada at short notice because of the death of his brother, the prizes were presented by Senior Warden (and organiser of the day) Graham Skinner. Some very creditable scores were achieved in these draining conditions with a top score of 35 Stableford points off 7/8 handicap.

Senior Warden Graham Skinner with Overall and Guest Winner John Wood

This score won the Men's first prize for guest John Wood, with the second prize taken by fellow guest and Beaconsfield member, Peter Mayer with 30 points. The first Lady was Sylvia Price with 31 points. Alan Grant won Nearest the Pin in 1 Shot on the par 3 7th hole with John Ferrie taking the honours in Nearest the Pin in 3 Shots on the par 5 17th. The competition for the WCE Trophy was very close and with both Graham Skinner and John Huffell scoring 30 points, the decision went to a count back and the winner was John Huffell.

Graham Skinner and Liverymen Winner John Huffell

All in all it was an excellent golf day with most players indicating their enthusiasm for returning for next year's event.

And the mystery of the shoes…? Liveryman Alec Osborne having completed his round, showered and changed was to be found in the locker room searching for his shoes. The locker room was turned upside down; Alec rather bemusedly even checked his car, although he knew he had not changed his shoes there, but to no avail. The combined problem solving prowess of eminent engineers was brought to bear and it was deduced that Alec's shoes had been

inadvertently collected with Phillip Edwards' belongings and taken off to hospital. A temporary solution was found with the loan of a pair of shoes from the Beaconsfield Golf Club lost property cupboard, allowing Alec to attend dinner and the presentation. The assumption on the whereabouts of the footwear proved to be correct and Alec was reunited with his own shoes later that evening.

Iain Sturrock

Visit to Milton's Cottage and Clivedon

Margaret Skinner organised our day which began with a visit to John Milton's cottage in the picturesque village of Chalfont St Giles. The cottage is the only remaining residence of Milton and was purchased in 1887 as a memorial to this great political thinker. He lived in it for only a short time to escape from The Plague but it was where he completed Paradise Lost. We were treated to a guided tour of the cottage which is now a museum containing many tributes, artefacts paintings and portraits. Milton's study contains a valuable collection of books including first editions of Paradise Lost and Paradise Regained and their translations into 20 foreign languages.

Milton's Cottage

We spent time discovering more interesting facts about Milton before exploring the delightful garden which is stocked with many of the plants and herbs mentioned in his poetry. It is well worth a visit if you are in the vicinity.

We then drove to Cliveden, a National Trust property overlooking the River Thames. The house which was built in 1606 is used as a hotel but the grounds are extensive and varied. We chatted over lunch before dividing into three groups to explore the gardens. The Parterre was planted with red, white and blue flowers and looked amazing from the terrace.

Cliveden Gardens and Rudbeckia Tiger's Eye

A walk down to view the river and visit the long garden which was a mass of golden orange Tigers Eye Rudbeckia with purple centres which were stunning. Others enjoyed a film of the history of Cliveden and a visit to the shop. Finally we met for a cup of tea before returning to The Golf Club to join the players for dinner.

Dixie Bayly

VISIT TO THE HYDRAULIC ACCUMULATOR AND LIMEHOUSE BASIN 15th August 2012

The informal evening event on 15th August 2012 combined broad technical interest with a pleasant amble around the Limehouse Basin, giving the 29 attendees time to chat and then to carry on with the conversations over supper at a pub with a panoramic view across the Thames.

The Start of the Tour at Limehouse Basin

Our principal guide, Jeremy Batch, with a degree in Mechanical Engineering followed by a career in publishing, has a great interest in the history of the Limehouse Basin. The walk around the basin was fascinating in its industrial history. The Victorian railway viaduct designed by John Rennie and engineered by George and Robert Stevenson and G P Bidder, now carrying the London Docklands Light Railway was not a bad starting point! From the Regent's Canal, the tour carried on anti-clockwise around the basin to take in, to mention a few particular items, a view of the mosaic on the West end of the Limehouse tunnel, the operation of the swing-bridge, the Dockmaster's House (now The Narrow to which we would repair for supper), the Cruising Association building, and the replica of original River Lee lock. From there, the fine architecture of Hawksmoor's St Anne's Church could not be overlooked, and the fact that Captains of boats were required to register births marriages and deaths at the church caused some comment. The statue of Christ, high on the brick-built Catholic Church, was an interesting point of contrast.

The culmination of the technical part was visit to the rather handsome Victorian building housing a Hydraulic Accumulator. Its purpose was to store energy by means of water acting under pressure on a piston to raise a very large weight vertically, so that the potential energy could be drawn on when necessary. Accumulators were incorporated in the networks of pipes used by the London Hydraulic Power Company to carry water at 700psi under the streets of London to operate cranes in the Docks and lifts in buildings in Central London, including the IMechE.

To digress slightly, my interest in it started through the Institution of Mechanical Engineers in the 1970's. A technical group, which I chaired for a few years, was very active in promoting R & D in Fluid Power. In the 60's and 70's water at much higher pressure was in use as a working fluid for safety reasons in the mining industry. The Joseph Bramah medal was established for services to the industry.

The Hydraulic Accumulator Building

In 1977 the following notice appeared in the main lift of the Institution of Mechanical Engineers

'CURTAILMENT OF LIFT SERVICES
The London Hydraulic Power Company, having expressed their intention to put the company into liquidation, gave us three months' notice of their decision to cease the supply in this area of London. Consequently, the lift has had to be taken out of use'.

Bramah embodied a proposal for hydraulic power networks in one of his last patents in 1812. The first realization was Hull in 1877 by E B Ellington, who then went on to establish the London Hydraulic Power Company in 1884. One of the original pumping stations is now a restaurant in Wapping, where we live.

An interesting IMechE paper of 1898 compared the operating efficiency of power distribution by the Company and the Westminster Electrical Supply Company. The cost at the Wapping hydraulic pumping station, (expressed as a unit of electricity) was 0.640 pence, whilst that of the Davies Street electrical station was 1.340 pence. The lower cost was attributed to the energy storage of the accumulators smoothing out demand on the steam engines, which could then run at optimum load. Perhaps we should bring them back into operation near wind farms!

Prior to the visit, David Cooper kindly sent me a copy of a 2004 paper by Ralph Turvey for the Newcomen Society on London Lifts and Hydraulic Power. It gives a fascinating insight into the tremendous variety of energy provision and distribution at the time, and

competition between the many providers of power. The niche for high-pressure water distribution was quite clearly where the demand was intermittent.

The Accumulator was opened specially for our visit. Charles Norrie from the Greater London Industrial Archeological Society, who had given additional information during the walk around, introduced the Accumulator and its role in the LHPC network.

A section of the cast iron pipes used to transmit the power, which is viewable through a glass panel, led to a highly technical discussion and mental arithmetic to estimate the likely wall thickness, amply demonstrating that Liverymen were not just attending for the supper.

Keith Foster, The Master and Jeremy Batch with their Clothes Pegs for Entry

After the pause for debate, the intrepid were invited to brave the entry into the accumulator to climb the internal stairs. A practical restriction allowed only ten people to be inside at any one time. The clothes peg being worn by the Master is not for the purpose of hanging out washing at the top, but the 'token' to be handed in on return. He still has a few months to go, so particular care was taken not to leave him behind!

Jeremy greeted the climbers on the top platform, by which time the blustery wind had subsided and the sun appeared. The 360^{O} view of a London skyline was full of interest. It is a view that combines a sight of marvelous historical engineering achievements, with a sense of the energy of modern architecture and modern engineering developments, viz the railway viaduct and the Docklands Light Railway trains, the Dome and the terminal for the cable car from Greenwich.

The visit finished with informal dining at The Narrow, where the party split into convivial table-groups. The fine weather, where sun set on the sweep of the Thames illuminated by the countless lights and reflections, was a wonderful end to the evening.

The Docklands Light Railway

The Former Dockmaster's House, now The Narrow

Contributions at the end enabled cheques to be given to Jeremy Batch for the local Pirate Castle Charity and to Charles Norrie for GLIAS for the Canal Museum.

Keith Foster

VISIT TO RNLI HEADQUARTERS POOLE 1st September 2012

Thirty two of us paid a memorable visit to the RNLI Headquarters, staying at the College with its splendid facilities and fine views over Upton Lake. We were impressed by the new Bridge at the entrance to the lake, designed as twin sails, which when partially open formed an elegant cross before becoming vertical allowing boats to pass.

The New Bridge Opening to let Boats out on the Morning Tide

Our day started with coffee in the Harbour View Suite

followed by a briefing from Emeritus Court Assistant Malcolm Vincent (left wearing an RNLI tie spelling courage). It soon became apparent that the RNLI is a remarkable and very professional organisation with 1300 permanent staff, 4400 volunteer life savers and 44,000 volunteers involved in fundraising and other activities The RNLI was formed in 1824 by Sir William Hillary as a national umbrella covering the UK and the Republic of Ireland, comprising 19,000miles of coast line. Its original purpose was to save lives from shipwrecks, but its role has changed over time and has recently taken responsibility for Lifeguard and Flood Rescue services. Annual Income last year was £162.9m almost entirely from voluntary donations (The UK government contribution is 2%) with capital expenditure of £31.8m

The sea rescue service has 235 lifeboat stations with 330 lifeboats and seven hovercraft. It provides 24/7 coverage and speed of response is vital, the aim being to launch a boat within 10 minutes of a call and to reach any incident within a 10 mile radius within 30 minutes. Lifeboats made 8905 launches in 2011 and saved 354 lives. The Lifeguard service now covers 169 beaches and aims to cover 300 beaches in due course. Last year the Lifeguard service dealt with 15,625 incidents and saved 84 lives.

Glen Mullen, a leader and trainer in Flood Rescue gave a fascinating talk. The RNLI has often been involved in flood rescue but following experience in Mozambique in 2000, the Flood Rescue team was formed and now has six divisional teams strategically positioned to respond to a flood anywhere in the UK or the RoI within 6 hours. It has a total of 285 team members, fifty of whom form the international Flood Rescue Team who can deploy anywhere in the world within 24 hours. Each team has two boats, a rescue van and a Land Rover, as well as all ancillary equipment to allow the team to operate self sufficiently for 48 hours, such as an operational base gazebo, electric generators, food, refreshments, scene lighting and maintenance equipment.

RNLI College with an External Platform to view the Wave Pool

Their skill was very evident in the Cockermouth floods in Cumbria. The team, led by Glen Mullen travelled from Poole (a journey of six hours) to experience water flowing at up to 25knots, about the same maximum speed as a boat, making navigation difficult. When evacuating people from houses, they learned that it was important to get the pets out first and then the owners would follow. In this disaster 50 lives were saved by the Air Sea Rescue service by helicopter and 150 by the RNLI in boats.

Metre High Waves in the Wave Pool

The College carries out training for all the volunteer rescue personnel. We spent some time in the lifeboat simulator each taking turns at the controls in a very realistic environment. The lifeboat was off the white cliffs of Dover where a merchant ship had caught fire, the crew had abandoned ship and were adrift in the sea. The task was to rescue them in various sea states

up to force eight! The training school also has the Survival Centre where, in the wave pool, complete darkness, thunder, lightning, and helicopter recovery can all be simulated to very real effect. The pool also hosts the capsize training element of the course.

Part of the Boatyard

David Brooke, the RNLI Engineering and Supply Director, conducted us round the boat yard to view the various types of all weather and inshore boats. The RNLI has a team of 60 engineers for boat design and it is planned to build their boats at Poole, in a new facility with a capacity of six boats a year, as the capability elsewhere in the UK is gradually disappearing. There are currently five classes of all weather boat, all named after rivers. The Tamar is the latest design which entered service in 2006 and is fitted with an integrated electronic Systems and Information Management System (SIMS) so that the crew can monitor, operate and control many of the boat's systems directly from their shock-mitigating seats, improving their safety. The Hull is made from fibre-reinforced composite with a single-skin section below the chine and 100mm thick foam-cored sandwich above. The deck and superstructure comprises a 25mm foam-cored sandwich. Two engines each produce 1000 hp driving propellers and a hydraulically powered bow thruster to improve manoeuvrability. It will ultimately replace the Tyne as part of a plan to reduce the fleet to three classes of boat.

Severn Class Lifeboat

There are currently five classes of inshore boat with speeds of up to 40 Knots. In addition the RNLI has four hovercraft in operation and three in reserve. Reserve vessels of all types are held at strategic locations to ensure quick replacement when an operational vessel is out of action. The RNLI operates a large logistics operation out of a warehouse in Poole that can supply anything from a spare engine for a lifeboat to Christmas cards.

Following a most enjoyable day we had an equally enjoyable dinner in the Harbour View Suite accompanied by guests from the RNLI. Our warmest thanks go to Malcolm and Linda Vincent for arranging the visit and for their hospitality throughout the weekend.

Phil Ruffles

VISIT TO BASEL
20th to 23rd September 2012

For the second year in succession the largest number of Liverymen and their guest since 1999 gathered for an Out of Town meeting at a Radisson Blu hotel, this time in Basel, Switzerland. Some of us came on from elsewhere in Europe by car and squeezed into the small car park below the hotel. Others came by plane or train but all were greeted on arrival by the Master and Gill and presented with a welcome pack giving even more information as well as some scrumptious Swiss biscuits and Basel rock sweets.

The highlight of the technical programme was the excellent visit to CERN where, unusually, for a research establishment we had very free access. Unfortunately Shirley French fell and broke her hip during the visit but both she and Cecil were very well looked after by Mick Storr, Head of CERN's Visit Service, and Cecil was able to enjoy several additional visits about which he has written in a postscript.

Basel being close to the Swiss borders with Germany and France we were able to enjoy the culture, food and wine of all three countries.

Raymond Cousins

Dinner at Inzlinger Wasserschloss

This marvellous 'out –of- town' trip to Basel kicked off with quite a gastronomic experience in an amazing restaurant just over the border in Germany at a place called Inzingler, the restaurant itself called the Inzingler Wasserschloss. The dress code was lounge suits and 'posh frocks' and personally we started the evening with a glass of the fizzy stuff at our hotel, The Radisson Blu, Basel. We left in the early evening in two coaches to cross the border into Germany,

passports taken but not required at the border, and arrived, in what seemed to be no time at all, at the very beautiful Schloss. If you can imagine a typical German white washed manor house dating in its present form to circa 1500, surrounded by a moat with a wooden bridge leading in, you probably have a pretty accurate picture. However, now set that vision in amongst well manicured parkland on a lovely autumn evening and you could almost be there with us.

The Wasserschloss

For those interested in its history, the manor, called Inzingler Castle was built as a hunting lodge for the Bishops of Basel and in 1533 it was owned by the von Reichenstein family. It spent some time in the ownership of the Basel side of that family, until it was sold to a local family called Saner in 1875. It was purchased in 1969, by the local community and renovated, and this renovation was completed in 1978, when the current owners, the family Beha turned it into a centre of gastronomy, which they seem to have done very well by combining this in conjunction with the manor's traditional ambiance.

The Inner Quadrangle of the Wasserschloss

We started the evening with a glass of very pleasant sparkling dry German wine in the grounds surrounding the house. As dusk began to set in we withdrew to the Manor to sit down to dine. The Manor itself had an inner courtyard open to the sky in a quadrangle format with cobbled ground, and rooms leading off. Because of our numbers we were split into two groups, and each group had its own private dining room, called the Nepomuk rooms. Both rooms beautifully restored and although very elegant, they felt warm and welcoming. Grace was given and dinner served. The food was superb, Grilled Halibut with a lemon crust to start with, accompanied by a white Pinot Blanc, and then followed by a Braised Rib Eye steak in red wine sauce with savoy cabbage, potato dumplings and accompanied by a well selected Pinot Noir. A traditional German Apple Cake followed with vanilla ice cream and vanilla sauce.

We left the venue at 10.30pm by coach and arrived back at our hotel by only a little later than 11pm, some of us choosing to take a brief nightcap before retiring for the start of our adventures the following day to CERN or on the Erasmus walking and Rhine boat trip.

Alan and Karen Bozeat

Visit to CERN

"Where do we come from? What are we made of? Where are we going?" These are the questions mankind has been asking since we have had the ability to reason, and physicists and engineers at the European Centre for Nuclear Research (CERN) are trying to provide the answers. Their latest tool in this quest, the Large Hadron Collider, is the largest and most powerful particle accelerator ever built. It began operation in 2009 has become internationally famous and is said to be the largest machine ever built. It was therefore an opportunity too good to miss to incorporate a visit to see the LHC at CERN in our programme for the 2012 Out of Town Event. It was such a big draw that two coach-loads of Out of Towners were prepared to set off at 7:45am on a six hour round trip from Basel to Geneva.

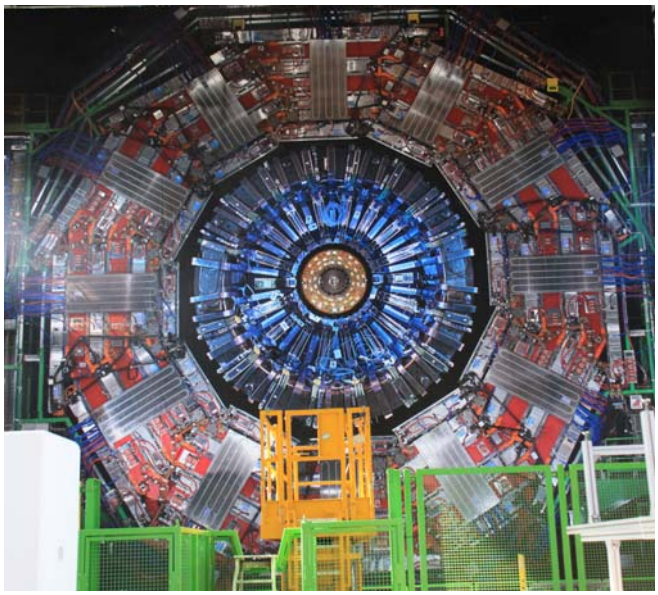
25 Tonne Gargamelle Bubble Chamber, One of Many Exhibits in the CERN Garden

On arrival, we were treated to an excellent lunch in the staff restaurant before being welcomed into the main auditorium for an explanation of the work or CERN and, importantly, their outreach programme. Everything they do at CERN is published freely and they have a mission, as well as answering fundamental questions, to inspire the next generation of physicist and physics teachers. Our host was Mick Storr who heads the outreach programme and has the distinction of once sharing an office with Tim Berners-Lee, the inventor of the Internet and another CERN scientist.

Mick (left) told us that CERN has a budget of CHF1Bn per year – equivalent to a medium sized European university – and is supported by 20 European states.

We were then taken to see various parts of the CERN facility, guided by scientists and engineers who are engaged in the experiments themselves. A degree in physics would have been useful to understand the explanations so for those (like me) who didn't quite get the whole thing at the time, here's my simple (I hope) explanation (correct, I hope) of what the LHC is, how it works, what they are looking for and why.

The objective of the LHC is to accelerate two streams of protons (positively charged particles that are found in the nuclei of atoms) to close to the speed of light and then encourage them to run head-on into each other. Other particles are expected to be formed as a result of these collisions including, they hope, the famous "Higgs Boson" and to detect those particles when they are formed. So how do you accelerate a charged particle? Easy – putting it in an electric field will give it a shove – but to get it moving fast enough for the kind of collisions they need requires a lot of shoves so they are sent round in a circle and put through the electric field repeatedly, rather as a hammer thrower builds up speed in the hammer by spinning round several times. In the LHC, two beams of protons move in opposite directions in concentric tubes 27km in circumference, buried under the Swiss and French countryside and they actually go round billions of times. How do you make them move in a circle? Electrical engineers will remember that a charged particle moving in a magnetic field experiences a sideways force, so if giant electromagnets are placed around the tubes they can produce the inward force that keeps the protons moving in a circle rather as the hammer thrower pulls on the hammer until it's time to let go. But these protons are travelling at great speed so it needs a powerful magnetic field to turn the protons by a small amount, hence the electromagnets have superconducting coils and the circle is 27km in circumference



At the CMS Site

To get the beams to collide, they steer them towards each other and focus them down so each is the thickness of a human hair. Even then, the chance of collision is small but there are so many of them that they get about 600 million collisions per second. At full speed, each proton has about the same energy as a flying mosquito, which doesn't sound like very much, but considering the proton is a billion billion times smaller than the mosquito, that's quite a punch.

The detector, called a Compact Muon Solenoid (CMS) comprises some more electromagnets that are wrapped around the point of collision and which cause the particles formed to travel in spirals in a solid-state detector. The traces formed allow the physicists to calculate the energy of the particles produced and they then try to match the energies of those particles to the energies of particles that theory predicts should exist. If they get a match, that's a piece of evidence that the theory is correct. If not, then that's equally interesting (to a physicist, anyway). And the one they are looking for is the famous "Higgs Boson".

Our party was able to go underground to see (or at least get close to) the point of collision and the CMS. We were just in time because the area was about to be

closed off for several months to allow the experiments to continue. We were also able to visit the control room and we had an explanation of the work from Dr Lyn Evans (below) who is LHC project leader.

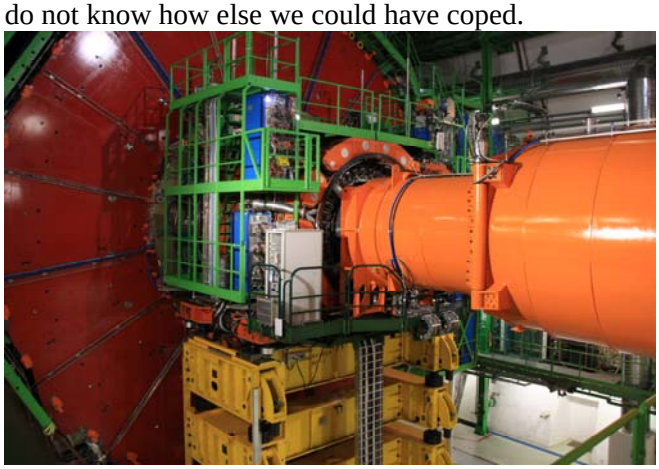
Why are they so keen to find the Higgs Boson? To answer the question of why particles have mass and some particles have more mass than others. To us it seems obvious from our everyday experience that all objects have mass but physicists are trying to find out how they get that mass. Theory (proposed by Peter Higgs in the 1960s) suggests that particles have mass through their interaction with the Higgs Field, the more interaction, the greater the mass. And that Higgs Field is like of syrupy liquid made of Higgs Bosons rather as water molecules fill a tank of water. Theory says what mass (energy) the Higgs Boson should have – and it's a lot by particle physics standards, hence the need for such a powerful machine to generate the collisions.

So have they found it? They are almost certain they have. They have found a particle with the right mass but they need now to confirm that it's "spin" (another particle property) is zero, as it almost certainly is. By the end of 2012 they expect to have an answer. If that's so, a significant piece of evidence that the current theories of how the universe works are correct will have been found. That will allow physicists to answer some deep questions about the origin of the universe, what happened before the "big bang" and whether multiple universes exist. And we'll be a good step forward in understanding where we come from, what we are made of and where we are going. But they won't be able to tell us "why" creation was made that way. For an answer to that, we'll have to ask the Chaplain.

Chris Elston

Postscript to the CERN Visit

Following Shirley's accident when she fell and fractured her hip, I remained in Geneva for an additional week before she was well enough to return home. During this time we were overwhelmed by the kindness shown to us by many members of the Company and also by Mick Storr and his many colleagues at CERN. I hope that the Editor of the Swordsman will allow me to mention in particular Graham and Raymond for arranging for our room at the Hotel in Basel to be cleared and for then driving the 200 miles or so to Geneva with our belongings. I do not know how else we could have coped.



Underground close to the CMS Collision Site

Mick Storr was keen that I should take the maximum opportunity of my time to tour Geneva but also to see much more of the work at CERN. I found the engineering which underpins the particle physics experiments particularly impressive. The 1232 superconductivity Dipole magnets for example which guide the beams are each fifteen metres long and weigh thirty five tons. They operate at 1.9 degrees Kelvin and carry a current of 11,850 amps. It was of course at an electrical junction in one of these that a fault occurred about two years ago. Imagine testing all the junctions in all the magnets, removing faulty magnets and replacing them in the tunnel! No wonder it took eighteen months. I found the magnet test facility very impressive as was the detailed engineering shown in a sectioned magnet

The results from the LHC require very large computing power. Tim Berners Lee was of course working at CERN when he invented the World Wide Web. The CERN Computing Centre with its 40,000 or so PC cores is unable to handle all the data and so is ganged into the "GRID" involving computing centres from all over the World. Would you like to join in with your PC? If so you must promise not to switch it off!

CERN, as a part of their education programme, receive parties of Physics teachers from all over the world, to inspire them and hence their students with a love of physics. We discussed the possibility of organising something similar with an emphasis on engineering; if it is possible to identify cohorts of teachers who might influence potential engineers. This is a thought which I have passed to the Royal Academy of Engineering.

Cecil French

Erasmus Tour of Basel

We had two groups, two guides, two tours, two versions of the history of Erasmus and Basel! Both, no doubt, contain some correct elements of the history. Here is one.

Inside Basel Cathedral

Erasmus of Rotterdam was a 16th century theologian and intellectual of huge reputation who travelled Europe (including 5 years in Cambridge University) and spent his early and latter life in Basel so he could mix with intellectuals of the University and where he was able to have printed his prolific number of books, including his version of the New Testament. He, a catholic, is buried in the protestant Basel Cathedral. He was originally interned at the front of the church but a parishioner complained that he could not concentrate with a catholic nearby so he was moved! More recent exhumation found several bodies in his grave. They chose the one who looked like his portrait but later found that this body had syphilis. Thus, to protect his reputation, it was decided that it could not be him so they chose another body. In taking a picture of the skeleton the cameraman dropped his camera and smashed the skull to pieces so all that remains is the body!

The Red Town Hall and Market

On the way to the ancient cathedral (one) tour passed many places. We saw Erasmus's birthplace, a fountain made of moving, discarded parts by the 20th C. artist Tinguely, and at the Fine Art Gallery saw a most moving statue by Rodin of 'The Burghers of Calais', who were awaiting execution with great expressions of concern. We were shown the buildings where individual 'guilds', like ours, have held their meetings for 600 years and the 15th C. University hall where we saw pictures of past members of the University such as Euler. At the wonderful, red, 16th C. Town Hall we saw an aspect of Swiss humour in a painting of the universe with hell illustrated, not surprisingly with a gambler and prostitute but also, cheekily, a nun and the Pope eyeing a naked woman. The tour learnt that the Swiss have always been prudish. A statue of a kilted Roman general had underwear added – they never wore such items as every self-respecting kilt wearer knows!

The Courtyard of Basel Town Hall and the Statue of the Roman General

The tours ended with a relaxing lunch aboard a river cruiser. The highlight for some were the topless sunbathers on the river's edge but for most the meal, the views and the Company made the tour most memorable. Some continued the culinary delights of Basel with high tea at Les Trois Rois.

Ken Gray

Dinner at the Radisson Blu

Those who sat down for dinner in the dining room of the Radisson Blu on Friday evening included those who went to CERN, the CERNites, and those who had stayed in Basel, the Baslers.

The CERNites arrived back at the hotel just before 8.30 pm weary and tired but desperate for a long drink after scaling the intellectual heights of considering the nature of matter (or was it plumbing the depths?). The CERNites could only guess that the Baslers had taken advantage of the hotel's spa facilities and were

contemplating the tension between free will and predestination and Erasmus' contribution to the renaissance.

Within minutes of alighting from the coaches the CERNites were queuing up for pre dinner drinks and keen to sit down for dinner!

The tables were set for a fondue which arrived after a very tasty salad. The fondue bubbled and glooped away while conversation buzzed with comparing notes of the day's event until.....

Conversation was interrupted, not by a romantic fiddle or guitar, but a full frontal assault from a drum and fife band. The band was comprised of musicians made of very strange matter! Had Halloween come early? Led by a drummer who was having a bad hair day and a nose that doubled as a baton we were regaled by renditions of 'the British Grenadiers' and Men of Harlech'.

A Sweet Serenade after a Long Day

Two more courses after the fondue and the conversation had not abated. It was the end of a long day. No speeches, no ceremony and casual attire but very much a Company dinner.

As we slipped away back to our beds how many of us fell to sleep knowing we had all had a special day?

Raymond Joyce

(From 4am on the first Monday in Lent each year, until 4am on the following Thursday many piccolo and drum bands, wander the streets playing the sort of music experienced at supper and dressed in similar manner. Fastnacht celebrates the removal of Catholicism in Basel. The event is accompanied by continuously available food and drink and expected Swiss reserve. Ed)

Vintage Tram Tour of Basel

All Aboard! This was the cry from the members of our Livery Company as two vintage trams arrived with Swiss timeliness at the tram stop immediately opposite our hotel. Built in the 1920s, but well maintained, they made ideal vehicles for our tour of this mainly modern city. Yet, there were some historic surprises, underlining Basel's long history at this Swiss-Franco-German crossroads.

The city sits astride a seismic fault line. In 1356 it suffered one of Central Europe's worst ever earthquakes and it was flattened. Buildings are now designed and constructed with the structural integrity suitable for such conditions.

All Aboard the Vintage Tram

Once underway, as tram wheels rattled on steel rails, we took the gentle slope that led to the main Market square, Barfusser Platz, passing the modern Kunsthalle theatre with its broad plaza leading up to the theatre and featuring a Jean Tinguely fountain. Some of those mechanically minded returned on foot to study its artistic intricacies. The square is a tram junction and is overlooked by the Historisches Museum. Our journey continued into the Fish market although there was no market on this particular Saturday morning. Overlooking this area is the large Basel Munster, originally a convent and now a protestant cathedral. Many of the group were to return there on the Sunday morning for a church service.

Between the mainly modern buildings we caught our first sight on the tour of the Rhine. Our guide explained that the large gaps between blocks of buildings are there to give easy access to the river in the event of a fire and are the requirements are enshrined in the city's planning laws.

The tram made its way along Falknerstrasse and as we approached the next market square the dominant Town Hall appeared. It is over 500 years old and has striking red brick walls. A little further along there were also the remains of the city wall, little of which still stands.

The tram shortly took a right turn to cross the Johannniterbrucke Bridge spanning a fast flowing Rhine. We passed offices of Novartis, some still badged as Sandoz and Ciba Geigy, which merged into

Novartis in 1996. It is the chemical and pharmaceutical industries that are at the heart of the Basel economic engine. Our guide said 30,000 commuters come across the border to work in Basel every day. They say the ideal is to work in the city and live in France, where it is much cheaper.

As we made our way along the other side of the river the guide left our carriage to join the rear one following appeals from its Livery passengers. All was not lost, as the trams recrossed the river via the Wettsteinbrucke Bridge, to retrace its rails for much of the return journey, before coming to a stop a short distance from the Paper Mill Museum. Those with umbrellas were well served, as we made our way to the shelter of the museum, on a very wet Saturday morning.

The Editor Could Not Possibly Comment

Before leaving the tram four recorded their journey together, suitably headlined.

Keith Millard

Basel Papiermühle Museum

It is called the "Paper Museum", but that is an inadequate misnomer. It is really a museum of paper, writing, printing and bookbinding.

Twelve water driven corn mills began in the area in the mid 12th century, when the monastery of St Alban built a canal to carry water to drive them. During the late Middle Ages ten were converted to paper mills to satisfy the needs of The Church and its Synods, making the area the most important paper producer in Switzerland. Since 1980 the Stregreif and Galiciean mills have housed the museum.

Until 1428 the Galiciean mill was a corn mill owned by the Klingental monastery. It then became a hammer mill until Antonious Galican made it into a paper mill in 1453. The Galican family was prosperous, witness the fine rooms on the first floor. Political changes in 1521 brought this to a sudden end. The Thuring family became the owners and developers of the paper mill. In 1778, bookseller and publisher Johann Christof Im Hof-Burckhardt (obviously more distinguished than his contemporary, simple John Smith) took it over and in 1788 replaced the manufacturing part facing the canal with the present two story building. A major change occurred in 1850 when it was all acquired by the Hugo Brothers, tobacco manufacturers, and from 1857 it was a warehouse for 123 years, until, guess when, 1980.

Our visit on the Saturday morning of the Basel OOT Meeting was timely as it accompanied one of the few spells of rain in the whole weekend. We were escorted and shown many fascinating exhibits by Katrina, one of the most knowledgeable and enthusiastic guides it has been our pleasure to follow.

Withdrawing the Frame from the Pulp

Several of our party was persuaded to practice the arts on display. The Master was one who made paper by the old traditional method of scooping a thin "sheet" of a weak solution of mainly pulped rags into a mould, draining off the surplus and delicately rolling it on to a piece of felt in a stack with others, to be pressed and dried. Later he printed on to his own paper. He might show you his if you want to show him yours.

Is That Enough?

Before this technology, writing was on papyrus, the cheap Egyptian medium. Indeed, "paper" and "papyrus" have etymological kinship. In Europe, parchment, from untanned animal skins, was used for important documents: it still is!

Paper was made of rags from old clothes and other material. They were heavily diluted, soaked and beaten to a pulp by the stamping machine, with noisy hammers driven by the mill's water wheel and a heavy camshaft. Noise was not the only hazard of early paper making: with the uncertain sources of the raw material, anthrax was not unknown!

Tools for making Paper Fabric 'Tapa' from Plants

From about 100 AD, the Chinese used similar paper making methods. The Nepalese still do.

We also saw a sequence of later paper making technology and machines over the centuries. The Industrial Revolution spared the labourers the sweat of making individual sheets, it being thence made in endless rolls by machine. Nicolas-Louis Robert developed the first such machine in 1799. We saw a similar reproduction machine built in 1964. This was eclipsed by a British machine by Bryan Donkin (1804). From about 1840 wood became the main raw material, to be joined by cellulose from about 1854.

There is a view that writing was the other great achievement by mankind, with the wheel (but here some would argue for the axle). The Basler museum displays outline the story of writing from its origins to the printing press. Many scripts developed round the world, each effectively beginning with picture characters to record the world as seen. Later ideas and concepts were depicted by combining picture characters. Eventually characters cease to represent what is seen or thought, but to mimic the sounds of the language, leading to scripts based on alphabets.

We are all familiar with the concept of expert writers copying valuable books in bad light for a pittance. About 1450 Johannes Gutenberg invented what would lead to their release – the printing press with removable and changeable characters. Throughout Europe by the end of the 15th century books were available to the prosperous and not only to clerics and the nobility. Nothing much changed for 400 years until typesetting machines and high speed printers in the 19th century. In the 1980s lead typesetting was replaced by offset and digital printing. The rest is, yet again, history.

The buildings themselves were well worth several looks, as was their environment, wet as it was.

The weather had no chance to diminish the depth of our experiences in the museum. Its restaurant lunch, while welcome and enjoyable, was an anticlimax.

Embarking onto the Current Driven Ferry

There is a rumour that some of the party did not continue to the Tinguely museum, not because of the damp journey, but to relish the wealth of material to be remembered from the Papiermuhle. I was one of them.

Peter Gray

Tinguely Museum

After the tour of the Papiermühle, those of us who were cast out into the rain of Basel to cross the river to the Tinguely museum on the north bank cast envious eyes at those who were staying in the dry warmth. However, the rain had reduced to a drizzle by the time we reached the museum and the lunch which was being served in the museum's Chez Jeannot restaurant soon restored the spirits.

Two of The Tinguely Exhibits in the Theatre Square

Many of us had seen the Tinguely Fountain at the city's theatre close to the hotel. All manner of gently manic water-agitating machines reside therein. It is wonderful fun and makes one smile but does little to prepare the mind for the collected works of Jean Tinguely. The first impression as one walked into the museum was that Tinguely must have suffered some tortured nightmares inspired by Hieronymus Bosch in his wildest-eyed moments and by Salvidor Dali in his last, creaking arthritic days.

One of the Internal Exhibits

The exhibits, not to damn with faint praise, consist of an eclectic collection and mish-mash of wildly disparate , generally metallic objects interspersed with such items as bovine and ovine skulls atop, plus various inane pieces of flotsam and jetsam. All these are strung, clamped, chained, belted or otherwise set up to create an assortment of perfectly crazy exhibits of all sizes, many of which are powered. The clankings and screechings of metal rubbing and scraping on metal, when the powered exhibits are switched on, made one wonder if it would not be fun to smuggle in a can of WD40 to silence the ear-curling racket.

There is no practical point to any of the exhibits nor anything to touch the aesthetic heart-strings and many thought the whole collection to be a load of old junk (which, of course, it is).

Exhibits in the Gardens

And yet, and yet .... several of us nose-in-the-air types were soon to be seen pressing many red buttons to crank up the daft whirly-gigs, nodders and jumpers; and when they did their stuff, we were reluctantly drawn in to enjoy and laugh at the sheer dilly, off-the-wall, exuberant genius of their creator.

The exhibits of Vladimir Yevgraphovich Tatlin – a Russian and Soviet painter and architect – being hosted by the Tinguely Museum, were so much easier to appreciate - lovely lines and delicious curves.

All in all a very interesting and enjoyable visit to the Tinguely Museum : thank you!

Mike Inkson

National Automobile Museum of France

This museum was created simply as the private collection of the Swiss brothers Hans and Fritz Schlumpf who owned a textile business at Malmerspach about 30 km west from Mulhouse. They accumulated the collection mainly over the twenty years beginning in around 1950, buying individual cars and whole collections on a grand scale. The Schlumpfs bought a disused mill to house their collection. The museum reflects the interests of the brothers who had to please nobody but themselves when building their collection

There is a very fine and comprehensive collection of French cars from the very earliest days through to around 1970 and a very good representation of other European makes.

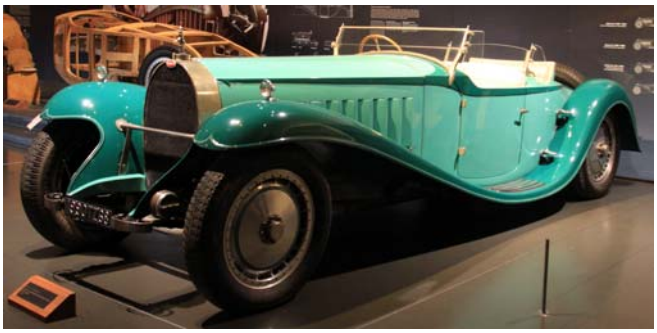
1902 De Dion Bouton

The section containing the very earliest cars is especially interesting. These really are 'horseless carriages' with a great variety of layouts. There was no standardised set of controls in those early times. Some cars had a steering wheel, some had a tiller to steer and all of the other controls were individual to that make. These early cars are reminiscent of the great variety of animal forms in the earliest days before evolution found the fittest and eliminated the others.

The 'Masterpieces' hall contains some of the very finest exhibits, mainly from the 1925 to 1960 period. This was truly the 'Golden Age' of motoring, especially between 1925 and 1939 but to some degree from 1945 to 1960. It was the Golden Age because cars had progressed to be safe, reliable, comfortable and fast by the standards of the day and the roads had improved to permit the use of their performance. The Golden Age passed because the performance of powerful cars became simply not usable. Many modern cars can exceed 150 mph and some even 200 mph but it is pointless. By the standards of today, none of these cars was especially fast. It was speed differential that mattered and these cars had a great but usable advantage over most of the traffic

1912 Rolls Royce

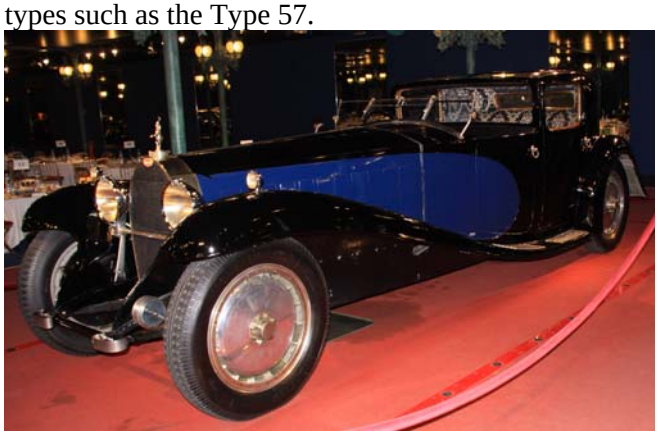
All of the great European makes are represented with exceptional examples of Hispano-Suiza, Isotta-Fraschini, Mercedes-Benz, Horch and many others. Rolls Royce and Bentley are well represented. Expensive French and Italian cars were normally built with the steering wheel on the right hand side although of course they were intended for use in Europe. Chauffeur driven cars then had easy pavement access for the chauffeur to open the door for the passenger. Sports cars usually raced on clockwise circuits and so it was some advantage to sit on the right hand side of the car. Whatever the logic of these explanations, German cars were built with the steering wheel on the left hand side.



Bugatti La Royale Esders (Right Hand Drive)

The racing car hall shows the development of the racing car through the years from early days to the modern rear-engined cars. Above all, there are three cars which are very appropriately displayed next to each other. The Bugatti Type 59 was the last Grand Prix car from the firm and it is surely every school boy's idea of how a racing car should look. The Type 59 had little competition success because it was outclassed by the Mercedes-Benz W125 and W163 Grand Prix cars next to it. They were contemporary with it and yet were obviously a generation ahead in engine and chassis technology and in performance, superior in everything except perhaps beauty.

The Schlumpf brothers were obsessed by one make above all others, Bugatti. This museum is a shrine to Bugatti. Ettore Bugatti established his firm at Molsheim some 120 km north from Mulhouse in 1910. Between that date and 1939 he built only about 7,850 cars and over 120 of the surviving 1500 or so are in this museum. In general the brothers bought cars to give proper representation to each make but in the case of Bugatti they simply wanted any they could buy so there are numerous examples of the more common types such as the Type 57.



Bugatti Royale

Bugatti was self-taught with no apprenticeship or theoretical training but he had a remarkable intuition, often right but sometimes wrong. He was an artist rather than an engineer. His cars express his individual preferences and view point. He did employ professional engineers but they had to operate under his direction and in total anonymity. His sports and racing cars were designed to be light and agile, renowned for their road holding. The engines were of relatively small capacity and ran at high revs for the period, up to 5,500 rpm. The great Bugattis had 8 cylinders in line and one or two overhead camshafts, He did make some 4 cylinder cars and once a 16 cylinder using two 8 cylinder engines geared together.

It was through sporting and racing cars that Bugatti made his name but he also wanted to produce the best possible luxury car regardless of cost. He designed the Type 41, generally known as the Bugatti Royale, 'For the crowned heads of Europe'.

It was an ambitious project in every aspect; the engine was 12.7 litres, roughly twice the capacity of the biggest Rolls-Royce and the car was much longer and wider than any other but its graceful proportions disguised its size until it was seen against something else. The car cost more than twice the price of the most expensive Rolls-Royce. Only six cars were ever built and none was bought by a crowned head. Three cars remained in the Bugatti family and one was sold in England, one in France and one to USA.

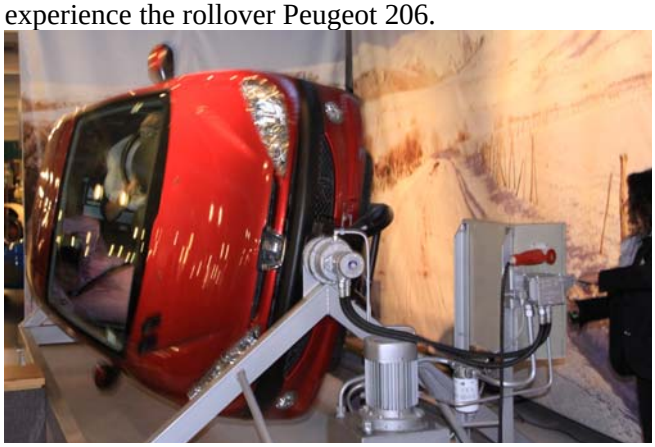
Brian Cook

The Out-of-Town Dinner on Saturday evening in the museum was simply magical. This exceptional automobile collection from the Schlumpf brothers, Fritz and Hans, is still located on the north side of Mulhouse city, in exactly the same wool spinning factory where the Schlumpf brothers had left it in the 1970s but the museum has been significantly embellished to exhibit these lovely cars.

Cars Coming Through the Museum Glass Entrance

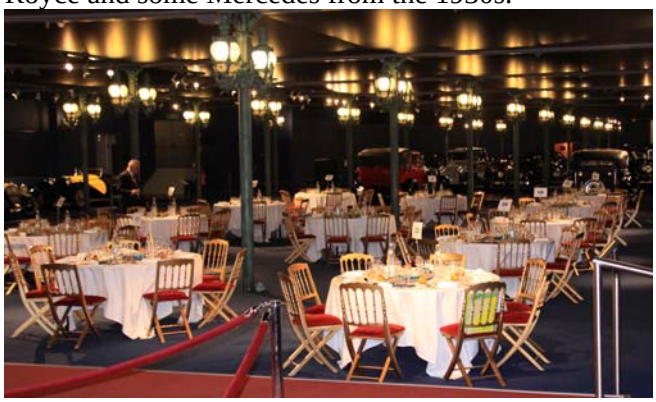
Upon arrival from the car park on foot over the modern wooden access bridge the visitors are greeted by an original sculptural work made of suspended racing car models. Entering the building into the main entrance hall the impression one gets is of sumptuous theatre decor. This impression is increased further as the visitor walks into the museum and through the half-lit corridor, exquisitely decorated on both sides with automobiles mascots and other similar objects. Then, suddenly, when the visitor reaches the Main Exhibition Hall, he is immediately impressed by the sheer size of the collection and by the generous lighting, as if suddenly the theatre curtain is lifted!

A welcome drink (Alsace crémant and white wine) was immediately offered to everyone and Master David Scahill made a brief welcoming speech and explained the way the evening would take place. Then Liveryman Brian Cook, who had already wetted our appetite by his article on this collection, before we arrived, gave us some more detailed and very interesting information on the Schlumpf brothers and on the origin of this collection. A summary of this is given above. The guests were then allowed to wander around through the museum at their own pace, during which some of the "braver" visitors like Court Assistant Commodore Barry Brooks opted to experience the rollover Peugeot 206.



In The Rollover Peugeot

This individual visit allowed all the visitors to admire this extensive and unique collection before we all met for aperitif and dinner in the "Area of Masterpieces". The elegance of the ladies' dresses and of the gentlemen among these exquisite automobiles had a touch of Belle Epoque on this special evening. This Belle Epoque atmosphere was further enhanced by the marvelous museum's lanterns which are in fact exact replicas of the Alexander III Bridge's lanterns in Paris. The "Area of Masterpieces" is a unique experience. It is the jewel-case of the collection where the most precious collection's pieces are exhibited, especially the famous Bugatti Royale Coupé Napoleon. In fact this was the personal car of Ettore Bugatti, the founder of the Bugatti dynasty, who had his manufacturing plant in Molsheim near Strasbourg, north of Mulhouse. Other exceptional cars in this area include some Rolls Royce and some Mercedes from the 1930s.



Ready for Elegant Dining in the Hall of Masterpieces

For aperitif and dinner Chef Sebastien Compos had done his best for the Worshipful Company of Engineers. His delicious aperitif canapés were followed by a dinner matching perfectly this exceptional décor. An exquisite foie gras starter was

served with Alsatian Gewürztraminer, and a main course made of delicious quail stuffed with Normandy cider reduction, was accompanied by a Bordeaux Saint-Emilion. The dinner was concluded, as always in France, by an original dessert and a coffee.

The evening came to a close when Junior Warden Pat O'Reilly made a brief and witty speech to warmly thank Master David Scahill and Lady Master Gillian Scahill before presenting a gift in the name of everybody present in appreciation of their hard work in organizing the Out of Town Meeting.

Daniel Fayolle

Service in Basel Munster

Our Sunday opened with fine weather which made a welcome change from the day before. We set off from the hotel to the Cathedral only to find our way blocked by a marathon race that was being run through the streets of Basel. After several diversions we managed to find our way to the Munster Platz in sufficient time to have a coffee prior to the Engineers' Service. The Cathedral was built in the 13th Century with about a third of it rebuilt in the 15th Century after a major earthquake.

It is built with a very red stone with a roof made up of brightly coloured glazed tiles. One of its features is a sundial which in mediaeval times was set to "Basel time" which was an hour ahead of the time everywhere else in the area. Hence in modern times the sundial is correct during the months of summer time but one hour out during the winter.

The Rhine from the Cathedral with Cross River Ferry

There is a fantastic view over the Rhine from a terrace adjacent to the Cathedral. From there you can see across to both Germany and France with the Black Forest in the distance. Down below us we could see swimmers swimming downstream with waterproof bags to carry their belongings. Having finished our coffee we made our way to the chapel of St Nicholas going past a lively group of African dancers and then two Christening parties going into the main church.

The Sculpture of The Table of Fruit and Vegetables

On the way to the chapel going through the cloisters we went past two sculptures one depicting a table of fruit and vegetables and the other of death and destruction. These sculptures were erected to commemorate the huge chemical spill into the Rhine that took place in 1986 which had a serious environmental impact on the Rhine. A very sobering thought.

The Chapel was completely full with the Engineers and their guests and Morning Service was lead by the Reverend Professor Roy Farrer. Roy told us that he had spent his career as a Professor in Welding Technology at Southampton University. He was very proudly wearing the PhD hood that had been presented to him by the Queen Mother. Having retired he had taken Holy Orders and now lived in Switzerland. The lessons were read by the Master and his Lady. The congregation were in good voice and sung the hymns very well despite the fact that the organist had been unable to come due to illness.

Roy preached to us about the glory of God's Creation. He talked about the fact that we are all part of God's Plan and that there is a purpose for us all. He talked about the beauty of the world and the things in the world relating in particular to his experience of such things as looking at the beauty of molten copper. Finally he said that the Engineer in us is born when we see the fruits of our labours. All in all it was a wonderful service.

After the service the Master took us on what seemed to be a fairly circuitous walk to the restaurant where a number of us were to have lunch. This was the Restaurant Lowenzorn. This is a traditional Swiss restaurant. The room was decorated with swords, masks and even had some grotesque monkey figures over the door. We all had a very relaxed lunch before

saying our goodbyes and starting to make our way home.

A Grand Finale in The Lowenzorn

All in all our Sunday was a great finish to what had been a fantastic weekend.

Tom Barton

LADIES LUNCHEON CUTLERS' HALL 3rd October 2012

Prior to the luncheon in the Cutlers' Hall, a group of the ladies attended a private viewing of Vestments at St Paul's cathedral. This visit had been arranged by Mrs Gillian Scahill, The Master's Lady and Mrs Ruth Cousins, Past Master's Lady and also by a member of the team of vergers at the Cathedral.

After enjoying refreshments in the Crypt cafeteria, the group was split into two groups for the tour of the Cathedral. In the absence of one of the vergers Gillian, who is a tour guide at the Cathedral one day a week, stepped into the role of guide for the groups.

Hood of a King George V Cope Recently Restored

St Paul's Cathedral is a Church of England Cathedral and was built by Sir Christopher Wren after the Great Fire of London, and was completed within his lifetime in 1711. Sir Christopher Wren was a Scientist, Architect and Engineer. The Cathedral is one of the most recognisable sights of London with its dome framed by the spires of Wren's other City churches.

Important services held at St Paul's include the funerals of Lord Nelson and Sir Winston Churchill; Jubilee celebrations for Queen Victoria; peace services marking the end of the First and Second World Wars; the wedding of Charles, Prince of Wales and Lady Diana Spencer; and services for the Golden Jubilee, the 80th Birthday and most recently the Diamond Jubilee of Queen Elizabeth II.

A private viewing and a talk about the vestments and copes was given. We were shown different copes, or ecclesiastical cloaks, used for various occasions, including the black cope used for the funeral of Winston Churchill, which has not been worn since. The highlight of the visit was the Jubilee cope made for the Bishop of London to mark the Silver Jubilee of Queen Elizabeth in 1977; the same cope was worn for the Diamond Jubilee. The Jubilee cope, designed by Beryl Dean and made by a group of volunteers is very ornate and is adorned by the steeples of all the Wren churches of the City of London as well as the dome of St Paul's Cathedral. We were then escorted to the sewing rooms, where the new vestments are designed and the old vestments are repaired. Some of the gold embroidery for new copes to celebrate the Tercentenary of St Paul's was made in India, but much of the sewing and embroidery was done by volunteers.

A King George V Cope Recently Restored and Worn for the Diamond Jubilee Celebration Service

Upon leaving St Paul's, a welcome drink awaited us in the Cutlers Hall. The Cutlers' Company is one of the oldest livery companies in the City of London. Their business was producing and trading in knives, swords and other implements with a cutting edge. Technically, spoons and forks are not "cutlery", since they have no cutting edge, but are termed 'flatware'

After an excellent luncheon Mrs Gillian Scahill, The Master's Lady, introduced our Speaker: Rev Sarah Eynstone. Sarah was ordained in 2005. Prior to ordination training she worked in a variety of social work environments including working with young homeless people and people with disabilities. She has degrees in Anthropology, History and Theology and has foundational training in psychotherapy and counselling. Sarah is a Minor Canon at St Paul's

Cathedral. Once there were as many as twelve Minor Canons but this has now been reduced to just three. All three Minor Canons share the various duties. Sarah works particularly with the Education Department which welcomes over 25,000 school children who visit St Paul's each year. She also works with the Canon Pastor in ministering to the Cathedral congregation and staff. Sarah has to prepare and proof-read the various services, which include Baptisms and Weddings in the British Empire Chapel. These latter Services are for people who have been made members of the Order by the Queen, together with their families.

After University, Sarah was involved in a very bad road accident and nearly died. Her parents' Church at that time gave her a different vision of what the Church is and can do. She then got involved in her Church and this led her to where she is today. She is the only woman Canon at St Paul's, and has been at there for two and a half years. The usual time in any post is five years and Sarah may become a Parish Vicar next. Sarah was indeed an inspiration to us all.

Mrs Gillian Scahill with Principal Guest Rev Canon Sarah Eynstone and Guest Mrs Janet Ward

The Luncheon concluded with a vote of thanks by Mrs Margaret Skinner, The Senior Warden's lady.

Jenette Parker

THE MASTER'S MUSINGS

I would like to start my Master's Musings by recommending that you read again IPM John Banyard's Musings written this time last year in Issue 27 of the Swordsman, and also the Valedictory Message of the then IPM John Robinson in Issue 26. Their comments about the role of the Master, and the responsibilities and reputation of our Livery: with the other Livery Companies; with the City and with our Charities, merit re-reading rather than repetition here, by me.

I would simply encapsulate what I feel is the essence of what they said: we have established a well deserved standing and "punch above our weight" because we

have the enthusiastic support of our Liverymen and partners which provides an example to other Liveries on how we take our Engineering, and City, and Charitable objectives seriously, but in an environment which encourages "friendship and fraternity" – now where have I heard that phrase before?

Previous Masters have eloquently espoused the strengths of our Engineering message and the quiet but significant influence we have at home and indeed overseas. So I would like to spend a little time on the "friendship and fraternity" theme and how Gill and I set out in our year to encourage it together with my other theme of "Manufacturing Engineering."

A goodly number of our members and their partners have been able to join us at the five informal events that have so far taken place around the country organised by fellow liverymen; a mixture of technical visits, social events and Mini Out of Town meetings which are described elsewhere in this, and the previous edition of the Swordsman. More to come next time.

One of the joys of these informal functions is that Liverymen and friends who have not been able to attend the formal Dinners and Banquets, some for many years, have joined in and experienced again the "friendship and fraternity" of our Company – oh! there I go again! They have also provided the opportunity for everyone to get to know the other attendees better which is just as true for Gill and me. This is a good place to acknowledge the sterling, oft unseen work of the Clerk and Assistant Clerk and Beadle in maintaining our formal programme of events and meetings, and the freely given assistance in the Informal Programme of events when required.

Gill and I thoroughly enjoyed planning and arranging the Out of Town Meeting in Basel which I guess will be reported in some detail in this issue of *The Swordsman*, (*'it is Ed'*) and all we can say is that if those who attended had half the fun *during it*, as Gill and I had in *organising it*, then we are well content. But I bet none of them slept as long or as deeply as we did when it was all over!

There are many things that make being a Liveryman of the Engineers' Company enjoyable; there are some that simply would not be possible if we were not in our Livery.

To my mind one of these was visiting CERN to meet and question Dr Lyn Evans (the Project Director of the Large Hadron Collider at CERN) who spent 15 years delivering the equipment which has enabled some of the world's greatest physicists to pursue their theories. In the same vein, as Master Engineer, I have been privileged to attend other special events amongst which are: hosting HRH Prince William, Duke of Cambridge at the Diamond Jubilee Lunch in honour of Her Majesty the Queen, and, at the joining of the Paralympics' Flame at Stoke Mandeville, to engage in conversation with Sir Roger Bannister on engineering in today's environment.

There have also been many other opportunities to meet and converse at Dinner with other Livery Masters and to be inspired by many interesting Lectures and events. I came to understand many years ago that the best way to lead any organisation or group is constantly to seek out ways to serve it. I hope that I have achieved this at least in part, over the last six months, and Gill and I look forward to doing the same in the remainder of my year as Master Engineer.

COMPANY NEWS

We welcome one new Liveryman invested at the Court Meeting on July 10th and six invested at the Court Meeting on October 9th

David Price MSc, BEng (Hons), CEng, FIET

After graduating from the Polytechnic of Central London where he was sponsored by Marconi Space and Defence Systems David Price continued to work for Marconi until 1997. He specialised in Computer Software Design for Military and Space Communications. David then joined London Underground initially designing and managing Control Systems for Canary Wharf Stations. David is currently the Reliability Growth Manager for Tube Lines Ltd. responsible for the reliability of the Transmission Based Train Control Signalling System being installed on the Jubilee and Northern Lines.

Dr Andrew James Vickers M.Eng(Hons) D.Phil, C.Eng, FIET, FBCS

Andrew graduated from York University in 1990 and completed his Doctorate in Software engineering there in 1995. After two years lecturing at York University Andrew joined Praxis Critical Systems as consultant and then Business Manager. Following two years as Technical Director with Aspect Assessment he rejoined Praxis as Head of Capability in 2006. In 2010 after periods as Operations Director and Engineering Director Andrew was made Executive Director of Altran Praxis a position he held until June this year. Since then Andrew has taken up a new international role working for the Altran Group, leading project management across all of Altran's operations in over twenty countries throughout Europe, Asia and the Americas. Andrew's particular interests include effective problem solving in the context of safety critical systems.

Rear Admiral Paul Anthony Moseley Thomas CB, B.Sc(Eng), M.Sc(Eng), FREng, C.Eng, FIMechE, Hon FNucI

Paul joined the Royal Navy in 1963. Graduating from the Royal Naval Engineering College (RNEC) in 1968 he spent most of his 35 years service in submarines and submarine related appointments including Director Nuclear Propulsion, Captain RNEC and Chief Strategic Systems Executive. After

retirement from the Navy in 1998 Paul spent three years with AEA Technology, Nuclear Engineering, as DirectorProjects and then Director Strategic Developments. In 2001 Paul joined BNFL as Group Director Environment, Health, Safety & Quality for eight years. In 2007 Paul became a non executive director of Rail Safety and Standards Board and is currently Chairman. Paul was the first President of The Nuclear Institute, is a non executive director of NNB GenCo and chairs the Defence Nuclear Safety Committee, The Hazards Forum and The Process Safety Forum.

Dr Michael Purshouse MA, PhD, CEng, FREng, FIMechE, FIET, FInstP, FIMA

After completing a PhD on the theory of noise and vibration generated by turbulence, Michael spent the early part of his career working as a specialist in the design of quiet submarines. In the course of a lifelong career in industry he moved progressively into general naval engineering, and contributed to many submarine and surface warship programmes for the RN and overseas navies. The most recent of these was the Royal Navy's Queen Elizabeth class aircraft carriers, now in build, where he was Chief Engineer. In 2007 he became Technical Director for Thales Land Systems, responsible for electronic systems fitted to armoured vehicles, retiring from that post in June 2012. He is now an independent consultant and has just been elected to a 5-year term as President of Cambridge University Engineers' Association.

Professor Carl Wilhelm Irene Pistorius BSc, BEng, MS, PhD, C.Eng, FIET

Professor Calie Pistorius is the Vice-Chancellor of the University of Hull, a post he has held since September 2009. He is a member of the Humber LEP, a director of Yorkshire Universities and The Deep, a Yorkshire Patron and serves on the CBI Regional Council for Yorkshire and the Humber as well as the Advisory Board of the Bondholder Scheme in Hull and the East Riding of Yorkshire.

From 2001 to 2009 Calie was the Vice-Chancellor and Principal of the University of Pretoria in South Africa and a member of the National Advisory Council on Innovation (NACI) in South Africa from1998 to 2009, serving as its chair from 2004 until 2008.

Calie holds bachelors and honours degrees cum laude in electronic engineering from the University of Pretoria, masters and Ph.D degrees in electrical engineering from The Ohio State University and a masters degree in the management of technology from the Massachusetts Institute of Technology. He is also an alumnus of the Harvard Business School, having completed the Advanced Management Program in 2003.

As well as being a Chartered Engineer in the UK Calie is a Professional Engineer in South Africa, a Fellow of the Royal Society of South Africa, a Fellow of the South African Academy of Engineers, a Fellow of the South African Institute of Electrical Engineers and a member of the Academy of Science of South Africa.

Eur Ing. Peter W. East OBE FREng BSc(Eng) ACGI CEng FIET

Peter's engineering career began in 1955 as an electrical fitter apprentice at Chatham Dockyard. With the dedicated support from staff at the Dockyard Technical College, he qualified for entrance to Imperial College. After graduating with a BSc(Eng) honours degree in 1962, he joined Mullard Research Laboratories. There, he spent 20 productive years researching new microwave and processing techniques in the radar, navigation and electronic warfare fields, working closely with the MoD research establishments. The second half of Peter's career from 1982, was as Technical Director of

Racal Radar Defence Systems Ltd where he led engineering and development of a range of active and passive electronic warfare equipment mainly for Royal Navy surface ships, submarines and helicopters, but also for the British Army and for export to friendly nations. Since retirement Peter has written two books on microwave system design and kept active in the field as an occasional consultant, microwave systems tutor and an IET volunteer.

Richard Thomas Nevard BSc, MBA, C.Eng, FIMechE

Richard was an MoD sponsored student at Southampton University. After graduating in 1983 he became a Project Engineer with the Mod before moving to Procter and Gamble. This was followed by 6 years with Cadbury in their Sugar confectionery Division. In 2000 Richard participated in the Millennium Round-the-World Yacht Race before returning to the Automotive industry in 2002 as a programme manager for global products. Currently Richard is programme manager for Faurecia Emission Control Technologies. Richard's main interests are: Programme Management particularly in the manufacturing industry and Engineering Training and Awards through the Tom Nevard Apprentice Scheme. He has sponsored 8 graduates to become chartered mechanical engineers. Richard was Master Upholder in 2008-9.

MEMBERS NEWS

Olympic and Paralympic Games Makers and Ambassadors

Amongst the thousands of Volunteers who helped to make the Olympic and Paralympic Games such a wonderful success and showpiece for the Country were the Senior Warden Graham Skinner with his wife Margaret and the Middle Warden's wife Margaret Baxter. Graham and Margaret volunteered for six days or so as Ambassadors and Margaret Baxter volunteered for a fantastic 19 days as a Games Maker. They met by accident at Heathrow and Graham took the photograph above in their striking uniforms. Below are their stories.

A Games Maker's Story

In 2011 LOCOG advertised for over 70,000 Games Makers to act as volunteers at the Olympic Games and Paralympic Games in 2012. Some 120,000 were interviewed in summer and autumn of 2011, with final selection and initial training having taken place by the end of the year. General training comprised an initial event for 10,000 Games Makers at Wembley, then more specific processes training.

When I applied I envisaged a role escorting Usain Bolt to the start line of the 100 metres sprint, but the reality was a role within workforce operations at Heathrow Terminal 1!! Over the Olympic and Paralympic Games I did 30 shifts, mostly starting at 4.30am! Colleagues came from all walks of life and ages, and included other Games Makers as well as the LOCOG team, airport employees and of course the London Ambassadors!

Duties included checking the Games Makers in and out, issuing meal vouchers, running the daily competitions and handing out the Games Maker lapel pins. The last of these was the most fascinating and contentious, with grown men competing amongst each other to see who could collect the most badges!

So what did I learn:

- volunteering is an extremely rewarding experience and an opportunity to meet some delightful people;
- Heathrow is a huge enterprise and I saw every terminal and ate in most canteens alongside check-in staff, security, baggage handlers and others
- the Olympic excitement was all pervading (well maybe not quite at the 3am alarm clock)
- the vision and foresight of LOCOG, and the organisation of the Games was truly astonishing and we should be so proud of our achievement

Margaret Baxter

A London Ambassadorial Experience

Margaret and Graham Skinner were each one of the 7,400 London Ambassadors recruited, trained, and uniformed in pink as part of the Mayor of London, Boris Johnson's army to welcome visitors to London

during the Olympic and Paralympic Games. There were 3 days of training including a session on John Lewis's doctrine of 'customer welcome' as well as event briefings and in-situ familiarisation. Ambassadors were at all the main London airports, railway stations, parks and landmarks – Margaret was at Heathrow Terminal 3 and Graham at Terminal 4. Armed with numerous maps, guides and other 'freebies' the job was to greet, answer any questions, and send tourists on their way with confidence after having a good first experience of the UK. We soon learned the secret was to offer our free maps first to avoid being classed as 'chuggers' and be given a wide berth. During Graham's 6 days of duty visitors included the Russian Paralympic team supporters. As well as helping a whole range of various visitors, some in distress and lost, Margaret was amazed at the volume of Chinese and other Far East students coming to do Masters degrees here at UK universities. Heathrow turned out to be a great place to work as the Olympics were clearly such a success and all the tourists arriving were so complimentary about their experience and the positive impressions they had received. The perks of the role were the chance to be at the rehearsal of the Olympic Opening Ceremony with Brunel playing such a prominent role and finally the joyous Parade of Athletes at the conclusion. It was also great to be actively involved and to contribute towards the fantastic summer of 2012 and the pleasure of working with other volunteers who shared our enthusiasm for our capital city, London. Boris is now actively considering retaining the London Ambassador troops as part of his plan to sustain the London experience.

Graham and Margaret Skinner

Ruby Wedding

Congratulations to the Master David Scahill and his wife Gillian who celebrated their 40th Wedding Anniversary on 22nd July 2012 during the Master's year of office.

David and Gill on the Balcony of the RNLI College

OBITUARIES

I am sorry to report that Michael John Neale OBE who only joined the Company in April 2009 died in August. Just as the last edition of the Swordsman was going to print I was able to report the sad news that Sir William Barlow, a founder of the Company had died in May and I now include an appreciation of his life and contribution to the Worshipful Company of Engineers

Sir William Barlow FREng, FIET, FIMechE

8th June 1924 - 19th May 2012

I have compiled this obituary from the addresses given at the Service of Thanksgiving held on 29th May at St Mary's Church in Henley on Thames. The church was full with many members of the Engineers' Company present including Past Master Sir David Davies representing HRH the Duke of Edinburgh.

A headmaster's son, Bill was born in Oldham and was a Scholar at Manchester Grammar School and then UMIST where he graduated with a first in electrical engineering in 1944. He was commissioned in the Royal Navy and he was engaged in minesweeping for over two years. He was proud of his service in the Navy which he described as his "finishing school".

On demobilisation in 1947 he joined The English Electric Company as a graduate apprentice in the railway division and spent several years in Spain. He returned to England in 1955 and went to Liverpool as head of the Company's Fusegear Division which introduced him to manufacture, product design and business management. Bill then spent four years in Canada before returning in 1962 to be Managing Director of English Electric's operations in Liverpool.

Bill's career then changed direction and he became Managing Director of the English Electric Computer Company, which was growing fast whilst the new industry was in a rapid state of development. He saw that the main British computer firms should combine and organised the merger of his company with ICT to form ICL in 1968. Within weeks English Electric decided to merge with GEC but he was strongly opposed to that move and resigned after 21 years with the company.

Bill's next appointment was as Chairman and Chief Executive of RHP, his first totally independent command. The company had been formed by the government's Industrial Reorganisation Corporation to fend off a take-over by SKF. However, all three companies were suffering from chronic under-investment, and Bill set in train a programme of modernisation which in about six years transformed RHP into a world class company. Bill was a terrific fighter and during this appointment he also became the driving force behind the formation of a European Bearing Manufacturers Association. This, under his Chairmanship, successfully moderated the flow of bearings being dumped into Europe by the Japanese. For his work in industry Bill was knighted in 1977.

Bill was then persuaded by the Government to become Chairman of the Post Office in September 1977. At that time the Post Office Corporation employed 420,000 people split roughly equally between Post and Telecommunications. He organised the split between the postal services and telecoms and he would have stayed as Chairman of British Telecom if the Government had accepted his proposal to make British Telecom into an independent company with equity shares. The company was about to embark on a huge investment programme to introduce digital telephony for which Bill wished to attract external capital and he was not prepared to work with the Treasury controlling the purse strings. The Thatcher Government had not then embraced the idea of privatisations and turned down his proposal. As a result he announced his decision to return to the private sector once he had completed the split of the two Corporations in 1980.

On returning to the private sector Bill continued to press for the privatisation of British Telecom and was pleased to see how successful the company was after it happened in 1983.

He next became involved in the merger of Thorn and EMI and became Chairman of the Thorn EMI Engineering Group. This comprised 46 companies in the UK and USA in the electronics and defence fields. He took on several non-executive directorships but always in companies where he felt he understood the business and its technology.

In 1984 Bill became Chairman and Chief Executive of BICC which was one of the world's largest cable and construction companies. In the cable field he pressed forward with optical fibre capacity and very high voltage power cables. He was involved in the construction project of the Channel Tunnel from the beginning and considered it an outstanding engineering achievement.

After his retirement from BICC in 1992 he accepted various non executive directorships but concentrated on telecommunications and environmental engineering. He was Chairman of Ericsson UK for ten years, a director of Vodafone plc from its formation for ten years and gave numerous lectures advocating widespread adoption of optical fibre technology.

In 1984 Bill helped to found the Worshipful Company of Engineers and was the third Master in 1986 to 1987 succeeding Sir Denis Rooke. Bill was President of the Royal Academy of Engineering from 1991 to 1996, also in succession to Sir Denis Rooke. Bill used these and other appointments as a platform for vigorously promoting British manufacturing industry. As a reporter said of an Academy AGM 'I am always impressed by the President, who, only about half the height of his predecessor, has an imposing presence and speeds the business along with a diplomatic combination of affability and creative irritability'. I remember Bill did the same for Engineers' meetings and finding that things were not progressing very well after he became Master he quickly appointed Bryan Gibson as Clerk who distinguished himself in that role for 16 years.

Bill was also Chairman of the Design Council 1980-86 and the Engineering Council 1988-1990 and he served on numerous national industry and education bodies.

Bill married Elaine Adamson in 1948 and they had a son Ian, daughter Diana and five grandchildren. They moved to Henley-on-Thames in 1989.

In his retirement in Henley Bill was instrumental in helping to raise funds for the refurbishment and development of St Mary's Church and Leander Club and in improving the finances of Phyllis Court Club.

Diana and Ian, as well as two colleagues, gave addresses and the five Grandchildren read the lessons at the Service

Diana said that her father was interested in everyone and everything and always had an opinion. He had a zest for life and said he learnt as a child to contribute to the full in whatever he was doing. He hated tardiness, laziness, scruffiness. To the end he polished his shoes every night. His hobbies included golf where he enjoyed the company as much as the game. And horse racing which he took to in retirement at Ian's suggestion with great enthusiasm and mixed success. I read a recent text from him on my mobile which made me smile. He had watched a race where his horse had not performed well and he simply wrote 'came last, I await excuses'.

Ian said how much his father had helped him and once he got over the fact that Ian was not going to be an engineer, just a mere accountant, he was the principal guide in Ian's career. His father was always the person Ian turned to first for advice, whose judgement he most trusted.

Ian said that his father had a great sense of humour, was always on the ball, and was meticulous in all he did.

It was a family joke that Bill's postcards from overseas business trips always detailed the aircraft type and duration of the flight often adding in the population of the country and a few other key statistics. Ian said that today's service is another example as it is exactly as his father laid down in his funeral instructions. These were first issued to Diana and Ian almost ten years previously and been updated annually ever since.

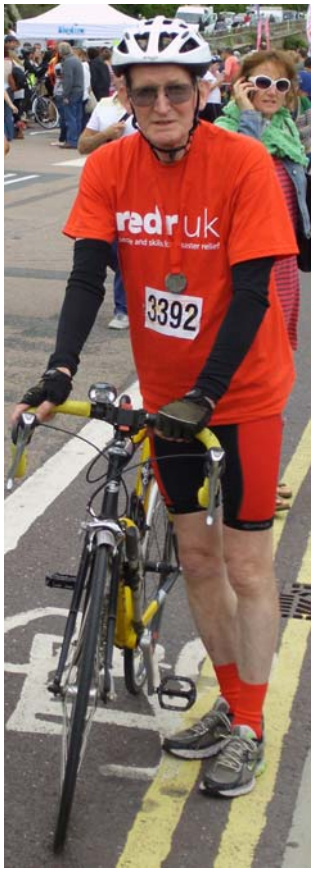
Ian opened his address by saying that he was often greeted with 'Oh yes, you're Bill Barlow's son aren't you? That is how I was known for most of my life and I am proud of it. That's when I wasn't taken for his younger brother which was something which delighted him, me less so!'

Ian concluded by saying
'Thanks for his long and full life.
Thanks for the support he gave me and Diana.
And thanks for being my Dad.

I am proud to say I am Bill Barlow's son'. The rest of us in the congregation echoed this thought with how proud we were to know him.

Raymond Cousins

Raising Money for RedR



Assistant Peter Blair Fish took part in the London to Brighton Cycle Ride on 16th September raising money for RedR of which the Company is a Patron. He writes:-

Very many thanks to everyone for their donations, especially members of the Worshipful Company of Engineers. The total amount of money donated at my on-line web site is over £1000. With other donations and gift aid supplements the total received by RedR is expected to be over £1400. The ride was a good day out. There was also a group of riders from a structural engineering consultancy, Elliott Wood, raising money for. The weather was fine, there was plenty of food at the halfway point, and my brother and I cycled on from Brighton to west of Worthing in time for tea (52 miles was not enough). It was well worthwhile to have raised money for RedR.

Peter, third from right, where's your bike?