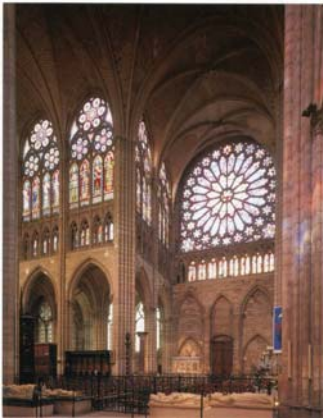


The Worshipful Company of Engineers

(Incorporated by Royal Charter 2004)

The Swordsman Newsletter



Issue 20

August 2008

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COVER PHOTOGRAPHS

Top Left	Canterbury Cathedral
Top Centre	The Master 2008-9 Tony Roche FREng.
Top Right	Henry VII Chapel, Westminster Abbey
Middle Left	Soloist from the Royal Engineers Light Orchestra at the Installation Dinner
Middle Centre	The Master, Wardens, HRH Duke of Kent and The Chief Royal Engineer at the Awards Dinner.
Middle Right	The Master for 2008-09, Tony Roche and his wife, Jeanette.
Bottom Left	One of the Presentations at the Awards Dinner
Bottom Right	A Eurostar Train in for service.

FUTURE EVENTS

11-14th September 2008	Out of Town Visit and 25th Anniversary Dinner	Ironbridge
29th September 2008	Election of Lord Mayor	Guildhall
1st October 2008	Ladies' Luncheon	Wax Chandlers' Hall
31st October 2008	25th Anniversary Banquet	Mansion House
8th November 2008	Lord Mayor's Show	Wax Chandlers' Hall
12th November 2008	Junior Warden's Lecture and Luncheon	Wax Chandlers' Hall
25th November 2008	Visit to the College of Arms	College of Arms
17th December 2008	Carol Service	Tower of London
3rd March 2009	Election Court	Wax Chandlers' Hall
27th March 2009	United Guilds' Service	St Paul's Cathedral
21st April 2009	AGM and Installation Dinner	Painter Stainers' Hall

EDITORIAL

The last few months have again been very active for the Worshipful Company of Engineers and I hope that the following pages will give those who have been unable to participate a flavour of the events. The last edition sparked a letter of comment which I include and I hope that it may provoke a debate and more letters. I have also included some information on our new Liverymen who have been invested recently which I hope you will find interesting.

Raymond Cousins

LETTERS

Dear Sir

I was pleased and very interested to read the recent Company Newsletter and particularly the reports on the visit to Portsmouth. Regrettably my wife and I are precluded from these visit by our lack of adequate mobility. I have a profound belief that since most of the Liverymen hold or have held some position of importance in the world of engineering, that the Company should at all times be seen to be promulgating the best standards as an example and to assist in elevating the status of engineering nationally.

It was, therefore, with some apprehension that I noted that in the report on the visit to Vospers there were some expressions regarding accuracy that were incorrect. It states that.... "laser cutting to within 0.3mm accuracy." This should read "to within an uncertainty of 0.3mm." To state that something has an accuracy of within 0.3mm means that the process has very large errors. Similarly, later on it states... "with perfect alignment – millimetre accuracy" and this should read "millimetre uncertainty".

Since about 1970 I have as part of my career been regarded as a UK expert in Metrology and have been responsible for the creation of many of the standard terms and expressions and uses in the world of measurement. For my work in this field I was a few years ago awarded the Callendar Medal at the Royal Society and was Vice President of The Institute of Measurement and Control and for this reason I am reluctant to accept such errors when they appear.

One of the most common in the current world of engineering and instrumentation is the statement that "this.... Has an accuracy of ½% and not what they say. If their expression was taken literally then it would mean that there were errors of 99.5% and this is obviously not what is intended.

E C Buckland
Honorary Senior Visiting Fellow
City University

Dear Editor

The Blythe Sappers

The Blythe Sappers is a society the purpose of which has always been to foster good comradeship among Sappers, serving or retired, by providing opportunities for getting together and to promote the Esprit de Corps of the Royal Engineers. It also makes donations to R.E. good causes.

Qualification is commissioned service in any past or present constituent part of the Royal Engineers; Regular, Territorial, Supplementary Reserve, Army Emergency Reserve, National Service or Engineer and Logistic Staff Corps.

If there are any qualified members of the Worshipful Company of Engineers who might be interested in joining such a society with such simple but pleasant aims please contact me and I will enlarge on the subject.

M.H.S.Muller
michaelmuller@windalls.freemove.co.uk

THE BRIDGE LECTURE 6 February 2008

The Engineering Challenge of the Gothic Cathedrals

**By Mr John Burton, DipArch, RIBA, IHBC, AABC
Surveyor of the Fabric of Canterbury Cathedral
and Westminster Abbey**

It is a great honour to be invited to give the Bridge Lecture. However, it might seem very presumptuous of me as an Architect who can hardly calculate a simple beam, to talk to you tonight about the structure of some of our greatest buildings in England. I trust those more expert than I will forgive me. What I am hoping to demonstrate is the fact that with very little engineering knowledge, the Medieval mason and the carpenters were able to satisfy the brief given them to provide enclosure for worship. They were also able to produce magnificent architecture as a result of their skills.

I will largely be focusing on the two dear friends that have taught me a great deal about stone structure, Canterbury Cathedral and Westminster Abbey.

It would be wise, to start looking at the material which is used to construct these great buildings. Stone. Canterbury Cathedral and Westminster Abbey have a great deal of Caen stone from northern France in their construction. The source of Caen stone is therefore used to introduce the material to you. The open cast quarry on the Falaise road, some 15 kilometres south of Caen gives some idea of the size of the resource potentially available. This stone was laid down at around 160 million years ago as a large shallow sea about 30 degrees north of the Equator. Not all is however suitable for construction. I am particularly interested in a very thin band of stone in this particular quarry for building purposes. It is important to emphasise that it is not just a matter of looking at the stone; sounding it or using local knowledge to determine its suitability as a building stone. It is important now we have the facilities to determine the stones suitability for the building using various scientific means in addition to the traditional approach.

In the open cast quarry, the Caen stone is now usually crushed and used for agricultural purposes or in the chemical industry. That which cannot be crushed easily is set aside for building purposes. Sadly this rescued stone is often weakened during the quarrying

process as blasting is used to extract it. The blasting can reduce the stones weathering properties long term.



Mining, traditionally, such as the large underground mine at D'Aubigny where stone was removed by hand tools, had none of the blasting problems. Near Brettsville, a few kilometres from the open cast quarry, a new Caen Stone mine has opened. The blocks are carefully cut by saws and cracked by air bags to remove them. This care in quarrying is essential if the stone is to weather well.

The Pont Julien in Provence is one of thousands of examples which show how successful stone can be in providing a long life structure. This 2nd century bridge did, until three years ago, provide a bridge to the N100 through Provence. The construction is of local stone in the form of a semi-circular arch thrusting against huge buttresses. These buttresses have been slightly lightened with further arches to allow high level flood water to pass through the structure without damaging it. This bridge structure is using the compressive strength of stone which is the only strength stone has.



The magnitude of the compressive strength of stone can be understood if one relates the crushing strength on the individual piece of stone with its self weight. It can be calculated, depending on the type of stone that a column around 2 kilometres high can be constructed before the lower stone is crushed. This massive structure forming the bridge in Provence is hardly using the available compressive strength of the stone.

It is interesting to compare this structure with the N100 bridge 200 metres away recently constructed of reinforced concrete which has both properties of compression and tension.

In the first building of Westminster Abbey (1064), a similar arched form was used to provide the Undercrofts and passages around the Precincts. Understanding the method of construction for these arches will enable us, as it did medieval man, to slowly understand and have a feel for the structural form we now call Gothic.

It is quite a simple process to construct a stone arch. Walls of stone or a timber form-work are constructed, between which were laid planks of timber as a temporary shuttering. With few tools, it is easy to draw a semi-circle, a piece of string or a length of timber nailed at one end and with a scratch mark at the other enables one to form this simple shape of a semi-circular arch.



At Canterbury, unfortunately during the 2nd World War, a bomb smashed through the vault of one of the largest monastic dormitories in Europe exposing the constructural method. Archaeological study has revealed the timber shuttering and the method of laying the blocks on the shuttering in a radial pattern in order to use the crushing properties of the stone.

Salagon Priory near Forcalquier in Provence has a simple nave made out of tunnel vaults with an apsidal end. Fortunately, for tonight's talk, the stones forming the vaults have been left exposed so we can see the way the stones were arranged on the timber shuttering.



These buildings formed with tunnel vaults are very limiting in their plan form. The walls have to be thick enough to take the horizontal thrust of the vault as the arch tends to flatten out pushing on the walls. One might therefore believe that the limited amount of windows in these churches is to ensure there is enough weight to resist the thrust. In fact, it would be possible to cut openings in these walls at a lower level without jeopardising the structure as a whole. I suspect that the limited amount of window came from the early churches requirement to worship in a dark mystical space.

To understand how these barrel vaults work, we are able nowadays to carry out mathematical calculations. From my experience, many engineers will advise that a number of these early vaults should have collapsed, ignoring the fact that they have stood for several hundred years.

I prefer to think of the behaviour of these vaults in a more natural way. Fortunately our thinking today can benefit from Robert Hooke's genius. Hooke understood how the forces in structures worked naturally and he demonstrated this by his famous hanging chain. This chain shows the natural shape of the line of forces in an arch particularly in a structure which is made of a material which can only take compression. Hooke said he knew the mathematical formula for this arch but never demonstrated it.

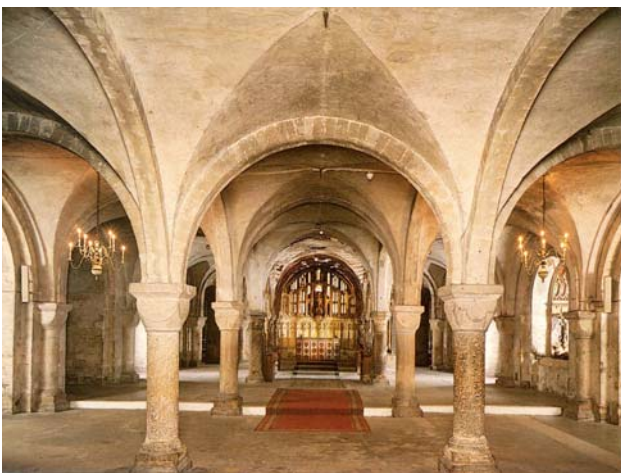
When we superimpose that natural curve on a barrel vault, we can see that Hooke's inverted arch will fit

within the arched form, provided the walls are thick enough. If Hooke's natural arch falls outside the structure, the structure will collapse. It is also interesting to note that the line of force can be quite thin as the crushing strength of stone is high relative to its self weight.

The way the forces can be taken up in stone can be demonstrated by the exaggerated deformity which occurs on a number of buildings. The examples show the very plastic nature of stone structures. Two extremes can be found at Ely Cathedral and Selby Abbey where the superimposed loads increased as the towers were constructed and the greater load impacted on the adjoining arcade. Collapse has not occurred but the forces have clearly been re-distributed and probably in these cases, the wall and the abutment are providing the line of Hooke's arch through which the principle force is flowing.

Buildings with barrel vault roofs are expensive to construct requiring considerable amount of shuttering and although it is possible to cut openings into the supporting walls, the size of them is somewhat limited if collapse is to be avoided.

The next stage in the development of vaulting could have been developed by either the carpenter or the mason. Simply it was to set one barrel vault at right angles to one another. The vaults being exactly the same width and diameter resulted in the structure we call a groin vault. The loads as one can see in the Undercroft of Canterbury Cathedral are concentrated at the point where the barrel vaults intercept. With these groin vaults one is able to form useable space all be it filled with columns.



It was a simple step to convert the groin vault into the quadripartite vault that is a vault having arches on the

diagonal, the line of the groin, as well as on the four sides. Forming shuttering for arches is considerably simpler (cheaper) than for the barrel vault or even intercepting barrel vaults. The mason can then fill in the four bays which make up the quadripartite vault with lightweight arching material which thrust onto the arches or what we now call ribs. At Canterbury, a very lightweight building stone was used; Tufa and in Westminster bands of green sandstone from Reigate and lightweight chalk from Kent were used to fill these panels.

In order to picture in ones mind how the forces are acting in the vaults, one can either physically or in ones imagination, place a tennis ball on any part of the vault and let it roll down, it will follow the line of force. Further to understand how a vault is behaving, one must exaggerate the force exerted on the external walls and show them pushed apart. In fact, such movement can be seen in the later vaulting at Sherbourne Abbey where the very rigid Romanesque structure of the tower abuts a later Gothic choir. The forces from the vaults are bending the columns. One can understand it if one folds a piece of paper up into a barrel vault form and pushes on the top it will tend to flatten out and stretch the vault. In a similar way as the Carpenter takes the shuttering away, the vault will tend to collapse pushing out on the walls. In doing so the natural line of force uses a proportion of the crushing strength of stone to allow the forces the line demonstrated by Hooke. Provided there is enough weight to take the horizontal element of force and enough foundation to take the vertical weight, the vault will settle down. The stretching effect as the vault collapses will produce some cracking at the point where the stretched vault separates from the wall as it follows the downward movement of the centre of the vault. In some cases, shallow arches will develop alongside this crack as well.

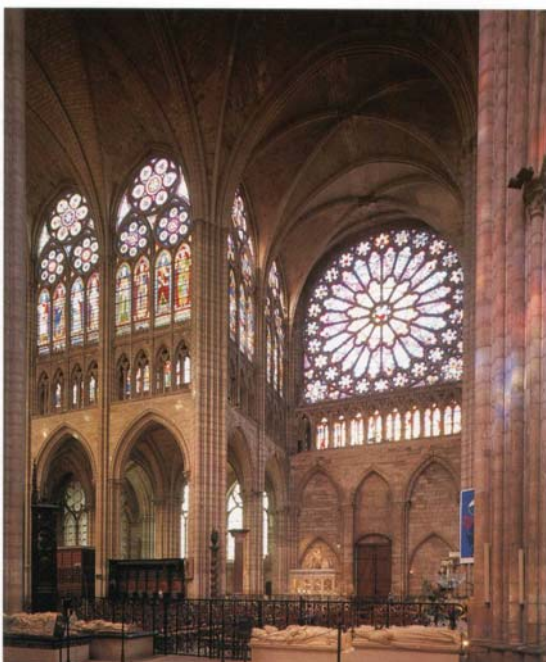
Quadripartite vaults which are based on the semi-circle and square are very limiting in plan arrangements. This can be seen at St Etienne in Caen, in the nave and its adjoining aisles. The aisles are a series of squares and the Nave has to be double square to enable quadripartite vaults to be used.

St Etienne in Caen was the Church which Lanfranc knew well before he became the first Norman Archbishop of Canterbury. He brought with him, those building skills to Canterbury. Sadly much of this early building has been lost in successive modernisations. Just part of the Undercroft mentioned earlier is all that we have.

There are many ways to free up the planning arrangements which masons slowly started to develop. If one requires a vault over an oblong plan form, it is possible to shutter up for the side arches and the quadrupartite ribs using semi-circles; or using only part of a semi-circle; or by resting some of the semi-circles on legs. We would now call that raising the springing point of the arch. It was not long before masons or was it carpenters knowing they had to reach a centre point which was at the same height as the surrounding arches in order to provide a flat usable surface found that a compound curve could be used meeting at a point. It was solving problems like the octagonal Romanesque Water Tower at Canterbury which I am sure required much debate between carpenter and masons that led to the solution using pointed arches.

It was in the region of Paris where the masons particularly developed this form of pointed arch. This pointed arch form has in modern times been referred to as Gothic largely in a derogatory way during the Renaissance. There were even debates in the 19th Century on whether a law court should be in Gothic or should be in classical form.

We have seen in earlier churches, partly because of the structure and the history of the early church, worshipping in mystical spaces which were quite dark with very little natural light.



It was in, what is now a northern suburb of Paris, at St Denis, that true Gothic started. The flexibility of the

pointed arch and the theology of Abbot Suger came together. In re-building St Denis which is the Mausoleum of the Kings and Queens of France, Abbott Suger talked of the 'architecture of light' and 'from the material to the immaterial'. His patronage of the Royal Family gave him the where with all to express his theology in stone and glass. This great change to encourage light into churches and to see God spreading the light of the world was converted into architectural terms from July 14 1140 when the foundation stone of this Benedictine Church was put in place by Abbot Suger. He was determined to put his theological thoughts into the built form.

In England, on the 29 December 1170, Beckett was murdered in his Cathedral at Canterbury. A building which was still Romanesque in form with heavy columns possibly groin vaulted roofs or maybe timber roofs and quite an old fashioned structure compared with the work which has started 30 years earlier at St Denis. We have a vague understanding of the form of the Romanesque Cathedral from Prior Wibert's waterworks of 1153 which records both the buildings as well as the water supply and drainage system. For us, it shows where Beckett's body first lay in the chapel to the east end of the Cathedral.

Shortly afterwards a disastrous fire ruined the building east of the central crossing. The side chapels which house the body of many English saints survived as did the eastern chapel where Beckett's body lay. It was in this chapel that the Beckett miracles started to occur and the Abbott was elevated to Saint hood.

The re-building of the eastern section of Canterbury Cathedral was won in competition. We would probably say nowadays, architectural competition but it would be more correct to say a competition between master masons. The work was entrusted to William of Sens who, as a result of his unfortunate falling of scaffolding, was later replaced by William of Canterbury.

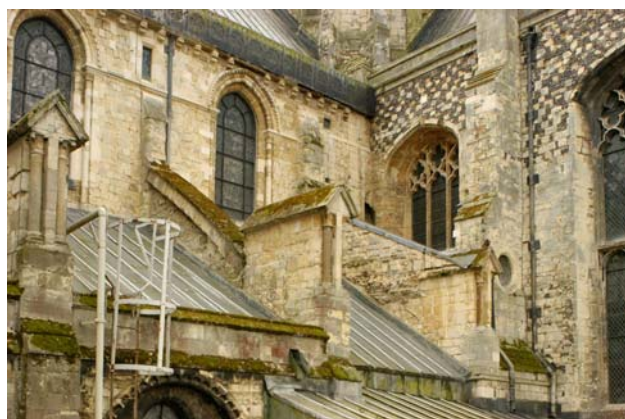
The brief for this re-building produced some very complexed structural requirements. The monks required the sites of the early Saints to be preserved and as these were in radiating chapels at the east end, a pinch point in the new choir was inevitable. This has resulted in the magnificent horse shoe shape around the eastern arm which gives added perspective to the east end of Canterbury. Symbolically Becketts body was raised up and place in a shrine above his original resting place. The work of re-building started in a

Romanesque way but the plan form could not cope with perfect semi-circular arches and the pointed arch was used as a solution.

The complex mathematics of designing the arched forms over the tapered plan and still have a line of bosses at the same height would stretch most computer aided design programmes even today. It is likely that the carpenters set up their formers by full scale geometry. We know from the holes drilled in the feet of rafters, that carpenters cut roof timbers to the right length by pivoting them over markers on the right ground thus ensuring the right angle of cut at the apex. The most complex vault forms were formed over the tapered sections and the horse shoe area.

What is interesting at Canterbury is to see the solutions by probably William the Englishman to hold back the horizontal thrust of the vaults. At high level, on the south side, an extra and rather unnecessary floor was added to the building in order to counteract this horizontal component of thrust. This is a very expensive solution in terms of material, time and manpower. Some of us say it was the Frenchman that did this, spending the English money.

The most interesting development which appears to have occurred at Canterbury was that, on the north side, as they built from east to west, an upper chamber was not constructed but instead a series of walls were built and the roof lay between them. There is evidence that they had planned and indeed started to build the additional chamber at high level on the north side but clearly changed their minds. As one views these walls, as constructed, one can see that as the building went further east, they lighten the wall using lightweight materials such as Tufa and concentrated the thrust in two lines of stone at the top of the wall. Unfortunately one of my predecessors removed the top course of stone and replaced it with a Portland stone capping.



The result of this is one of the reasons why we are trying to raise 50 million pounds at Canterbury for repairs as signs of buckling can be found in these props.



What is most interesting as William the Englishman moved east of the north transepts, the lightweight building material was left out of the construction and simply two courses of stone as braces to take the thrust from the vaults was all that was constructed. Large buttresses on the outer wall were used to turn this horizontal thrust to the ground. The flying buttress was now developed. Whilst I try and claim this is a first for Canterbury, there is evidence that similar solutions were developing elsewhere. This form of construction, Gothic architecture I always compare with Romanesque in the following manner. The Romanesque structure is parallel to the form but in the Gothic, the structural element is in right angles to the form.

Whilst we have looked at compressive materials, iron was available but horrendously expensive as it could only be manufactured in very small quantities which had to be hammer welded together. To bring the light into the Cathedral through the great Oculus, it was clearly decided around 1200 to use iron. This window is approximately 4.5 metres across and subject to horrendous wind loads being not far from the coast. The solution is what we now call a space frame. They simply constructed two frames out of 25 to 35mm iron bars separated by rods to give depth. I think this is one of the great achievements at Canterbury and there is little evidence that this construction method was taken up again for many centuries. I suspect, however, that some stone rose windows did have an iron cage externally to reinforce them. There appeared to be some evidence in this in the Dean's eye window at Lincoln. My point at Lincoln has never been proved.

Westminster Abbey when it was redeveloped by Henry III, for a similar reason to Canterbury, had to respect the earlier church. The design of this earlier church can be seen in the Bayeux tapestry. Henry III who had, as King, aged 13 assisted in the translation of Beckett's body at Canterbury had clearly decided to build a similar shrine at the heart of Westminster to that which he had seen at Canterbury. It was to house, as it still does, the body of St Edward the Confessor. The church was also re-developed as an ideal setting for Coronations. This required the enlargement of the crossing.

Henry III did not wish to reposition the earlier cloister. As a result, the transepts at Westminster uniquely have an aisle under built by a Cloister.

The Flying Buttresses which had developed at Canterbury had been perfected during this time of massive Cathedral building and allowed Henry III to raise his nave higher than any before. The structural difficulty was the need to take the horizontal thrust of all the vaults whilst keeping the cloister in position. As one looks at the section taken from Sir Bannister Fletcher, one can see how those forces can fall along a line demonstrated earlier by Robert Hooke and reach the ground without any catastrophe. The Bannister Fletcher family as members of the Carpenters Company were incidentally very important in developing the skills of masons and carpenters when they instigated the building of the Craft College in London which has recently gone from success to success at its new site in Stratford.

The shrine of Edward the Confessor at Canterbury was surrounded by the burials of the Kings and Queens of England. Unfortunately, by the time that Henry VII required a space for the depositing of his remains there was no space available. He



set about in providing a new chapel for this purpose at the east end of the Abbey. In the process he removed Henry III earlier Lady Chapel. Gothic architecture by this time had reached its most fantastic as we see from the windows in Henry VII Chapel. From within this chapel the amount of glazing compared with structure clearly demonstrates that Gothic had reached its zenith. The forces from the vaults and the magnificent form show the amazing lengths that masons would go with a compressive material to suggest it had some form of tension. This allowed the masons to glorify probably the King but one would like to think it also had a religious dimension.

Looking at the structure of Henry VII Chapel from above, we can see that the vaults are a series of circles, the elements of which are slightly tapered and therefore act as arches. As they tend to collapse they push out on the side walls. The fragile nature of the curtain walling of Henry VII Chapel creates a most magical effect. When one views the chapel from the outside, one can see that the forces have been taken down the buttresses to the enormous structures on the outside. By shaping the lower aisle windows, the buttress or structure is hidden as much as it can be from the viewer in the architectural form. The upper weight of these buttresses is about 60 tons and the pendants weigh approximately 5 tons. The pendants are pulling down the arch structure on the principle line of force to avoid it buckling upwards.

Whilst we have come along way from a simple barrel vault, nonetheless we have seen that compressive material can be used to span large spaces provided it is in balance. It seems possible to me that all this was done by trial and error and a natural eye. Natural forms were key to the Gothic and it interesting that Hooke, all those years later demonstrated the natural shape simply by hanging a chain of balls between his hands. Gaudi in modern times in Barcelona used similar methods to shape his arches.

I do so hope you will all share with me my love for these early structures and appreciate how sensitive one needs to be in understanding simple structure when caring for our historic buildings. There is a great need for us to ensure that we train our craftsmen in the traditional way to ensure they have a feeling for the material that they are using in a structural way. The Livery Companies of London have a great challenge to maintain the traditional natural craft approach to structures whilst those who want to expand our world with modern engineering and architecture continue to be educated in a highly sophisticated way, as in this great institution of the City University, London.

ELECTION COURT WINTER SERVICE AND DINNER 26 February 2008

There were various Committee meetings during the day and the Election Court followed in the early evening.

Tony Roche was elected as Master with Chris Price, John Robinson and John Banyard to support him as Wardens.

At the end of the Court Meeting Timothy Marsh was clothed and welcomed as a new Liveryman.

After the Court Meeting the Court and Members of the Livery processed down Foster Lane to St Vedast Alias Foster, a beautiful and unusual Wren Church. The congregation face each other as in a choir which enhances the entrance procession of the officers of the Company. Readings by the Master Engineer from Ecclesiastes and St John were followed by Prayers that the Court had had divine guidance in their choice of the officers for the ensuing year and by a thought provoking address by the Chaplain, the Rev. Michael West. Hymns were sung robustly by the congregation and a collection was made for RedR – Register of Engineers for Disaster Relief.



The Master and NewElected Master exchanging the Loving Cup

After proceeding back to Wax Chandlers' Hall some 70 Liverymen enjoyed a reception and excellent dinner in the splendidly refurbished rooms. Following the Loyal Toasts the New Master and Wardens were each proclaimed to the Livery by the Clerk and each exchanged a Loving Cup with the Master.

The Master welcomed and introduced the new Liveryman who briefly described his background and expressed his pleasure at joining the Company.

A convivial and memorable evening concluded at 21:45.

Denis Dickinson

INSTALLATION COURT AGM AND LIVERY DINNER 22 APRIL 2008

This year for the first time the Installation was held at Butchers' Hall which, appropriately, is near Smithfield Market.

After a brief private Court Meeting the Court reconvened with many Liverymen and guests for the investiture of four new Liverymen whose photographs are in the Personalia section at the end of this edition. All were welcomed and congratulated after their investiture.



The Outgoing Master with the New Liverymen

The Master then opened the Company's Annual General Meeting and reported on the activities and finances of the Company. Tony Roche was then installed as the new Master with Chris Price and John Robinson as the Senior and Middle Wardens. Unfortunately, John Banyard was away but will be invested as Junior Warden later.

The Clerk then announced the results of the election of new Assistants to the Court and Professor Isobel Pollock and Commodore Barry Brooks were invested and welcomed to the Court by the Master. After all that effort we retired for refreshment and we welcomed a number of visiting Masters.

Dinner was announced by a trumpeter from the Light Orchestra of the Band of the Corps of the Royal Engineers and they entertained us very well, during, and, after dinner.

Immediately after Grace the New Master thanked the immediate Past Master, Rear Admiral David Bawtree for his leadership of the Company during the last year and presented him with his Past Master's Goblet so that he could enjoy the excellent wine at dinner.

A very nice dinner included excellent fillet steak as would be expected at the Butchers' Company.

Raymond Cousins



The Outgoing Master receiving his Master's Certificate from the New Master

REPORT ON THE YEAR BY THE MASTER, REAR ADMIRAL DAVID BAWTREE CB, DL

A very warm welcome to you all this afternoon. It is good to see so many here. This is the time when the Master has the opportunity to briefly go through the activities and proceedings of the past 12 months – that is the year ending 31st December 2007. I hope you have all had the opportunity to read the Report of the Master and Wardens that was circulated with the calling notice for this Common Hall.

As you know I took over as Master from Commander Bryan Gibson, who reported to you at this event last year. With the support of the Clerk and his Assistant, the Wardens, the Court and the Committees by any count it has been a good year for the Company. Our numbers have increased by 13, although there have been 4 deaths in the year. So our numbers increase and

the average age reduces – a good thing. You will see from the accounts that we made a surplus which we put towards our reserves; you will hear more about this from the Senior Warden in a minute. Our charitable Trust Fund remains in good health, its objects being the advancement of education in the engineering profession and the relief of poverty generally and, in particular, in the profession of engineering. We have made awards in the civilian areas under the Cadzow Smith Award, Baroness of Writtle, Stephenson, Mercia and Water Engineering awards, and for the Armed Forces in the defence training and continuous professional development areas. There were two new awards in the past 12 months; one the Heritage Engineering Award, the winner being the Ironbridge Gorge Museum Trust, and the other the Fiona and Nicholas Hawley Award for Environmental Engineering to a post graduate working to extend the use of wetland reed beds to treat mine water wastes. The Clerk had 110 requests from individuals or other charities to help with the relief of poverty and I am grateful to Court Assistant Commodore Shirley for all his help in sorting out those we supported. A number of other sums were given to organisations such as RedR or to the organisations we visited such as the Royal Opera House or Christ's Hospital. Overall our charitable funds have increased by over £20,000, and we gave away £37,000 compared with £30,000 the previous year. So all our finances are in a healthy state.

But of course there are many other ways of assessing the Company's health. When I was installed last April I said that I hoped to pursue three ambitions – to continue to advance awareness of the importance of engineering in our society, to support the education of children and to support music making. I think these have been generally achieved. I have had to speak on a number of occasions and the role engineers can play in resolving global warming issues has been a constant theme. We have visited two schools in the course of the year and listened to their Headmasters at dinner in the Mansion House and in the Royal Marines' Museum at Portsmouth, where the children also sang to us. At the Ladies Lunch another Headteacher talked enthralingly about turning round an inner city sink school.

One of the main objectives of the Company is to promote social intercourse, and this we have achieved in a number of ways. We have had a number of formal and very enjoyable dinners with very many Company and private guests attending. We have visited the Old Bailey as paying guests, and we visited Denbies

Vineyard and Painshill Park Gardens. Following on from the 2006 Bridge Lecture we paid a return visit back stage to the Royal Opera House and in July we visited Christ's Hospital. The Golf day was its usual success and autumn saw us at the Royal College of Defence Studies in Belgrave Square listening to Assistant Commissioner Tarique Ghaffur talking, among other things, about security arrangements for the 2012 Olympic Games. We watched the Lord Mayor's Show fireworks display over the Thames from the Riviera Restaurant and then decided we should go on the river following the Carol Service on the *Dixie Queen*, the Tower Bridge being specially raised for us.

For Ann and me it was a delight to be able to introduce so many of the Company to Portsmouth, where not only did we dance on the gun deck of HMS Warrior to the music of Shep Wooley and his band but we also had a fascinating tour of Vosper's Shipbuilders and saw the part they were playing in the construction of the bow section of the Type 45 destroyers. 160 adults and 9 children dined in the Warrior. I think we can say that social intercourse has been well and truly promoted.

Finally in my year but not in the year of the accounts was the Bridge Lecture, in this our 25th year the most well attended of all Bridge lectures so far. John Burton, the Surveyor General of Westminster Abbey and Canterbury Cathedral and successor to Sir Christopher Wren, enthralled us with his talk on Engineering the Gothic Cathedrals. When I now visit our great cathedrals I look on them in an entirely different way and try and apply Hooke's Law to all the curves!

None of this happens without the tremendous contribution made by our Clerk and Assistant Clerk, to whom we are extremely grateful. The only significant difficulty throughout the year arose from the refurbishment of Wax Chandlers' Hall which continued from the previous year until its completion at the end of September 2007. Apart from the unpleasant working conditions for the office staff, it was necessary to reschedule activities that had previously been expected to be undertaken in the Hall.

However the result is a very pleasing one in the public rooms and the Company is able to display its Royal Charter and Grant of Arms in the Court Room, together with some of the Company silver. We started work in the autumn with the outsourcing of the development of a new web-site for the Company, and I hope you all now know that it is up and running with

an individual password protected members-only section. In due course, the web-site will have the capability to download the necessary booking forms for events and the electronic banking facilities which were recently introduced. All these changes in administrative processes modernise further the Company's business arrangements, provide improved services to Members, and help keep down overheads.



The New Master and Wardens and their Ladies

That then is the year in brief. You have it in more detail in the papers for this meeting. For me and Ann it has been a wonderfully enjoyable year. We have been to places we otherwise would not have visited and made many friends throughout the City. As Ann reminded me, it has often been the case of the great, the good and the Bawtrees! We are both grateful for the tremendous support we have had from the Officers and Members of the Company and I hope that Tony and Jeanette enjoy themselves as much as we have.

INSTALLATION SPEECH BY THE NEW MASTER TONY ROCHE, FREng

Wardens, Prime Warden, Masters, Past Masters, Ladies and Gentlemen

A warm welcome to you all to the Installation Dinner here in Butchers' Hall, and especially to our Company guests and those here as the personal guests of Liverymen; we are delighted you could join us.

It is with considerable pride that I take up my duties as Master of this very special Company I expect it to be a challenging year but also, I hope, one which gives satisfaction and pleasure to those in the Company.

It has been a most enjoyable evening and Butcher's Hall and it's staff have done us proud with excellent food and wine and all whilst listening to the wonderful music of the Band of the Royal Engineers. On behalf of all of us may I thank the band, the caterers and the Butchers Company for the use of this magnificent Hall.

My first pleasant duty is to give congratulations to Chris Price and John Robinson on their Installation as Senior and Middle Wardens of the Engineers Company.



The New Master and the Principal Guest Sir Bob Reed

Together with the Learned Clerk, the Beadle and our Honorary Chaplain we will seek, as a team, to deliver a further year of progress for the Engineers Company. The team would not be complete without our respected Auditors and Bankers and I welcome Paul Windmill from Myers Clark and Tony Stowell and Chris Dyer from Royal Bank of Scotland At this time I wish on behalf of the Company to congratulate David and Ann on a highly successful year. Whilst there were many successes during the annual programme of events, the 'Out of Town' visit to Portsmouth was especially enjoyable and memorable.

The start of a new Livery Year is a good time to focus on the future, but before doing so I want to reflect just a little on the 25 years that have passed since the Company was formed.

1983, so long ago, but in many ways it feels like yesterday. The Conservatives had just been re-elected following the success in the Falklands War. The years that followed have produced enormous change, driven by the ever growing progress of technology. Communication has been revolutionised with the wide spread use of mobile phones and e-mails via

computers. In the medical field we have seen the application of high tech equipment, enabling massive new developments in diagnostic and surgical treatments. Interestingly, the Medical Devices sector is now growing faster than pharmaceuticals. Products like hip and knee implants transform people's lives, and bio-engineered products will revolutionize many treatments.

Throughout this era transport has remained an ongoing and unsatisfied challenge. The opening of the Channel Tunnel, new or wider motorways, expanding Airports and the creation of cheap air travel have all enabled a considerable expansion of the movement of goods and people whether by road, rail or air. During that period our own supply of oil from the North Sea has been sustained, but future availability looks less secure.

Within the Company we have seen significant growth in Membership, in our Charitable Funds and in our links to other organisations within the city and within the engineering profession. We have now established our home at Wax Chandlers' Hall and combined with the gaining of our Royal Charter in 2004 the road ahead is open and clear for another 25 years of successful development



The New Master and Jeanette Roche

And so to the Future. During the year ahead our programme will have a strong focus on transport engineering, and the 2008 Out-of-Town meeting at Ironbridge will include transport themes both land and air based. Picking up from the results of the survey of Liverymen on desired future activities there will be

two half day Technical visits dealing with transport engineering of today and tomorrow. The first of these is on 13th May, St Pancras Day, to the Eurostar Train Maintenance Depot. Only 18 people are down to go at the moment and we need to be nearer 30 to get a good turnout. Another of our events will focus on the London transport scene both historical and into the future.

One of the objectives of our Company is to be a bridge between the City of London and Engineering. Over the decades and centuries the engineering industry and profession has made a vital contribution in the provision of London's key infrastructure. The future fortunes of the Capital will be significantly influenced by the availability of fit for purpose infrastructure, and engineering has a major role to play in building and maintaining the renewal and expansion of these vital assets.



The Master Tony Roche FREng

We will continue to foster our good relationships with Fellow Livery Companies. I am delighted to welcome the Prime Warden from the Worshipful Company of Blacksmiths, the Masters from the Worshipful Company of Plumbers, the Worshipful Company of Scientific Instrument Makers and the Worshipful Company of Environmental Cleaners here with us tonight. Can I also warmly welcome the four new Liverymen who were clothed earlier this evening and also Isobel Pollock and Barry Brookes as new members of the Court.

It is also a delight to welcome the Reverend Roger Hall, the Chaplain of the Tower of London and Mrs Hall.

Much of the good work of the Livery Companies relates to the financial support given to many

important bodies through Charitable Funds. Our Company is increasingly active in encouraging regular charitable donations and I would seek the support from those in the Company to help us in this endeavour.

We support a number of different activities, one being RedR, the Registered Engineers for Disaster Relief and of which I am a Vice President and I will be seeking to raise the profile of RedR within the wider Livery during the year ahead.

Our Principal Guest tonight is Sir Bob Reid and I am delighted he was able to join us following his return from Sydney this morning. Sir Bob has had a long and distinguished career in a range of major business activities, principally in the oil industry with Shell International Petroleum and he became Chairman of Shell UK Ltd from 1985-90. Sir Bob is currently Chairman ICE Futures, Europe, and also a Director of CHC Helicopter Corporation, of Sun Life Financial UK and the Merchants Trust. He has been active in the field of education and training, being a past Chancellor of the Robert Gordon Institute; continuing that commitment he is also the Chairman of the Foundation for Young Musicians, the 'Conservatoire for Dance and Drama' and 'Learning Through Landscapes'. My first meeting with him was in 1990 when he became the Chairman of the British Railways Board and without doubt he was an inspirational leader who was determined to improve the service to the customer.

Appropriately for tonight, he is also a Liveryman with the Worshipful Company of Butchers' and, Sir Bob, we look forward to hearing your response on behalf of the guests



Sir Bob Reid

I now invite all Members of the Company to rise and join me in the toast "Our Guests"

LADIES BROOCH LUNCHEON 23 APRIL 2008

The Brooch Luncheon is always an enjoyable event, when a small number of past and future Masters' Ladies are hosted by the outgoing Master's Lady. This year was no exception. On St. George's Day, in the delightful surroundings of the newly renovated Court Room at the Wax Chandlers' Hall, 18 ladies heard Ann Bawtree recall the highlights of her year.



The Master's Lady, Ann Bawtree recalling the highlights of her year.

She said there were so many wonderful experiences that she wished she could have spread them over five years instead of just one. If this had been the case, it would have addressed one of her, only two, regrets - their grandchild, who was eligible to attend the Lord Mayor's Christmas Children's Party, was abroad at the time and missed it!



Ann Bawtree passing the Ladies Brooch to Jeanette Roche

On behalf of those present, and those unable to attend, Ann wished Jeanette Roche a happy and successful year. She handed over the Brooch, pinning it on Jeanette's lapel.

Jeanette accepted, saying how privileged and pleased she felt, but also, humble and somewhat apprehensive. Ann interjected to say 'the most important thing is to enjoy every moment'. A 'Here, Here' could be heard from around the table. Jeanette then presented Ann with a replica brooch to wear in future, as both a remembrance and a recognition of her husband's year as Master of the Company.

Jeanette concluded by thanking all those responsible for preparing and serving such a delicious lunch and by paying tribute to Stephen Grundy, who was in attendance, for his help and support.

Ruth Rooley



The Ladies enjoying a pre-get together

Footnote

The Ladies Brooch was given by Peter and Cynthia Hammersley at the end of his year as Master and the idea for a Brooch Lunch was suggested by Gerry and Joan Clerehugh at the end of his year as Master. It was good to see both Cynthia and Joan at the Luncheon. The replica badges were given by David and Winifred Mitchell. Winifred was unable to attend because David could not bring her but she apologised and said she would be with the Ladies in spirit.

Ann Bawtree

VISIT TO EUROSTAR DEPOT 13 May 2008

The Knights Templar built water mills in the Lee Valley to grind corn, in an area that became known as Temple Mills. Later, the area became a railway marshalling yard, with the first hub marshalling yard using gravity to distribute wagons. As freight traffic declined in the 1970s, the marshalling yards became disused and Temple Mills Works was closed by the present Master Engineer, Tony Roche. Nineteen members of the Engineers Company visited the new Eurostar Depot at Temple Mills on St Pancras day, 13th May 2008 when we were hosted by Senior Staff, David Bailey, Chris Adamson, Nigel George and Ian McNaughton.



Two of the possible eight trains which can be serviced at any one time.

Eurostar train services through the Channel Tunnel started in 1994. Passenger trains ran from Waterloo, with a train maintenance depot on a narrow 2.5 mile long site alongside the Great Western line at North Pole near Willesden. 27 “Intercapital” trains were built with 18 passenger cars and two power cars, and 7 “north of London” trains of 14 passenger cars and two power cars. The “North of London” trains are leased to SNCF and now run between Paris and Lille. The Intercapital sets run from London to Paris and Brussels, and once a week to Bourg St Maurice in Winter and Avignon in summer. Eurostar carried 8.1 million passengers in 2007, and expects to carry 10 million in 2010. Eurostar’s London terminus has now moved from Waterloo to the terminus of the new high speed line at St Pancras. As there were insufficient train paths for coaching stock on the North London Line between North Pole to St Pancras, a new depot was built at Temple Mills

The new depot has a maintenance shed capable of attending to eight full length Eurostar trains, together

with two bogie drop roads, one wheel lathe road, an 8 metre high stores, and office accommodation. The depot is capable of expansion to 12 covered roads, and of servicing taller and wider trains up to full European gauge size. Future Eurostar trains are likely to be double decker. However, Kent Express and Olympic Javelin trains will be serviced in a separate depot.

Construction of the new depot started in November 2004 and was completed in April 2007, within the budget of £400 million. The move from North Pole was planned in meticulous detail, starting 2.5 years before the transfer. The move was explained in detail to the workforce and relocation assistance provided, so even though most lived closer to North Pole, only one member of staff left as a result of the move. 1,000 days of training were provided for 200 staff, and induction training for 300 staff. 10 extra specialist staff were used to help in the move. Eurostar services ran from North Pole and Waterloo on 13th November 2007. Trains and equipment were moved from North Pole to Temple Mills on the night of 13th November. Trains ran from Temple Mills and St Pancras on 14th November. All without a hitch but no mention was made of this in the Press as great engineering success does not claim headline news!



The View from the Driver's Seat. (Designed to provide a blinkered view, concentrating the driver's eyes on the way ahead, and to avoid stroboscopic problems.)

The workforce of 334 includes 11 Chartered Engineers. Typically, 2 graduate engineers and 3 or 4 apprentices are recruited each year. Once engineers become Chartered, many of them leave to join Rolling Stock Operating Companies. Apprentices studying for degrees sign “golden handcuff” agreements. Eurostar spend about four times the average per employee on training.

Eurostar trains are about half way through their planned 30 year life. Each train weighs 742 tonnes. Half of a train can be lifted at a time, to give access to the undercarriage. All cars except the power car have

air suspension. Sand is used continuously to achieve required traction on the high speed line. Overhead Line



Sand Delivery to the Driving Wheels

Equipment can be detached and neutralised in 3 minutes from arrival in the shed, so that examinations and maintenance can start. Various examinations are made of each train: routine examination; internal comfort examination; supplementary examination of wheel sets; 6 monthly, yearly and 3 yearly examinations. SNCF have a programme of Reliability Centred Maintenance covering 18,000 parts. Wheels are checked every 51 days. Ultrasonic tests are made on each wheel every six months. A wheel set can be changed in 2 hours. Spare bogies used to be kept at Derby but are now kept at Temple Meads. Toilets are serviced every 36-48 hours. Rubbish from the trains used to be burnt but is now recycled.

The depot at Temple Meads does work that was sub-contracted when maintenance operations were at North Pole. Working areas looked clean and efficient, if utilitarian. To comply with Health & Safety requirements, there is a lift to all office floors. Members of the Company attending this visit were impressed!

Peter Blair-Fish

NEW MEMBERS EVENING 20 May 2008

After several false starts because of the prolonged refurbishment of Wax Chandlers' Hall, the first New Members Evening was eventually held on Tuesday 20th May 2008. This was attended by 18 members, all of whom had joined the Company in the last 4 years; some were accompanied by their partners and the whole event was supported by The Master, Senior Warden, Immediate Past Master and the Chaplain; a total of 44 were present.



The Company's Modern Loving Cups

The purpose of the evening was to offer an informal occasion in 'our' Hall to acquaint those recently joining the Company with some background to our provenance and customs by setting them in the framework of The City of London and the Livery movement. This was accomplished with a varied programme of short presentations beginning with a DVD, 'Working for a World Class City', as shown at the City Briefings. This was followed by a power-point briefing by The Clerk on the history of the Engineers and their place in the modern livery arrangements. The Beadle then gave a short and humorous description of the role of his ancient appointment. This led on to The Clerk giving an explanation of the Livery and Court's annual cycle. Then a discussion of the Court organisational structure, which was supported by The Master and Senior Warden, explained the purpose of the Standing Committees that they have chaired and included the Chaplain describing his spiritual and pastoral role in the Company.



Some Other Company silver

An excellent light buffet followed to allow the opportunity to socialise amongst those attending and to

examine the wide range of silver pieces from the Company that the Beadle had polished and displayed in the Livery Hall. After supper, Mr Richard Percival, The Clerk of The Wax Chandlers' Company, gave a fascinating illustrated history of his Company and their buildings, including their current and 6th Hall. The final session concluded with an input from the Immediate Past Master, as the outgoing Chairman of the Charitable Trust Fund, on its place in the Company arrangements and its future plans. The evening finished at 10pm and included a lively Q&A session chaired by The Master.

Overall, the immediate feedback and later responses to the evening suggested both members and their partners had found it enjoyable and informative. The format provided a good knowledge base to give members a wider foundation to more fully and quickly engage in the life of the Company. As a result, The Clerk will be recommending to the Programme Committee that this should become a regular annual event available to newer members and, perhaps, to extend it to those who have been with the Company longer but felt they needed to know more about us. After all, there is always a great deal to learn about livery – indeed, The Clerk finds out something new every day!

Graham Skinner

ELECTION OF SHERIFFS

24 June 2008

One of the privileges of the Livery is the opportunity to participate in the ancient and dignified ceremonies of the City of London, and not least among these is the Election of Sheriffs. Indeed this is a rather special ceremony, for although the Sheriffs were formerly chosen by the citizens, since 1475 this privilege has belonged to the liverymen. The election takes place each year, usually on Midsummer Day, 24 June, in Common Hall, which is summoned by the Lord Mayor through a notice to the Livery Companies that their liverymen are to attend at Guildhall.

The call is answered as eagerly today as ever, and one does well to arrive in good time to ensure a seat. On arrival at Guildhall, I was struck by the august gathering around the entrance, but was made to feel at home when ushered into the Great Hall by our own Raymond Cousins in his capacity as a member of the Livery Committee. The Great Hall is in itself an imposing place, constructed in the 15th century and one of the largest civic halls in England, with stained glass windows and monuments to such figures as Nelson, Wellington and Sir Winston Churchill. The Livery Companies' crests are displayed, including our own,

which was unveiled in 1984 in a joint ceremony with the Arbitrators' Company.

The ceremony itself is of course well rehearsed and begins with a procession of the Livery Committee and the Masters of the Livery Companies (in reverse order of precedence). A procession of senior city officials and Aldermen then leads the Lord Mayor to the hustings. It is a colourful procession indeed, and the tradition of the dignitaries carrying nosegays reminds us that London has not always enjoyed the savoury atmosphere that we are used to today!

The meeting is then called to order by the Common Cryer, who proclaims silence, directs "all persons to be uncovered in the Hall", and orders "all those who are not liverymen to depart the Hall on pain of imprisonment"!

Two Sheriffs are elected. They are of equal standing, although one is an Alderman, known as the Aldermanic Sheriff, whilst the other need not be either an Alderman or a member of the Court of Common Council. This year there were only two candidates for the Shrievalty, although one understands that the proceedings can become lively if this is not the case! The newly elected Sheriffs are Roger Gifford, Alderman and Musician, and George Gillon, Citizen and Chartered Surveyor. They will take up their positions in September, ready to supervise the election of the Lord Mayor on Michaelmas Day, 29 September. Their duties will include attending the Lord Mayor in carrying out his official duties, attending the sessions at the Central Criminal Court in the Old Bailey and presenting petitions from the City to Parliament at the Bar at the House of Commons.

The ceremony also included the election of two bridge masters, four ale conners (traditional testers of ale), and six auditors, as well as the presentation of the report of the Livery Committee for approval, before closure of proceedings by the Common Cryer and the recession of the dignitaries from the Great Hall.

The proceedings were appropriately concluded by a buffet lunch and a glass of wine at Wax Chandlers' Hall. For my part, I was delighted to have the opportunity to participate in this time-honoured tradition. Although ancient, it is very much part of the governance of the modern City of London, and I would commend attendance to all liverymen at least once during their career with the Company.

Edmund Morgan-Warren

AWARDS DINNER

8 July 2008

The Awards Dinner was preceded by a full day of Committees culminating in a Court Meeting at which John Banyard, who was unable to be present in April, was installed as Junior Warden. The Court heard reports from the various Committees on their work and of the significant progress in creating a lasting record of the first twenty-five years of the Engineers' Company. The Archivist, John Banyard with very considerable help from Mrs Penny Weaver has nearly completed the work and a number of volumes of the Company's activities to April 2008 will soon be bound and deposited with the Guildhall as a permanent record.

At the end of the Court Meeting five new Liverymen were invested maintaining a very strong and growing membership.



The Master with HRH The Duke of Kent and The Chief Royal Engineer Sir Kevin O'Donoghue

presentation the Master proposed the Toast to the Prize Winners and Guests and Sir Kevin O'Donoghue responded.

Raymond Cousins



Reception in the Courtyard

After the Court meeting, on a beautiful summer's evening, we retired to the Courtyard of the Merchant Taylors' Hall where, in our 25th Anniversary year, it was a delight to welcome HRH, the Duke of Kent, Honorary Liveryman and Assistant Emeritus and Sir Kevin O'Donoghue Honorary Liverymen to the Awards Dinner. Both assisted the Master in presenting the many civilian and service awards that the Company is pleased to make to encourage young Engineers in their advancement in the profession. Throughout the Dinner the Light Orchestra of the Corps of the Royal Engineers entertained us culminating in a traditional party piece by the trombonist before the presentation. After the

THE ENGINEERING AWARDS 2008

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 (£2500 Prize) Mengyi Wu of Imperial College, impressed the panel by her breadth of vision of engineering and commitment to Geotechnic engineering in particular. A sponsored student of the Happold Trust, her academic achievement was supplemented by participation in demanding work placements. The panel appreciated her understanding of the role of engineers in society, and her efforts to encourage other, younger girls to improve their aspirations, particularly towards engineering. Mengyi Wu was unfortunately unable to be present,

Highly Commended (£500 each)



Anulika Ajufo from Queen Mary University displayed ability and enthusiasm in the field of Medical Engineering, having received several awards whilst at university and having completed a placement with a leading implants company. These achievements, notable in themselves, were

accompanied by charitable projects.

Ray Robinson from City University is a mature student who was highly motivated to study engineering in greater depth from his original employment as an Engineering Artificer in the Marine Branch of the Royal Navy, with the intention to pursue a career in the engineering sector.



Ray Robinson was unable to be present at the dinner but was awarded his certificate by the Clerk the next day.

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 Engineer's Company wishes to acknowledge the assistance of the Institution of Engineering and Technology in selecting that award winner.

Winner (£1000 Prize)

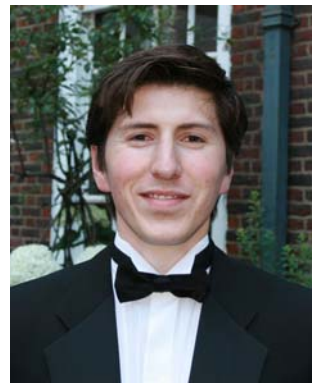


Mark Foster is studying for a BEng in Motorsport Engineering at Coventry University. While at school, he designed and built a two seat racing car. During the first two years of his university course, he worked on fuel and pedal box systems for the Formula Student competition. His

third year was on an industrial placement with Red Bull Racing Research & Development, where he tested braking systems, fluid systems and tyres, and assisted with tests on wings, car torsion and remote test viewing systems. During the final year of his course, he is doing a confidential project for Red Bull Racing. He is expected to achieve a first class degree.

Runner Up (£500).

Norman Brown Ruiz is studying for a BEng in Mechanical Technology at Coventry University. After two years as a full-time student, he opted for an industrial placement with Cummins, where he worked on improvements to air intake and water systems for testing diesel engines.



After six months, he was offered a full time position as a Test Engineer. He now coordinates all mechanical development tests at the Cummins Daventry Technical Centre and is completing his academic degree by part time study.

Mercia Award

The Award is made annually to a student under 30 and provides a medal and bursary towards the cost of a taught or research programme of postgraduate studies in Medical Engineering. (£500 Prize)

Erin Ross gained a First Class Honours Degree in Physics at the University of Edinburgh, and is now studying for a PhD in the University's Orthopaedic Engineering Department. Her research is concerned with imaging of the Musculoskeletal System using Freehand



Three-Dimensional Ultrasound, and involves setting up and assessing a freehand 3D ultrasound system suitable for musculoskeletal imaging. The results will be compared with those of the standard x-ray treatment used in the routine care of fracture patients, to assess whether 3D ultrasound can provide a safer, more informative and cost effective method of monitoring bone repair. Her leisure interests include serving with the No. 603 Squadron Royal Auxiliary Air Force, hill walking and cycling.

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.



Gemma Carr gained an Honours degree in Geology and Physical Geography from the University of Edinburgh, and an MSc in Development and Environment from Royal Holloway, University of London. She is currently studying for a PhD at the University of Reading. Her research integrates environmental and social

sciences, to improve understanding on how domestic treated wastewater can be used and managed to ensure soil sustainability for irrigated agriculture in Jordan. The work is part of a Leverhulme Trust funded project called Water, Life and Civilisation. In her leisure time, she is an ASA Swimming and Aquafit teacher.

Stephenson Award

The Award is intended 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 150th Anniversary of the Grant of their Royal Charter. Donations in excess of those needed for the Loving Cup were used to establish the Stephenson Award and further donations were received in 2001 & 2005.(Two Prizes of £500 each.)

Barry Shears has been the prime mover in the establishment of *Green Power* (electric car races for schools). This is a competition for young boys and girls, principally in the critical 14-16 age group. It was started in 1999 and Barry



was responsible for its development which saw an increase in car entries from 50 cars in 2000, to 100 cars in 2001, and many more since. *Green Power* is essentially a scheme to encourage greater appreciation of engineering at secondary school level and due to the sterling efforts of Barry Shears is

now UK wide and is being considered for international adoption.

Mark Williams introduced the Engineering Education Scheme (EES) into a large number of schools starting with Fortismere School in 1994. Mark, as a mathematics teacher, always ensured that his students received maximum recognition for all their engineering achievements at school, including their successes in British Association CREST (Creativity in Science & Technology)



Awards. In 2000 Mark left teaching to become the South East Regional Director of the EES. In two years he built a team of regional co-ordinators that doubled the number of participating students, schools and companies and improved the infrastructure and engineering content of the scheme. In 2003 he was appointed as National Director of EES and in his first year a record 1352 students were involved. Under his

guidance EES has been one of the major suppliers of candidates for the Stephenson Award and he has impacted on thousands of young people in raising their awareness of engineering as a career.

The Fiona & Nicholas Hawley Award for Environmental Engineering

The Fiona & Nicholas Hawley Award was established in 2006 and is made annually to recognise excellence in environmental engineering to 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 to present a project that has at least reached prototype stage in meeting three tests of social, economic and environmental sustainability. (£5000 Prize)

Dr John Robinson of Nottingham University who presented a paper, ‘Microwave Treatment of Oil Contaminated Drill Cuttings.’ This provided a solution to the problem was how to remove the oil contamination from cuttings (small crushed rock fragments) discharged from the drilling mud used to lubricate and cool oil well drilling bits). Offshore drilling platforms face stringent environmental legislation whereby sea disposal of the cuttings is not permitted and shipping them ashore for processing is weather dependent and expensive. John’s team has demonstrated a technical solution that allows the cuttings to be heated by microwaves as they pass along a conveyor belt, steam from the cuttings carrying away the oil for separation, and allowing the rock remnants to be disposed safely at sea.



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The presentation from Dr Robinson was an excellent demonstration of the practical combination of several engineering disciplines – microwave and electromagnetic engineering and materials handling - to overcome a significant environmental problem and to avoid large cost consequences. The solution has generated sufficient interest from the oil and gas

industry for a pilot-scale system to be sponsored by BP and BG.

Heritage Engineering Award 2008

The Engineering Heritage Award was established in 2006 using the residual funds of the former British Gas Technician Award. The purpose of the award is to make donations or grants to an individual or organisation that has made a significant contribution to the understanding and development of engineering through the interpretation of historical sites or processes. In considering nominations, preference is given to schemes which form part of an on-going educational programme. Awards normally consist of a grant or donation together with a certificate and medal. (£2000 Prize)

Vulcan to the Sky Trust (VTST) which after 15 years tireless work restored the cold-war delta wing V-bomber the Avro Vulcan XH558 back into the air on 18th October 2007 from Bruntingthorpe Airfield after the type was phased out of RAF service some 24 years earlier. The aircraft is the first 'complex' one to be returned to the Civil Aviation register (G-VCLN) and this represents a huge technical achievement by the dedicated team under **Dr Robert Fleming, the CEO VTST**, at Bruntingthorpe supported by Marshall Aerospace. Over £6m has been spent on returning the aircraft to flight, of which £2.7m has come from the Heritage Lottery Fund, with the rest from public donations. This year the aircraft has flown all the test flights towards its Civil Aviation Authority permit-to-fly certification for its



return to the air display circuit. Display flights will be a spectacular example of British design and engineering excellence in the air and will be supplemented by a ground education programme aimed to illustrate the historical 'Cold War' context of the Vulcan's period of service. The Award will be used to help fund the running costs of this important British heritage aircraft.

THE SERVICES ENGINEERING AWARDS

The Services Engineering Undergraduate Award

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

Officer Cadet Claire O’Connell earned 3 “A” grades at A2 level and went on to study Mechanical Engineering with Mathematical Modelling at Newcastle University, graduating with a 1st Class Masters degree in June 2007. Her academic performance was excellent throughout. Concurrent to this, she made a telling contribution to her university Squadron, involving herself wholeheartedly in all manner of activities. After graduating she undertook some commendable charity work in Rwanda where she assisted a vulnerable community, both in a teaching role and by assisting with a construction project. O/Cdt O’Connell is a highly talented and dynamic individual who shows great commitment and drive in all that she does and is fully committed to a career as an engineering officer and a leader in the Army. Claire O’Connell was unfortunately unable to be present as she was on duty elsewhere.

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 Steven Lumley commenced the Professional Engineer Training MSc Course at the Royal School of Military Engineering at Chatham in June 2005. He was seconded to Kellogg, Brown and Root (KBR) in South Australia for 16 months to gain experience in both project management and detailed design. During this period, and demonstrating exceptional confidence in his engineering ability by preferring him to their own staff, KBR sent Major Lumley to Darwin to manage

three failing publicly funded projects. He also produced a number of technical papers, including a comparison of UK and Australian contract terms, air conditioning in tropical regions, smoke extract ventilation and evaporative cooling. Major Lumley’s MSc dissertation was on the viability of coal as a future base load power generation fuel for the UK; he was judged top student on the MSc Course.

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 – Chief Petty Officer Marine Engineering Mechanic Matthew Crofts’ leadership and inspiration of the Royal Naval School of Marine Engineering’s Phase 2 trainees has been exceptional. He has led from the front, always set the highest of standards and motivated all trainees to aspire to match them. His contribution to the quality of training, particularly in blending Military Skills and Naval Ethos training with technical learning to meet the modern Fleet’s requirements has been remarkable; he is hugely deserving of this recognition.



Army – Warrant Officer (2nd Class) Ashley Fuller, a Clerk of Works Instructor at the RSME, prepares technicians to fill posts within STREs for operations. WO2 Fuller has been instrumental in restructuring the Clerk of Works course field training exercises to develop their operational relevance and realism. With a passion for producing interesting and testing environments, very significant effort has been required

to rewrite the exercises. Furthermore, in changing the emphasis of the RE Troop Commanders' course from the provision of a technical foundation to practical project delivery, there was the requirement to produce a comprehensive design report from which they could plan the delivery of a large project. Without support, he produced a very full and realistic report from which to base the entire final exercise.



Royal Air Force – Flight Sergeant Brian Hitchin's contribution to engineering excellence within Defence College of Electro-Mechanical Engineering, HMS Sultan as part of No 4 School of Technical training has been incomparable. His exemplary performance

within Harlech Flight and the contributions he makes to student development against the backdrop of a recent successful deployment to Afghanistan as an acting Warrant Officer make him fully deserving of this prestigious award.

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.

Royal Navy Operational Engineering Award

(Called the “Thunderer” award to sustain the heritage of this name within The Worshipful Company of Engineers)

Lieutenant Commander Stuart Currie RN as an instructor to the Iraqi Navy, drew on his engineering knowledge and experience to raise low engineering



standards and professional confidence in order to equip them for the vital security operations with which they were tasked. Specific examples where his engineering judgement and technical innovation contributed to the enhancement of operational capability include the establishment of engineering training, procurement and maintenance regimes for fire fighting and Fast Attack Craft, which had previously been lacking. These professional engineering achievements are all the more remarkable when you consider that the fundamental cultural and language difficulties he faced, as well as the personal danger that our people face in this operational theatre.

Royal Engineers Operational Engineering Award

Captain Peter Rushworth is the Garrison Engineer in 48 Field Squadron (Air Support). He deployed to Camp Bastion in Helmand Province, Afghanistan in September 2007. Capt Rushworth was tasked to undertake both Project Manager and Contract Works Officer roles for the new C-17 Globemaster Austere



Runway – a large, complex and challenging project that would provide a significant uplift in logistic capability and was considered critical to subsequent military success. The project was struggling to gain momentum in challenging and arduous conditions. Captain Rushworth challenged, where appropriate, historic practises in order to ensure the highest of engineering standards as well as financial scrutiny and efficiency. He demonstrated initiative, vision and the ability to develop solutions based on core combat engineering skills and professional engineering techniques. His management of a multinational subcontractor workforce demonstrated his tenacity, adaptability, project management and leadership skills. His command and control of the project as a whole and of individuals within the project team was exemplary; setting a personal example in everything he undertook. The Camp Bastion Austere Runway upgrade was completed 7 weeks ahead of schedule and \$4 million

under budget – a direct result of Captain Rushworth’s leadership, determination and engineering professionalism.

Royal Signals Operational Engineering Award

Captain Chris Fulthorpe was at the forefront of maintaining and enhancing the communications network in Helmand Province, Afghanistan, during a 6-month period in 2007. Under his guidance, a number of complex technical and infrastructure projects



were successfully delivered. This resulted in major improvements both in the resilience of the underlying communications network and the range of services which could be offered to users. He exercises his engineering judgement on a daily basis, prioritising, deconflicting and driving work parties to meet deadlines in an environment dogged by lack of resources. His impact on the operational capability in Afghanistan has been immense.

Royal Electrical & Mechanical Engineers Operational Engineering Award

Captain Paul Cummings

has consistently demonstrated his commitment to the professional standing of the Corps and specifically to his personal engineering ability. Commander Equipment Support 3rd (United Kingdom) Division stated that the two reasons for the marked improvement in the Regiment’s Equipment

Care standards were “a new Commanding Officer and Captain Cummings”. His personal involvement in all that his Light Aid Detachment achieved during a uniquely challenging operational tour supporting a Battlegroup in the desert Maysaan Province to the north of Basrah make him a worthy nomination for the REME Operational Engineering Award; the onus here being on operational.



Royal Air Force Operational Engineering Award

Wing Commander Peter McAlpine as OC Forward Support Wing at RAF Odiham, has delivered an inspirational performance in driving a developed theoretical model of future Chinook engineering into practice. In so doing, his efforts have led directly to increased aircraft availability, both in the UK and on Operations, and the force has achieved a third more in flying rate than ever before. He also has delivered significant financial savings, led the Transformation drive across the unit, and influenced Boeing and the Defence Aviation Repair Agency to enhance their approach to aircraft maintenance. Wing Commander McAlpine has set a sterling example of operational engineering leadership.



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 material availability targets for any of the Armed Forces. The recipient would normally be chosen from the Defence Equipment & Support Organisation.

Lieutenant Andrew Searle RN has a deep engineering knowledge, ability to project manage under pressure and a thorough professional approach in trialling the Land Phalanx Weapon System. These weapon systems provide valuable air cover to UK forces coming under enemy fire. This was a rapidly developed weapon system which required extensive testing before operational deployment. As a new and unique weapon, Lt Searle was required to exercise judgment based upon engineering first principles and was instrumental to the deployment of this essential support to the UK operation in Iraq.



THE MASTER'S AFTER DINNER SPEECH

Wardens, Your Royal Highness, Visiting Masters, Distinguished Guests, Ladies and Gentlemen.

A very warm welcome to you all to our Annual Awards Dinner here in Merchant Taylors' Hall, and especially to our Company guests and those here as the personal guests of Liverymen; we are delighted you could join us.

It has been a most enjoyable evening and Merchant Taylors' Hall and its staff have done us proud with excellent food and wine and all whilst listening to the wonderful music of the Light Orchestra of the Corps of the Royal Engineers. On behalf of us all may I thank the Orchestra; the Caterers; and the Merchant Taylors' Company for the use of this magnificent Hall.

The Engineers Company gives great importance to our Awards and tonight is the opportunity to celebrate the work of the Award Winners both from the Armed Services and from those in the civilian sectors. At this time I would wish to express thanks on behalf of the Company to the Award Judges for their diligence and hard work in selecting the 17 Award winners- it's no small task by any standards



The Master, Tony Roche

The Worshipful Company of Engineers acknowledges the huge debt of gratitude that the Nation owes to all the Armed Forces working to defend the Realm and in seeking to bring and maintain peace wherever they are asked to serve.

In these dangerous times the challenges are many and for those of you serving as engineers in the Services

we pay tribute to the enormous contribution you make in times of both peace and conflict.

The development and advancement of technology and engineering is essential whether it be for either civilian or military purposes. Progress comes from many quarters and it is right that we celebrate the contribution of all members of the corporate body of Engineers.

The work of our scientists, technologists and engineers has significant impact on the wealth of our nation, on our quality of life and on our ability to provide assistance to other countries. This is not only evidenced in the visible exports of leading edge hardware and software products, but also in the contribution it makes to the strength of the City of London and its significant achievements in the favourable balance on invisible trade. Therefore let us also recognise and pay tribute to those engineers working in Industry, in the wider Business Community and in Education.

Hearty congratulations to each of tonight's prize winners- you are a credit to the engineering profession and we wish you success in your future careers.

This is our 25th Anniversary year and there are a number of milestones to celebrate-it was on the 5th July 1983 that we submitted our petition for the Grant of Livery to the Lord Mayor and the Court of Aldermen. The petition had the support of 41 engineers and was only 6 days after the first formal meeting of the Company on 29th June 1983; just 7 days later on the 12th July it was received favourably by the Court of Aldermen. Engineers have a tradition of getting things done quickly and accurately and this achievement in a total of 13 days remains a proud record for the Company

On this important occasion we are especially delighted to welcome His Royal Highness The Duke of Kent, who has been a Member of the Company since June 1995. He is now an Honorary Liveryman and Assistant Emeritus of our Company and we were especially privileged when he presented us with our Royal Charter on 27th April 2004 in this very Hall. Your Royal Highness we are most grateful for your attendance here this evening during our 25th Anniversary year.

With us tonight we have a number of distinguished guests from the armed services including General Sir

Kevin O'Donoghue, The Chief of Defence Materiel and Chief Royal Engineer; Mr Jonathan Lyle, The Commandant of Defence College of Management; distinguished serving One Star Officers from Headquarters Fleet Portsmouth; from The Royal Engineers; from The Royal Signals; The Engineer in Chief, Army; Commandant of the Defence College of Communications & Information Systems; Headquarters Air Command, High Wycombe; Senior officers representing the Defence College of Electro-Mechanical, HMS Sultan; The Royal Electrical & Mechanical Engineers; and the Defence College of Aeronautical Engineering, Cosford



Sir Kevin O'Donoghue, Chief Royal Engineer

Also with us are Professor Malcolm Gillies the Vice Chancellor of City University, Major General Cima, Governor of HM Tower of London, and Mr Martin McCann, Chief Executive Officer of RedR, The Registered Engineers for Disaster Relief.

From the Professional Engineering Institutions, Mr Keith Millard, Senior Deputy President of the Institution of Mechanical Engineers; Mr John Loughhead, President of the Institution of Engineers and Technologists; Liveryman Professor Ray Clark, Chief Executive Officer of the Society of Environmental Engineers

A special welcome also to our guests from other Livery Company's, Mr Jonathan Hudson, The Master Ironmonger; Commander Hugh Evans, The Master Innholder; Mr Nicholas Carr, The Master Plaisterer; Captain Tony Davis, The Master Mariner; Mr Martin Wade, The Master Constructor; Mr David Morriss, The Master of the Information Technologists; Air Commodore Rick Peacock Edwards, Master of the Guild of Air pilots & Air Navigators Gentlemen we are delighted you could join us this evening, you are all most welcome.

The Company has had a long and fruitful relationship with the Corps of the Royal Engineers, including a memorable Out of Town Visit to Chatham in 2005 with Past Master Major General Ted Willmott, himself a distinguished Royal Engineer.

Sir Kevin O'Donoghue has been a good friend to the Company during his years in office and it is a particular pleasure that he will propose the Toast to the Company of Engineers. Sir Kevin has had a long and distinguished career with the Royal Engineers having been firstly engaged through a Territorial Army commission in 1968 whilst at the University of Manchester Institute of Science and Technology.



Merchant Taylors' Hall

Subsequently in 1971 he converted to a Regular Commission and has held a wide range of military appointments at various places around the world including Sandhurst, the Falklands, Hameln Garrison, Supreme Allied Powers Europe and the Ministry of Defence in London. He is currently the Chief of Defence Materiel, responsible for delivering all aspects of the Defence Equipment and Support Plan covering some £76 billion of MOD assets and with an annual operating budget of £16million. He is currently the Chief Royal Engineer and Honorary Colonel Commandant of the Royal Logistics Corp.

Sir, we look forward to hearing your response on behalf of the guests.

But before that can I ask members of the Worshipful Company of Engineers to rise and drink a toast to our guests

The toast is "Our Guests"

PROFILES OF NEW LIVERYMEN

As almost all Liverymen will know it is traditional when new Liverymen are clothed at a Court Meeting which is only followed by a Court Dinner they are invited to speak to the Court about their careers.

This is not possible when the Court Meeting is followed by the Installation or Awards Dinner so I asked the new Liverymen invested in April and July if they would like to let me have a brief history of their careers. They were all pleased to oblige and what they might have said to the Court follows:

Professor Pat MCKEOWN, OBE, FREng, MSc, DSc(Hon), FIMechE, FIET, FIED, FCIRP, FSME(USA).

I started my engineering life as a student apprentice with Bristol Aircraft Co in 1952 after two years' National Service in the Royal Engineers; I was advised to go to what was then "The College of Aeronautics" at Cranfield, now Cranfield University, to do a two years MSc. I did, but during this time a certain political disaster named Duncan Sandys issued an official government defence policy document saying that manned military aircraft would be totally redundant within some ten to twenty years. This caused mayhem in the industry with consequent cancelling of projects etc. so, having become interested in metrology and precision manufacturing, I decided not to return and joined a famous Swiss machine tool company for some 14 years.

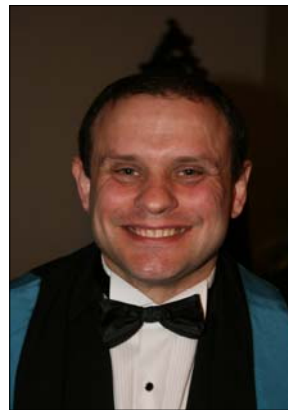


I returned to Cranfield in 1968 having helped to gain Min Tech funding (part of the "white heat of technological revolution" promised by Harold Wilson and Tony Benn in 1967) to set up what turned out to be the most successful of the six university based Min Tech Units "to bridge the gap between university engineering and UK industry" Over the following 28 years we designed, built and delivered a wider range of truly ultra-precision machine tools than any other organisation in the world, in many cases achieving nanometre precision and true sub-micrometre accuracy on work pieces of more than one metre size. I enjoyed my career in R&D / pushing the frontiers forward in high precision engineering, from 1975 or thereabouts merging into nanotechnology.

Chasing and securing the next decimal point in machine accuracy was always an exciting challengeit captures many others throughout the worldbut gratifying to know that we in the UK were ahead of the game and remain highly competitive in the field today. So perhaps Sandys wasn't a total disaster for me!

Dr Mark A WILLIAMS, CEng, BEng(Hons), MSc, PhD, FIMechE.

I was born in Coventry on 23rd August 1969 and was raised in Rugby with a brother and sister by my father, Stuart Martin, and my mother, Irene Anne who were both school teachers. I attended the local Grammar school and left in 1986 to start my career in engineering as a technician apprentice with GEC Turbine Generators. After finishing my apprenticeship I went on to study Mechanical Engineering at Nottingham. I then went on to complete a Masters Degree in Manufacturing Technology at the University of Manchester



Institute of Science and Technology (UMIST) before going on to be awarded a PhD in 1998 in New Product Introduction and Business Process Re-engineering. I then moved back into industry to work at Jaguar and Land Rover (JLR) as a Manufacturing Process specialist before moving to The University Of Warwick in 2003. I am currently based in WMG as a Principal Research Fellow on a number of engineering research projects working with a wide range of interesting companies including JLR, Metris and Tata Motors, India. This work resulted in my qualification as a Chartered Engineer in 2004 before being elected as a Fellow of the Institution of Mechanical Engineers (FIMechE) in 2006.

Stephen Davies, BSc(Hons), MICE.

I am a Chemical Engineer and have worked in the area of design and supply of capital projects to predominantly the hygienic industries (Food, Dairy, Beverage, Brewing, Healthcare and Pharmaceutical sectors) all of my career to date. This has encompassed the design and installation of complete manufacturing facilities down to modifications of pieces of existing equipment; example customers would be Unilever, Dairy Crest, Danone, Coors etc.



I am a long standing member of the IChemE Food & Drink Subject Group and have represented the UK manufacturers on the international Hygienic Requirements For Design Of Machinery Group (ISO TC/199). I have mentored, coached and acted as an IChemE reference for many Chemical Engineers throughout my career.

I am currently the CEO for Pursuit Processing Equipment Ltd the commercial arm of the start up Pursuit Dynamics Plc Group. Pursuit Dynamics has developed and is commercialising the innovative PDX® fluid processing reactor in areas such as Food, Brewing, Bio Ethanol, Fire Suppression, Waste Processing and Decontamination. This varied role allows me to keep close to engineering R&D and system design in conjunction with general management responsibilities.

I am married with three children and live in West Sussex. My wife, Sarah-Jo, is a Liveryman of the Worshipful Company of Armourers & Brasiers, so I have some experience of City Company activities.

I am delighted to have been accepted into the Worshipful Company of Engineers and I am looking forward to getting to know the Company, the members and to playing my part in its future.

Dr Dougal Goodman, Polar Medal, MSc, MA, PhD, FREng, FICE, FInstP, FIMMM.

I was educated at Christ's College, Cambridge where I read Natural Sciences specialising in theoretical physics. I stayed on at Cambridge to take a PhD and to do post-doctoral work at the Cavendish Laboratory, the physics department at Cambridge, undertaking research into the creep and fracture properties of ice. This included many expeditions to the Arctic and one to the Antarctic to observe glacier and sea ice behaviour. The Antarctic expedition was with the US Antarctic Programme and included observing the bending of the sea ice runway at McMurdo Sound as aircraft landed and observations of the flexing of Erebus Glacier Tongue, a floating glacier 13 km long and 0.3 km wide as ocean waves passed underneath.



After a year spent in a Japanese university experiment on ice single crystals and doing more field work, I joined BP to run a research effort in Alaska and Canada to estimate the design load for offshore production structures to be built in sea ice zones.

In the mid-80s I worked as an operations manager in the North Sea responsible for the Magnus oil field and for a period worked offshore as a production manager on a Forties platform. At the end of the 1980s I was appointed Head of Safety for BP with responsibility for safety across all the company's operations which at that time included exploration and production of oil and gas, chemicals manufacture, refining and retailing, mineral extraction, coal mining and even the production and marketing of food.

After spending a year at the Graduate School of Business at Stanford, California as a Sloan Fellow I moved into strategic management in the company working first on corporate strategy and then in refining management and corporate risk management. I worked on the strategy to refocus the company onto its core businesses, as strategy and planning manager for European refining and for the Company Secretary on risk management issues.

In 1995 I became Deputy Director (and Acting Director) of the British Antarctic Survey where I was responsible for research strategy and implementation, making the case for the future funding of the Survey, economic studies of South Georgia, began a PFI deal to purchase a ship and devised the process for the bid for the next five year plan. During this time I was also awarded a £0.5 million grant by the DTI to develop closer links between the UK science base and the insurance industry and to run a Short Programme at the Isaac Newton Institute for Mathematical Sciences on managing uncertainty.



Dougal Goodman measuring surface strain changes

In 2000 I was appointed Chief Executive of the Foundation for Science and Technology a charity which works with parliament, Whitehall, industry, the Research Councils and universities to promote debate about policy issues with a science, technology, engineering or medical element. I also undertake consulting work for the insurance industry and is currently working for the International Group of Protection and Indemnity (P&I) Clubs on their annual reinsurance purchase strategy. The P&I Clubs provide third party liability insurance for around 90% of the global shipping fleet. I am Chairman of the Lighthill Risk Network, a body working to promote more co-operation between the insurance and science communities, a former Vice-Chairman of the Hazards Forum, an engineering body promoting improved awareness of risk issues, and I have served on the Cambridge-MIT Institute Advisory Board and the Department of Environment, Food and Rural Affairs Science Advisory Committee for a study of risk management in the Department.

I have been on fifteen expeditions to the Arctic and Antarctic for scientific study or with my family. I was awarded the Polar Medal by HM Queen in 1998 for my contributions to scientific exploration in the Arctic and the Antarctic. I am a Fellow of The Royal

Academy of Engineering, the Institute of Physics, the Institute of Materials, Minerals & Mining, the Institution of Civil Engineers and the Royal Geographical Society and a member of the Gino Watkins Travel Fund committee; a charity which helps to fund expeditions.



James Clark Ross in Ice

**Derek Adams,
BSc, MSc, CEng, FStructE.**



My career started at the age of 16 in the drawing office of a firm of Consulting Engineers in Victoria St London. A few years and a degree course later I was working in the Oil and Gas Industry on the design, fabrication and installation of major North Sea drilling and production platforms and also onshore petrochemical plants.

While this work took me to such exotic places as Istanbul and Stornoway well over half of the next 22 years were spent in Norway either in Oslo or in one of the Norwegian coastal towns. For the past 8 years my experience in the design of structures to support heavy equipment, those subject to dynamic loads and lifting and moving unusual shaped objects has been neatly transferred to working on replacement and refurbishment of Lifts and Escalators for London’s Underground Railway. In 2006 I completed an MSc at City University with a Dissertation on the “Interaction of lift cars and guide rails under emergency braking”. Most academic years I mentor MSc students at City University with specialist computer analysis advice.

EurIng David Gutteridge, BEng, CEng, FICE, MHKIE.



David Gutteridge is a Divisional Director within Mott MacDonald Ltd. in Croydon where he manages the Tunnels Division and plays a key role in many metro projects. He has over 35 years working experience, mostly in design in the UK, but including ten very enjoyable years in south-east Asia where he was involved with metros in Hong Kong, Singapore and Taiwan. David is currently working on the Crossrail project in London as well as the Dublin Interconnector. David is also the Chairman of London Excellence and Chairman of Council at CIRIA. When he is not working, David lives in a 250 years old cottage near Banbury in Oxfordshire and relaxes by playing golf (handicap 15), running with the Hash House Harriers and gardening. David and his wife, Ceridwen, also enjoy taking their black Labrador to the local pub. David used to play rugby but retired when his bones started to break. He is now a keen spectator.

Singapore and Taiwan. David is currently working on the Crossrail project in London as well as the Dublin Interconnector. David is also the Chairman of London Excellence and Chairman of Council at CIRIA. When he is not working, David lives in a 250 years old cottage near Banbury in Oxfordshire and relaxes by playing golf (handicap 15), running with the Hash House Harriers and gardening. David and his wife, Ceridwen, also enjoy taking their black Labrador to the local pub. David used to play rugby but retired when his bones started to break. He is now a keen spectator.

Dr David Mba, BEng, PhD, FIMechE, FHEA, FInstNDL, FSOE, FIPlantE.

Dr David Mba has a 1st class degree in Aerospace Engineering and completed a doctoral programme in Mechanical Engineering at Cranfield University in 1999 where he was awarded the University's Lord King Norton gold medal for the best doctoral thesis. After his doctorate Dr Mba was retained by the University and currently is the Associated Dean in the School of Engineering. He plays a significant role in the strategic direction of the School, and is responsible for quality and delivery of all twenty-three Master degree programmes across the School. He currently heads the Turbo-machinery and Icing group.



Dr Mba's area of expertise is in vibration and Acoustic Emissions, particularly the application of these

technologies to rotating machinery. He is a convenor for an ISO (International Standards Organisation) working group and was responsible for the publication of the first international standard on Acoustic Emission in condition monitoring of machines. He also contributes to several working groups with the British Standards Institute (BSI) and British Institute of Non-Destructive Testing (BINDT) on condition monitoring.

Paul Wood, CEng, FIET, FEI.



“My first job in 1972 was as a Marine Engineer with the BP Tanker Company Limited. When my training finished in 1977, I left the sea to join Schlumberger, a major oilfield services company. I undertook further training with them and became a Wireline/Well Test specialist – these are arcane roles in an industry built on such segmentation. I spent three years in Schlumberger, working in field operations offshore and onshore in Iran, Saudi Arabia, Bahrain and the United Arab Emirates. This was during the first oil price shock, the lessons from which seem to have been forgotten in the lamentation surrounding us today! Wishing to get married, I sought more domesticated work, and joined Shell International Exploration and Production in 1980. After more training as a production specialist, I was assigned to Sarawak in the island of Borneo, where I spent six happy years and gained two fine sons with a continuing predilection for Asian food. There I built and commissioned offshore facilities, and led planning and hydrocarbon allocation activities. In 1987 I was posted to the North Sea, where I was the youngest Offshore Installation Manager to be appointed to a major offshore platform. My time offshore included working the fallout from the Piper Alpha disaster. I helped build and commission more facilities offshore UK, then moved into a superintendent role. In 1992, I was set to Nigeria as the Head of Well Services. This was a fascinating and very challenging assignment in a country that demands commitment. Following that, in 1996, I was posted to Syria as the Head of Business Services; a posting that required me to promptly develop my political skills. My next role, in 1999, was as the faculty head for Production Engineering in Shell Learning, in The Netherlands. During this assignment I was the architect of Shell's online university, which changed the way Shell staff received training; the

model moved from classroom courses to blended (classroom/distance) learning. I feel this was my most significant and lasting achievement in Shell so far. In 2002, I was made the head of the Global Production Improvement team, and was proud to deliver over 100,000 barrels/day of additional production for each year of my assignment. My latest posting, from 2005, is as the Middle East Regional Production Manager for Shell EP, based in Dubai. To my considerable personal pride, in 2005 I was also appointed one of just seven Global Technical Consultants (GTC) in Shell EP, and the only surface operations GTC. The GTCs are considered to be the finest all-round engineers in Shell EP, and represent the pinnacle of Shell's Technical Progression Ladder."

"Engineering has been my passion since I first discovered, like many before me, the Meccano set. I was fortunate to grow up in the period when it was still possible to wander round a scrapyards as a child; and the ready abundance of MOD surplus equipment allowed cheap experimentation. During the early space programme, weedkiller and sugar rockets regularly devastated back gardens but drove quite advanced understanding of fuel chemistry and nozzle geometry. Later, a tension arose between a desire to see the world, and a passion for practical, hands-on engineering. I decided, as many Brits before me, to go to sea. While fulfilling my urge to travel, and training me for every eventuality, I did tire of the routine, and soon found myself working in the very different, and unpredictable world, of oilfield engineering. This, it turned out, had as many toys as a big boy could wish for, with vast budgets and a drive for innovation that met my needs better than I could have hoped. With thirty years now across four continents, I have had responsibilities that others can only dream about. My passion now is to share my fascination with young engineers from every continent, and to help them to find the same fulfilment and satisfaction in their careers that I have been so fortunate in myself."

I am proud to be a liveryman of a Company with such distinguished engineers as members. I look forward to supporting the Company's educational and charitable initiatives to ensure success for British engineering now, and particularly in the future.

GOLF DAY 25 July 2008

CLANDON REGIS GOLF CLUB

The Livery Company's Annual Golf Day was again held in bright and warm sunshine for the third and final year at Clandon Regis Golf Club near Guildford.

18 golfers played in the morning 9-hole Texas Scramble and 21 players competed in the 18-hole Stableford Trophy round in the afternoon.

The course was in excellent condition and some demanding pin placings made for two interesting and challenging competitions; the scores for both being closer than for many a year.

The winners of the Texas Scramble, with a net score of 28 were the Clerk, Graham Skinner, with two guests Chris Taylor (guest of the Master) and John Pullen. Another team comprising the Middle Warden, John Robinson, Helen Ferrie and Andrew Evans shared the same score but were beaten by a better score on the back 6 holes (sorry about the technicalities which, whilst informing the golfing fraternity, will mean and matter nothing to the rest of The Swordsman readers!)

A lunch of chilled watercress soup and sandwiches was followed by the main match, the Engineers' Trophy competition, which again was closely contested in the men's game with five players being within a point of the winning score (closer even than last week's Open Championship!)

The prize winners were announced at the end of a dinner and the Master presented the prizes.

The outright winner on 34 points was Andrew Evans, guest of Sylvia and the Senior Warden, Chris Price. Runner up with 33 points was the highest scoring Liveryman, Past Master Richard Rooley who once again will hold the Trophy bought at the outset of the annual competition by Richard and his father.

John Huffell won third prize also on 33 points but with a slightly lower back 9 score (more technicalities!); fourth and fifth places, also with 33 points went to Rob Walmsley and David Scahill.

But it really was the Rooleys' day as Ruth stormed home to win the ladies' competition also scoring a best of the day 34 points. It was also Ruth and Richard's wedding anniversary a fact that the two kept quiet until the end of the evening!

Next year the Golf Event will be held on 26/27 July 2009 at the Stratford upon Avon Welcome Hotel and Golf complex.

David and Gill Scahill

PERSONALIA

We welcome new Liverymen invested at the Court Meeting held on 8 January 2008



Brian NUTTELL
CEng, FIET, MCIBSE



Alan John GRANT
BSc.(Hons) PhD, CEng, FIET,
FInst Physics, CPhysics



Hugh Nicholas HARGREAVES
TD, MA, MSc, FIMechE, FIET



David James Anderson CALDERWOOD
BSc (Hons), FIET

We welcome the new Liveryman invested at the Court Meeting on 26 February 2008



Timothy George MARSH
CEng FIET DMS

We welcome the new Liverymen invested at the Installation Court Meeting 24 April 2008



***Professor Patrick Arthur
McKEOWN OBE
FREng, MSc, DSc(Hon) FIMechE
FIET FIED FCIRP FSME(USA)***



***Stephen Albert
DAVIES
BSc(Hons) MICE***



***Dr Dougal Jocelyn
GOODMAN
Polar Medal FREng FICE
FInstP FIMMM MA PhD MSc***



***Dr Mark Antony WILLIAMS
CEng BEng(Hons) MSc PhD
FIMechE***

We also welcome two new Court Assistants at the Installation Court Meeting



***Professor Isobel Anne POLLOCK
BSc(Eng) ACGI CEng Hons DSc FImechE***



***Commodore Barry Philip Stewart
BROOKS Royal Navy
FIMarEST FIEE BSc(Eng) DipNRT FCGI CEng***

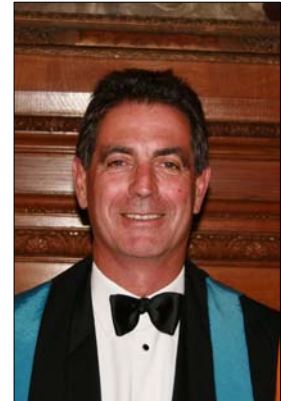
We welcome new Liverymen invested at the Awards Dinner on 8 July 2008



***Eur Ing Simon Adrian MILES
MEng(Hons) CEng FIET
IFMechE MIAM***



***Derek Albert ADAMS
BSc MSc CEng FIStructE***



***Eur Ing David Roy GUTTERIDGE
BEng CEng FICE MHKIE***



***Dr David Uzochukwesi MBA
BEng PhD FIMech FHEA
FInstNDL FSOE FIPlantE***



***Paul Geoffrey Doake WOOD
CEng FIET FEI***



The New Liverymen with the Master