

The Worshipful Company of Engineers

(Incorporated by Royal Charter 2004)

The Swordsman Newsletter

Issue 24, May 2010



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Top Left	The Master Chris Price exchanging a Loving Cup with the Master Elect John Robinson on Election Night
Top Right	The Master John Robinson presenting the Immediate Past Master Chris Price with his Goblet before dinner after Installation
Centre	The New Master and Immediate Past Master with his certificate of service.
Bottom Left	The Installation Dinner at Fishmongers Hall.
Bottom Right	The Master and Officers.

FUTURE EVENTS

24th June 2010	Election of the Sheriffs	Guildhall
6th July 2010	Awards Dinner	Gibson Hall
25th-26th July 2010	Annual Golf Competition	Welcombe Club Stratford
24th-26th September 2010	Out Of Town Meeting	East Yorkshire
28th September 2010	Election of Lord Mayor	Guildhall
6th October 2010	Ladies Luncheon	House of Lords
29th October 2010	Annual Banquet	The Mansion House
13th November 2010	The Lord Mayor's Procession	
15th December 2012	Carol Service	Tower of London

EDITORIAL

This Edition number 24 of the Swordsman includes important papers on the some of the Charitable Work supported by the Company in addition to the usual reports of Company' Functions. After a very successful first 25 years since its Foundation in 1983 the Immediate Past Master led detailed discussions on how the Company should seek to develop over its next 25 years. A summary of the proposals adopted by the Court and Common Hall is included in this edition and the whole of his paper can be accessed through our web site.

As always I would like to thank the willing reporters of the Company's Events who make my job much easier and I hope that you enjoy this edition. Letters and contributions from Liverymen are always welcome.

Raymond Cousins
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THE BRIDGE LECTURE 10th February 2010

The title of this year's bridge lecture is an excellent example of the spirit of the bridge lecture series, connecting (bridging) practising engineers with those benefitting from engineering. Douglas Oakervee gave an excellent and inspiring presentation to a packed Oliver Thompson lecture theatre at City University. The evening commenced with a welcome to City University from the Acting Vice Chancellor, Professor Weinberg, who stressed the importance of Engineering to the University, both historically and currently. Even the building room numbering system has engineering roots, the room number prefix of 'CM' representing civil and mechanical engineering. It was heartening to hear Professor Weinberg state that the future of Engineering at the University is good. Professor Weinberg also expressed his gratitude for the support of the Company.



Professor Weinberg, Doug Oakervee and The Master



Douglas Oakervee OBE, FREng

The Master then introduced Douglas, one of the country's most distinguished Civil Engineers, vastly experienced in the delivery of major projects, former Executive Chairman of Crossrail and a Liveryman of the Company.

Doug's presentation took us on an impressive journey through the complexities of the Crossrail project covering a multitude of aspects, including establishing the company, obtaining government support, statutory approval, dealing with HM treasury, and the engineering challenges. It was fascinating to hear of the details of this ambitious project and to understand the potential benefits. *His presentation is given in full detail, below.*

The range of questions reflected the depth and breadth of the lecture. The questions commenced with issues about safety and flooding and how these had been incorporated into the design? Douglas responded that the design takes due account of flooding as does the existing Underground system. All aspects of safety are of paramount importance especially fire and evacuation. The London Fire Brigade have been positively engaged with us for nearly 2 years and influenced the design of tunnel walkways, cross passages, points of intervention, the smoke extraction and ventilation systems as well as developing a new protocol regarding the direction in which smoke travels in conjunction with evacuation routes. Safety also included consideration of security against terrorism involving station accessing being built to prevent ramming vehicles and also to stop flooding, entrances being placed at a higher level. Professor Tony Ridley from Imperial College considered that Doug's greatest achievement was in getting close to HM treasury and wondered how he had achieved treasury approval. Doug's response stressed the importance of open, honest and good communications. The innovation he introduced was a series of workshops with HM treasury, working with them to enable a full understanding of the challenges and risks. This meant that Treasury staff could report to their superiors based on knowledge and fact rather than speculation and rumour. Other questions related to the details of interchanges and the extent of Crossrail. One questioner wondered why the line was planned to stop at Maidenhead in the West when Reading, a major interchange, was effectively the next station 'down'. There are historical reasons for this but it would be of no surprise if Crossrail goes on to Reading at some stage. Doug involved some of his Crossrail team, who were supporting the lecture, in answering questions about improving services already coming into major interchanges with Crossrail, such as Liverpool Street. These considerations are included in the planning. The final question was about a possible extension of Crossrail to Amersham. This is complicated by the existing track and is unlikely to happen in the near future but there may be possibilities of another branch to the West for our children's children.

The Middle warden John Banyard gave the vote of thanks summarising some of the key points from Doug's riveting lecture. In particular he noted the estimated economic return of £38 billion from an investment of £15.9 billion, and marvelled at Doug's capacity to survive the many parliamentary meetings, alternative proposals and numerous dinners. He was thankful that the Philharmonic Orchestra had not been affected by the cavern under the Barbican and highlighted some of the many innovations in the project such as 'green' stations, the cooperative working with other companies and the benefits to the environment for example at Wallasea Island. He also highlighted the benefits of the project to Engineers and Engineering in the future through the legacy of a well trained workforce and the inspiration that the project will bring to current and future generations.

An excellent evening was rounded off by the hospitality of City University with a glass of wine and some food supporting continuing discussions on the lecture and networking.

Peter Bullen

CROSSRAIL – CROSSING THE CAPITAL, CONNECTING THE UK

Douglas Oakervee OBE FREng

It is a great privilege and honour to be invited to present the Bridge Lecture for 2010 which is entitled "CROSSRAIL-Crossing the Capital, Connecting the UK". Crossrail is that much needed and long overdue transport link connecting the Great Western, Great Eastern and Southern Regions of Network Rail.

My involvement with Crossrail commenced in December 2005, on a part-time basis, when the then Secretary of State for Transport the Rt. Hon. Alistair Darling and The Mayor for London Ken Livingstone appointed me Executive Chairman. An arrangement had been reached between the Permanent Secretary to the Department of Transport and the Chairman of P&O to enable me to pursue this new role yet continue as Director of London Gateway Port Limited. This was fine but all I was actually looking for was a modest role to occupy me in retirement. Thanks to the acquisition of P&O by Dubai Port World I was able to devote the whole of my time to Cross London Rail Links Limited, the Company responsible for Crossrail.

My service continued until the 31st May 2009 at which point I stepped down in favour of a younger duo, Terry Morgan as Non-Executive Chairman and Rob Holden as Chief Executive, to lead this fantastic scheme through its implementation to completion. Therefore this lecture focuses on the history of Crossrail and the challenges that had to be overcome before the necessary legislation was put in place and a funding package agreed enabling Crossrail to proceed. Detailed accounts of design, engineering and construction will, no doubt be the subject of numerous papers and lectures to be delivered throughout Crossrail's exciting future.

What Is Crossrail?

Crossrail is a high frequency urban rail service travelling at moderate speed. It extends from Maidenhead in the west to Paddington and on through the West End and City to Stepney Green in East London where it bifurcates with one leg going to Shenfield in Essex and the other going out through Canary Wharf beneath the River Thames to Abbey Wood in the London Borough of Greenwich. There is also a spur connecting Heathrow Airport.

Why do we need Crossrail?

Prior to the current global recession it had been estimated that the growth in employment along the east west axis paralleling the path of Crossrail would result in another 636,000 jobs by 2016. Further it was anticipated that the population of Greater London would grow by 800,000.

Although there has been considerable improvement in bus capacity and upgrades on the Underground the transport system has been struggling to meet the existing demands let alone coping with further demand.

Even though the timing of these forecasts could be challenged in the current climate and may not be achieved until beyond 2016 the predicted demand remains. A delay could be of benefit as the phased opening of Crossrail does not begin until 2017. What is certain is that without the introduction of Crossrail together with Thameslink, the continued



The Crossrail Route

Upgrades to the Underground, the extensions to both the East London Line and Docklands Light Rail the Capital will not be able to retain its prime position as the World’s leading financial centre.

The History

As I have already stated this railway is long overdue for it has been considered on several occasions over the last 40 years. And even before that an examination of historical records will show that railway engineers since the early 1800’s have had aspirations to connect the mainline network underground from east to west and north to south. To some extent that was achieved by the Underground system that evolved. Therefore, before considering Crossrail as now being constructed, it may be of interest to briefly review railway history for the past 170 years for the need for Crossrail can be frequently detected.

Conscious of the ever growing traffic congestion in London during the 1830’s the great railway engineers of those days looked to see how they could resolve the problem. Both Robert Stephenson and Isambard Kingdom Brunel were interested in the problem as their new termini of Euston and Paddington were then on the outskirts of central London. In 1836 Robert Stephenson had prepared plans to extend his newly completed main line beyond the Euston terminus in tunnel under Gower Street and Covent Garden to the Savoy Wharf on the River Thames.

Transport schemes under London met with serious objection for it was feared that the weight of the traffic overhead would crush any tunnels beneath, and the houses above the proposed routes would collapse from the vibrations. This, coupled with the problem of operating steam locomotives underground and how best to ensure passengers in open top wagons, let alone the driver and fireman, survived and were not asphyxiated by smoke. As a consequence the Stephenson plan did not come to fruition.

The Metropolitan Railway Company appeared to overcome these problems by 1863 when on the 10th January they opened the World’s first underground railway. This was in reality an extension of the Great Western Railway running from a junction at Paddington to Farringdon using 7’ 0” broad gauge locomotives and stock. Crossrail is to link these same two stations as well as going underground just outside Paddington.

Real solutions to London’s traffic considered.

The next milestone in the history leading towards Crossrail was the 1905 Royal Commission Report on transport in London. Among other things it recommended two new avenues be constructed, each 140 feet wide, one from Bayswater Road to Whitechapel and the other from Holloway to Elephant & Castle. Each was to have a four-track

tramway on the surface and a four-track railway in tunnel beneath. Had this proposal been adopted in full I am sure London's transport problems of today would not have emerged.

This of course came in the early days of railway electrification, when long tunnels without frequent ventilation shafts first became possible. The opening of The City and South London Railway in 1890, heralded this new era by being the first Tube and electrified railway in London. This was quickly followed by the Central Line in 1900, Bakerloo and Piccadilly in 1906 and the Northern in 1907. London's Underground had arrived and remains with us today.

Crossrail begins to emerge.

No further thought to a scheme similar to Crossrail appears to have been given until "Movement in London" was published by GLC in 1969 which describes a range of work done over the previous six years led by the GLC and the Ministry of Transport. One of the scenarios this report examined, referred to as G/B, was very similar to the scheme included in the later "London Rail Study" published in November 1974. For the first time the route was referred to as Crossrail. This study had been commissioned by the Minister for Transport and the Greater London Council in February 1973 under the chairmanship of Sir David Barran, a former Chairman of Shell.

The report examined many schemes put forward by both British Rail and London Transport which included a route for Crossrail and the Hackney Chelsea Line, now known as Crossrail 2. The report's epilogue opens with the following statement:

"This is not, and cannot hope to be, a study to end all studies. We doubt whether there will ever be a complete solution to London's rail problems, and this report certainly does not provide one. Indeed it does not even provide final answers on all of the major investment projects which we have examined."

Little changes! However, the report did recommend that further studies be carried out for the Crossrail scheme and notes that if the findings support the proposal it is likely to change the priority for further transport investment. This can therefore be regarded as the start of Crossrail as we know it today.

Ken Livingstone told me he well remembers this report being presented to the Greater London Council in 1974 and recalls that the estimated construction cost for Crossrail had increased from £175 million in the 1969 Study to approximately £300 million.

Nothing of note happened with the report and the Crossrail files gathered dust for 14 years until London Underground published "Central London Rail Study" 1988. And then in 1989 and again in 1990 reports having the same title were published but this time included DfT, BR, LRT as well as London Underground.

The first attempt to develop Crossrail

These reports lead to a private Bill sponsored by London Underground and British Railways going before Parliament in 1991. One of the requirements of a private Bill is that the promoters must be able to demonstrate that the funds to build the scheme are in place or at least that there is a realistic prospect that such funds will be available. HM Treasury was unwilling to give the necessary commitment and a great deal of time was expended in the Commons Committee examining the business case for the project. Matters were not helped by the recession in the early 1990's temporarily depressing passenger journeys into and through London. In the end the project was voted out in the Commons Committee and Crossrail was dead.

Crossrail in the doldrums

Notwithstanding opposition, there was still support at high level in government for Crossrail and strongly backed by Sir Wilfred Newton the Chairman of London Transport and Sir Bob Reid the Chairman of British Rail. Thought was given to raising a Transport and Works Act order to authorise construction and work started on preparation of the order, but before much progress could be made the decision was taken to privatise British Rail and the project was again mothballed.

Fortunately, Sir Wilfred kept in place a small team to safeguard the alignment of Crossrail together with that for Crossrail 2, the Chelsea – Hackney line. This was almost certainly the most important single act in Crossrail's long history for it saved the scheme and ensured it continued to have a future.

Without this work the corridor would have been built on, including some very large buildings with deep foundations. A notable example is the Paddington Central development where a corridor was left through the piles to accommodate the railway.

Despite the enthusiasm and support from Sir Wilfred and Sir Bob in 1997 new political hurdles inhibited the progress. Namely, the completion of the privatisation of British Rail with Sir Bob stepping down weakened the team coupled with the fact both major political parties being fully engaged with the impending General Election.

High hopes of punching through the bureaucracy.

Following New Labour's success, John Prescott was appointed deputy Prime Minister and created the Department for the Environment, Transport and the Regions (DETR). The first major initiatives to be taken forward were the establishment of the London government including the Greater London Assembly, Transport for London and the Mayoralty, and secondly, the creation of the Strategic Rail Authority (SRA). The SRA took over the functions previously undertaken by the Office of Rail Franchising and the British Railways Board and a number of other government activities. The relationship between these creations and government proved to be very difficult and took a long time to settle down. The election of the Mayor for London was also not without its own excitement and political clashes.

One of the DETR's first acts was to commission a 10 year transport plan which was delivered in late 1999 and set out a number of very ambitious targets for development of the transport system over the period. These were largely focussed on switching transport from being mainly road based towards greater use of rail. Though the recommendations were not prioritised it suggested that the schemes for Central London should be developed.

Defining London's Rail needs

In January 2000 the SRA were asked to review the department's report by the end of the year on North- South and East-West links across London. The North-South study reported in June. It recommended the implementation of the Thameslink scheme, which had been in preparation for some time, and also suggested taking over the East London LU Line and its northern extension, for which powers had already been obtained, extending it to the south and incorporating it into the national rail network. The recommendations were accepted very quickly and the necessary Transport and Works Order applications were made or, in the case of Thameslink, brought to a conclusion.

Work on the East West study took longer and discarded many of the schemes as unrealistic or too remote from centre of town to be of much benefit. This effectively left three possible corridors relatively free from underground obstructions running across central London roughly in an east west direction. These were the original Crossrail proposal, the Chelsea Hackney corridor and a line reserved for the original Jubilee Line (then called the Fleet Line) running from Charing Cross, along Fleet Street to St Paul's, which had been kept clear of deep foundations.

Having got to this stage the first decision to be made was what kind of railway it should be recognising the policy for some time had been that no totally new lines should be built at tube structure gauge but rather the national rail or sub-surface line gauge be used. The next question was should it be a self contained line or linked to existing railways. The advantages of linking to existing railways had recently been demonstrated by the RER in Paris. The most economic solution found was to have the central section underground and surfacing as soon as practical to link with the existing surface railway network.

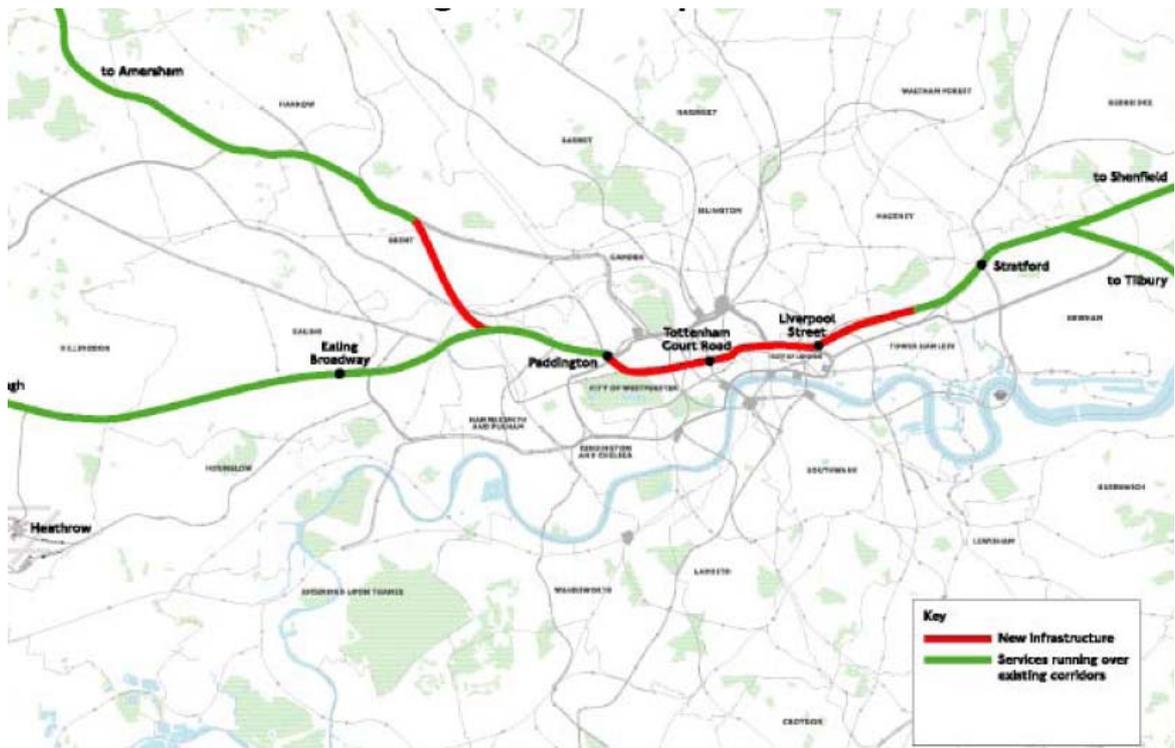
The extent of the railway was the next issue and proposals wide ranging with the longest proposal being from Southampton to Ipswich. However, it was obvious that if the line was to effectively distribute passengers through central London several stations at key locations would be required and served by a high frequency train service similar to the Underground. Whereas, trains serving the outer destinations require less frequent services as they attract fewer passengers. This would necessitate traffic from a larger number of remote origins being combined close to the central

section to meet the increased frequency. Whilst tests showed a marginal increase in the fare-box the benefits were outweighed by operational consideration and hence this approach was dropped.

Further examination of the abandoned Fleet Line corridor demonstrated that it would be difficult to access the West End and also was too far away from the strongest traffic potential. This left the original Crossrail alignment and the Chelsea Hackney Line. Three possible options were worked up; one for each of these two routes and one for a combination of the eastern half of Cross Rail and the south western part of the Chelsea – Hackney Line. In each case long and short distance options were tested. Crossrail and the composite SW to E option came up to about the same benefit cost ratio but the E-W route was more affordable and provided a link to Heathrow, for which there had been considerable agitation by the City of London.

The report was presented to the SRA Board and, following its adoption, to the Deputy PM on 22 December 2000...

Cross London Rail Links Limited comes into being.



London East West Study

After several months consideration by government Cross London Rail Links Limited was formed in June 2001 the shareholding being held equally by the SRA and TfL. Sir Christopher Benson was appointed Chairman. This arrangement was not regarded as ideal by most but necessary given that the scheme required both parties participation. Governance and relationships proved a challenge and remained so throughout the company’s seven years existence.

Initially the company took over the safeguarding team set up by Sir Wilfred Newton and were joined by a small number of engineers from the SRA and led by SRA director Keith Berryman whose role was to prove pivotal to the success of Crossrail from that time through to Royal Assent.

Refinement of the scheme together with the evaluation of the final destinations beyond the central section continued. The most important point to be recognised was the importance of Canary Wharf, which hadn’t really existed when the original Crossrail route was selected. Detailed analysis of the many options was brought to a close and by November 2002 a scheme broadly similar to that which is now being built had been worked up and ‘The Case for Crossrail’ had been produced. This was presented to the newly formed CLRL Board whereupon some members challenged management by introducing radical changes to improve the business case.

This came to the attention of the Department of Transport and as a consequence on the last day of Parliament in July 2003 the then Secretary for State Alistair Darling announced that a review was to be carried out by Adrian Montague.

Parliament and the Hybrid Bill

Adrian Montague reported in early 2004 and his report was considered by ministers during the spring of that year. Again on the last day of parliament, in July 2004, Alistair Darling announced that a Hybrid Bill would be brought forward as quickly as possible.

A herculean effort managed to complete hundreds of sets of documents, each weighing 40kg, in time to enable the Bill to be deposited and given its first reading in February 2005. During the following spring both the Chairman and CEO completed their terms of office and by then Sir Adrian Montague took over as interim chairman with Keith Berryman as the Managing Director.

It was at this point that I was approached to become the Executive Chairman and was appointed the following December as mentioned earlier. The second reading of the Bill occurred in late July 2005 following the general election.

Unlike a private Bill a hybrid Bill does not require the promoters to demonstrate that funds are available to construct the project, the assumption is that if government is promoting a Bill then the money will be found to fund the cost. The second reading establishes the principle of the Bill and once this stage has been passed the fundamentals of the scheme cannot be re-opened in the committee stage.

The Select Committees hear the petitions.

The Bill having had its second reading allowed petitioning to start with the Commons Select Committee commencing its session in February 2006 under the chairmanship of Alan Meale MP. Like many select committees, members of parliament are not always anxious to volunteer for only the Chairman gets paid and this was particularly so with the Crossrail Bill as it was expected to be demanding, hence the delay in starting. But the Chief Whip found the solution for the Labour members; those appointed were on a punishment detail for voting against the 90 days Detention Bill. True democracy!

The parliamentary process through both Houses to Royal Assent took three and half years, the longest in the history of Parliament. During this time some 579 petitions were lodged. Although many of these were settled before reaching the Select Committee others had to be argued through. Some we lost, the most notable being a requirement to build Woolwich Station box and provide an extra entrance for Liverpool Street Station.

In an earlier version of the scheme there had been a plan to carry freight on part of the eastern section of the route, which meant the shallow gradient needed to carry trains under the River Thames would have meant going very deep under Woolwich making the cost of a station prohibitive. The freight option thankfully evaporated largely because the Docklands Light Railway took over some of the track which connected to the tunnels. This enabled the gradient to be revised to accommodate a station at Woolwich.

Lighter moments behind the curtains

Despite the seriousness of the process there were some lighter moments. One petitioner proposed to build a huge monorail through central London and beyond instead of Crossrail. The artist's impression accompanying the submission was to become known as the giant curtain rail. This should not have been considered as it was outside the fundamentals of the Bill scheme but members of the select committee were concerned the petitioner may have claimed that he had not had a fair hearing under the Human Rights Act. All went well until the petitioner announced he was a "Welsh Fundamental Methodist" and could only take the oath on a bible that did not include The Old Testament. This threw the Clerks, for they had the Old Testament for Jewish people, the Koran for Muslims and even plates for the Greeks but nobody had ever heard of the "Welsh Fundamental Methodist" before and did not have a bible without the Old Testament. By now it was 8.00 pm but miraculously after some time and presumably through some sacrilegious act a bible with the New Testament only appeared. The rest of the evening was spent in rather surreal proceedings finishing very late. However, without changing the face of Crossrail the petitioner departed content that the members of the Select Committee had listened to him with the utmost patience and reverence.

The end in sight

Both the Select Committees, under their respective Chairs, in the House of Lords Viscount Colville, QC and in the House of Commons the Hon. Alan Meale MP, did an outstanding job over a very long period. Towards the end pressure was applied to the process from within government to ensure that matters were concluded before the Summer Recess. On the last day of Parliament 2008 both Houses sat late into the evening until after Grand Committee met, the third reading heard and report back to the Commons; then they remained in place until the Bill was taken by messenger to Buckingham Palace for the Queen to pronounce in old Norman French “La Reyne le veult” which, when translated, was “the Queen wills it.” Royal Assent was received on the evening of 22nd July 2008 after the Bill entered Parliament on the 22nd February 2005. The hybrid Crossrail Bill was no longer – for, after many years, the Crossrail Act was in being, providing the legal right to build the railway.

Gaining Public and Political Support

During the early days of the parliamentary process in 2005 and 2006 Crossrail met with considerable opposition in the public, business and political arenas. The media coverage tended to be against the scheme rather than in support. Therefore it was necessary to turn this situation around to ensure that if and when the Bill had been enacted it would be possible to gain financial and government approval to commence construction. History shows that all major infrastructure schemes require a champion to succeed. The Jubilee Line Extension would not have happened had it not been for Margaret Thatcher taking on this role. In the case of Crossrail it was Ken Livingstone who in June 2006 put his full force behind the scheme.



Support from HRH The Duke of Kent KG GCMG GCVO

All parliamentarians of both Houses were not in support for many saw this as just more money being poured into London and the South East at the expense of the deprived regions in the Country. The claim that London is the power house generating the country’s wealth was not accepted by a good number. An All Party Parliamentary Crossrail Group was formed for both the Commons and the Lords under the chairmanship of Mike Gapes MP. This group was regularly updated by the Ministers, the Mayor, the Commissioner for Transport, leaders of other key groups and

stakeholders as well as myself. The Chair and members of the group did an excellent job and together we found considerably more favour.

Baroness Jo Valentine the CEO of London First always recognised the need for Crossrail if the Capital was to retain its global leadership position. The Members of London First are a wide range of businesses from sole proprietors to multi nationals and whose voice is heard in Government and the City. Jo arranged a series of dinners over a period of 18 months with small intimate groups of her members allowing me to promote the benefits of the scheme. This had a very positive effect for Crossrail and a profound effect on my waistline. Within the Square Mile the project had its own champion Sir Michael Snyder (Chairman of the Policy and Resources Committee from 2003 to April 2008) of The City of London Corporation. Sir Michael was always a strong ally although he regularly interrogated me concerning costs. He was also responsible for enabling the City’s financial contribution to the Project.

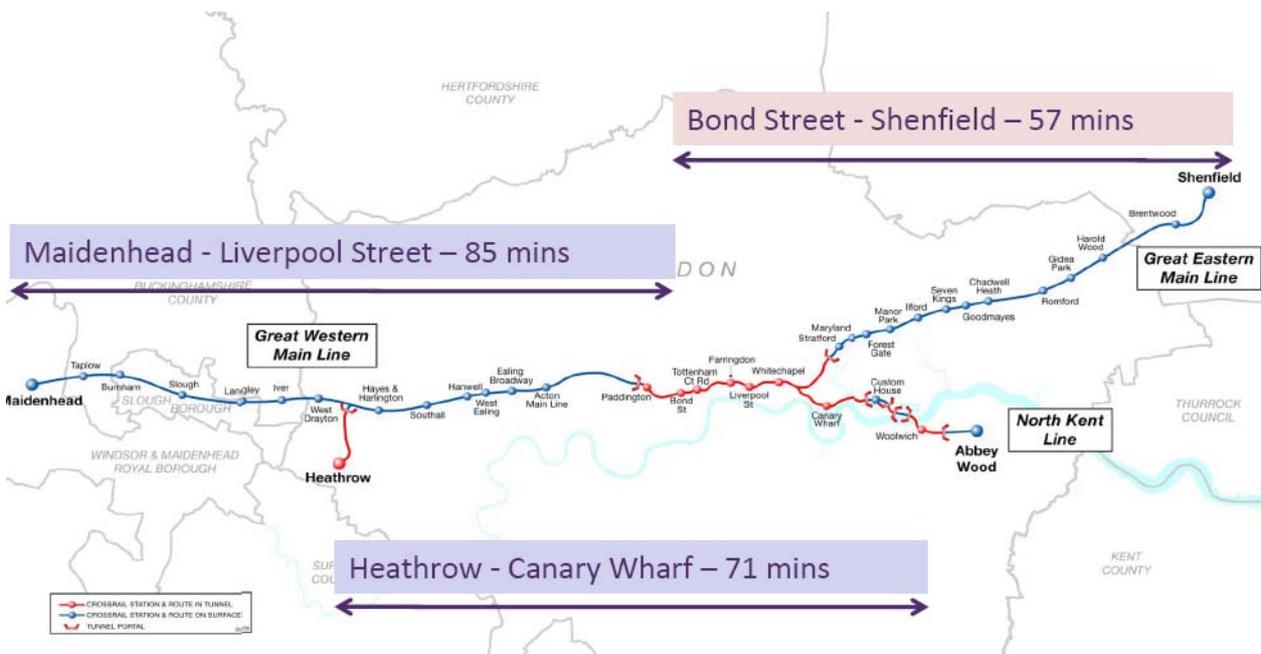
All these exercises were conducted in parallel to the Bill process and without achieving support through these channels combined with a proactive PR drive and taking every opportunity to speak at many public forums and events it is unlikely approval would have been so readily given in 2007 by the Prime Minister.

The Benefits and Economics

It is clear from history that there has always been a driving ambition to achieve direct connections between London’s east and west for reasons of freight and passenger movement. London Transport has achieved the latter throughout the 20th Century by its network of buses and the underground railway. However as we are all painfully aware the systems have been creaking at the seams despite the modernisation in hand and the introduction of the Victoria and Jubilee lines in 1968 and 1979 respectively and the Jubilee Line Extension in 1999.

One interesting observation is that London’s population in 1939 was over 8 million and despite recent increases is not expected to fully recover to that same level before 2016. So why can’t the present transport system with all its post war extensions and upgrades manage given that it was adequate to meet pre-war demands. Before the Second World War there were in excess of 1.5 million jobs available in engineering and light industrial alone in and around London and people generally lived close to their employment often walking or cycling to work. That same industry has all but disappeared with many now enjoying a different lifestyle and commuting long distances placing ever greater demand on the infrastructure.

Transport benefits.



Existing Journey Times

Although not a high speed railway in today's parlance Crossrail will reduce journey times considerably for example: Maidenhead to Liverpool Street is reduced by 34 minutes, Bond Street to Shenfield by 10 minutes and Canary Wharf to Heathrow by 28 minutes. Of equal importance is that potentially a further 1.5 million passengers will be within a 60 minutes commute from the City centre. And this will be achieved in the comfort of air conditioned trains of a style and type consistent with a new railway of the 21st Century.

The frequency of service in central London will at peak be 24 trains per hour in each direction and will bring considerable relief to overcrowding and congestion on the Underground. Crossrail will also increase the capacity of the public transport network by 10% which is significant by any standard. The new railway will not only provide employment for its operations and management but will engage some 14,000 persons at the peak of construction and upon completion is expected to enable another 30,000 jobs within the central London area.

The wider economic benefits

Naturally several business cases have been produced over the decades and all have been scrutinised by others, most notably the Treasury. Whilst each is of interest it is worth reflecting on the business case produced in 2007 which demonstrated that Crossrail was not only viable but would generate economic growth and as a consequence this assisted in gaining approval to take Crossrail forward.

The economic appraisal conducted for the 2007 Business Case varied considerably from the previous study in 2002. The 2002 economic appraisal concentrated only on the direct transportation effects, in the form of changes to time and comfort for travellers and had been assumed to capture the whole of the economic benefits. The 2007 work carried out by Volterra Consulting and Colin Buchanan extended that analysis of economic benefits by developing an approach which quantified and valued the impact of Crossrail on central London growth and productivity by applying the theory of agglomeration.

This approach suggested that the economic impacts of Crossrail on business productivity valued in this way were both very large and entirely additional to the transport impacts. This approach was considered radical and contrary to the conventional approach to transport appraisal. But after consideration the arguments were sufficiently compelling to cause the DfT to modify their Guidance Notes on the matter. Sadly this change also demonstrated that UK had for years been under investing, in urban rail infrastructure in particular, by ignoring the wider economic benefits.

The issue still to be resolved and rationalised with government in the context of the wider economic benefits is the treatment of future tax revenues. Currently no allowance is given to tax revenues yet any reduction in VAT or fuel tax has to be treated as an additional cost. If railways are expected to remove freight and passengers from the road to penalise them for the loss of revenue from fuel tax seems to be at odds with that expectation. In the case of Crossrail the Gross Domestic Product (GDP) over 60 years at present value (PV) will give rise to an increase of at least £36 billion with corresponding national tax revenues of £14.8 billion. I say "at least" for the range of benefits calculated for the high scenario amounts to £67 billion with a corresponding increase in tax revenues. Whilst the economists believe the high level scenario is closer to reality government and Crossrail have been prudent and used the low forecast in preparing the business case. Even using the lower forecast the Cost Benefit Ratio (CBR) is better than most other infrastructure projects and exceeds 2.6:1. Using the more optimistic scenarios this could increase to 8:1.

Governance and Funding

As I indicated earlier the governance of Crossrail has always been complex, largely due to the different agendas of the DfT and TfL and the related ministerial and mayoral goals. Obviously the former holds national interest to the fore whereas the latter interests revolved around London. This situation was not altered by Boris Johnson succeeding Ken Livingstone as Mayor of London on the 2nd May 2008. However, circumstances did change following on from Royal Assent on the 24th July 2008 when the Secretary of State appointed the company [Crossrail] as a Nominated Undertaker.

In August 2008 the non executive directors who were drawn from the ranks of the two sponsor's retired and new independent non executive directors were appointed by the Secretary of State. This was followed on 3rd December 2008 when, after many of the differences between the parties had been resolved, Crossrail, DfT and TfL entered into

the Project Development Agreement. At this point DfT's 50% shareholding in the Crossrail Company was transferred to TfL.

Being a wholly owned subsidiary of TfL only eased the issues of governance in the corporate sense but Crossrail "the Project" was still owned jointly by both the Department and TfL. In addition we had partners from the public and private sector joining the team, namely, London Underground, Network Rail, Canary Wharf and Berkeley Homes.

On the 29th January 2009 CLRL changed its name to Crossrail Limited and continues under that name. The reason the name was not used from the outset was because Crossrail Ltd had been retained by the DfT for a scheme in Glasgow which was subsequently cancelled.

An affordable Railway

Much of the engineering and planning done by CLRL since its formation in 2001 had merely been an extension of the work started in 1989 for the Private Member's Bill put before Parliament in 1991. Not surprising therefore that for some their efforts and element of design represented near perfection. However, the sum of the parts did not necessarily equal an affordable railway having the functionality required for the 21st Century.

To address this issue and much to the dismay of my engineers I invited the MD for implementation, Richard Morris, himself a veteran railway operator to undertake a Value Management exercise. This he did over a period of 6 months holding 106 workshops involving over 300 staff from all organisations involved whether stakeholders or designers. This not only improved functionality but brought about some significant changes which in most cases resulted in savings. The most notable being the relocation of the depot from Romford to Old Oak Common; the removal of working shafts for tunnelling resulting from a change to the tunnelling strategy and dispensing with the huge cavern beneath the Barbican which was to accommodate a cross-over. The latter was much to the relief of the London Symphony Orchestra who lived above. It must be said that some options were not available earlier due largely to land ownership issues.

The other areas explored were hazards, safety, emergency procedures for fire and evacuation. In these matters the London Fire Brigade played a key role for it is they that set the rules. This resulted in a small reduction in the number of intervention shafts required as well as improved safety procedures. During the course of reviewing the functional needs of the railway a culture of preventative maintenance evolved and I am sure will continue to develop during the railways construction, commissioning and trial operation. The exercise was of immense value and above all else made all appreciate that we were required to design and build an integrated railway system rather than an engineering masterpiece with a risk that it was unable to function efficiently. Not surprising therefore that the outcomes of this exercise align with the present Crossrail Visions and Aims.

The Outturn cost.

The original estimate accompanying the hybrid Bill was in 2002 money and based on the scope in the Bill as submitted to parliament which over the years had been modified both as a result of the petitioners and the value management exercise. Although, as I have previously suggested, some elements of design had been optimised, others had remained vague and nowhere was this more prevalent than in systems and especially signalling. Hence hefty contingency was allocated against these areas. In addition the estimators had been extremely prudent and often added contingency on top of contingency.

To address these issues two parallel exercises were initiated. The first a quick top down estimate was undertaken by our Development Manager, Bechtel who had direct access to a wealth of pricing data relating to CTRL, West Coast mainline rebuild, Jubilee Line Extension as well as other railway projects overseas. The second approach was a bottom up estimate based on the design as it stood with current rates and prices. Surprisingly the results were extremely close and indicated that reductions to the capital cost could be made and provided the confidence to offer an outturn cost of £15.90 billion. Following many months of detailed analysis, audit and scrutiny by all parties involved including the OGC and HM Treasury this sum remains the same and represents outturn cost for the whole project in terms of nominal monies. Rolling stock is however the sole exclusion and this will be procured through the DfT's standard leasing arrangement.

This approach was made possible and feasible by the close working relationship and involvement of HM Treasury alongside the Sponsors. A situation arose in late 2006 that provided an opportunity for teams from both Treasury and CLRL to jointly hold a series of intense workshops to explore both the estimates and the quantified risk analysis supporting the contingency allowance. This enabled both organisations to speak with knowledge and confidence rather than speculation. Further and in addition to the normal OGC reviews there is the more onerous Major Project Review Group (MPRG), a panel of independent experts chaired by a high officer from HM Treasury, who interrogates the plans and intentions of the delivery agent, sponsors and stakeholders alike. It is not until satisfaction has been reached that final approval to commence work is given by the Chancellor and the Prime Minister.

The outcomes were enshrined in the “Project Development Agreement” which was signed in December 2008 and defines what is to be delivered by Crossrail in terms of scope, programme, functionality and outturn cost. The MPRG does not let matters rest at this point but continues its work up to and beyond the point of financial commitment and/or no return.

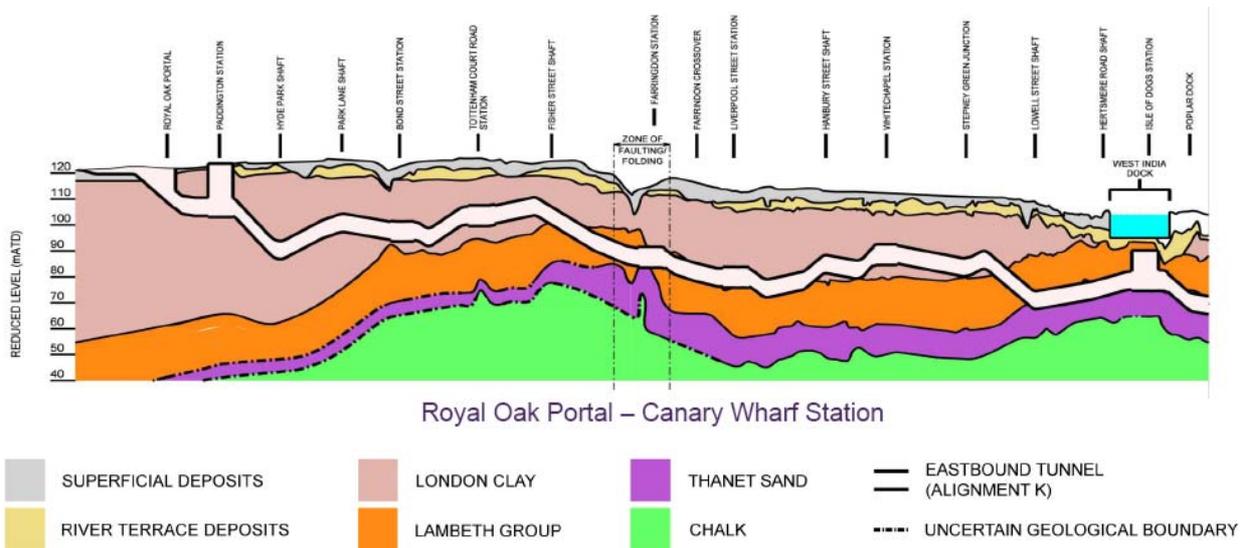
Funding

The Prime Minister visited Crossrail’s Office on the 5th October 2007 together with The Mayor, Ken Livingstone and Secretary of State Ruth Kelly, other officials and London business leaders to announce that a funding package for Crossrail had been agreed and gave his approval for the scheme to go ahead. The funding package included both guaranteed and unsecured funds from the City of London, a contribution from BAA and investment contributions from both the Canary Wharf Group and Berkeley Homes. The overall funding package had been underwritten by TfL to the amount of £7.7 billion and DfT £5.6 billion and the balance of the £15.9billion from other parties including Network Rail and the unsecured contributions

Constructing Crossrail

The works to be undertaken over the next seven years are extensive and the Project is largest construction job in Europe. This section describes in brief the nature of the construction and some of the methods to be used. The Works to be undertaken include 90 km of existing surface network to be upgraded with the section from Paddington to Maidenhead requiring electrification, new signalling, upgrading of 17 existing

Geology and tunnelling



Geology Long Section

The ground conditions under London are generally conducive to tunnelling which accounts for the extensive networks that have been built under the City over many years. Despite the many tunnels and obstructions the Crossrail alignment has for the most part been kept within the band of London blue clay which is the ideal medium. However,

the Lambeth beds and Thanet sands are encountered at Farringdon and West India Dock and will require the tunnelling techniques to be modified.

The new twin bored running tunnels, that have to thread their way across London between existing tunnels and obstructions, run from the Royal Oak Portals west of Paddington to Stratford and then from Stepney Green beneath Canary Wharf and the Thames emerging at Plumstead. The tunnels have a nominal internal diameter of 6.0m and the total route length of twin bore being 21 km. Eight new sub-surface stations at Paddington, Bond Street, Tottenham Court Road, Farringdon, Liverpool Street, Whitechapel, Canary Wharf and Woolwich have to be constructed. All, with the exception of Woolwich, have to be fully integrated with the existing Underground lines and in addition those at Paddington, Farringdon and Liverpool Street have to connect with the mainline rail services.



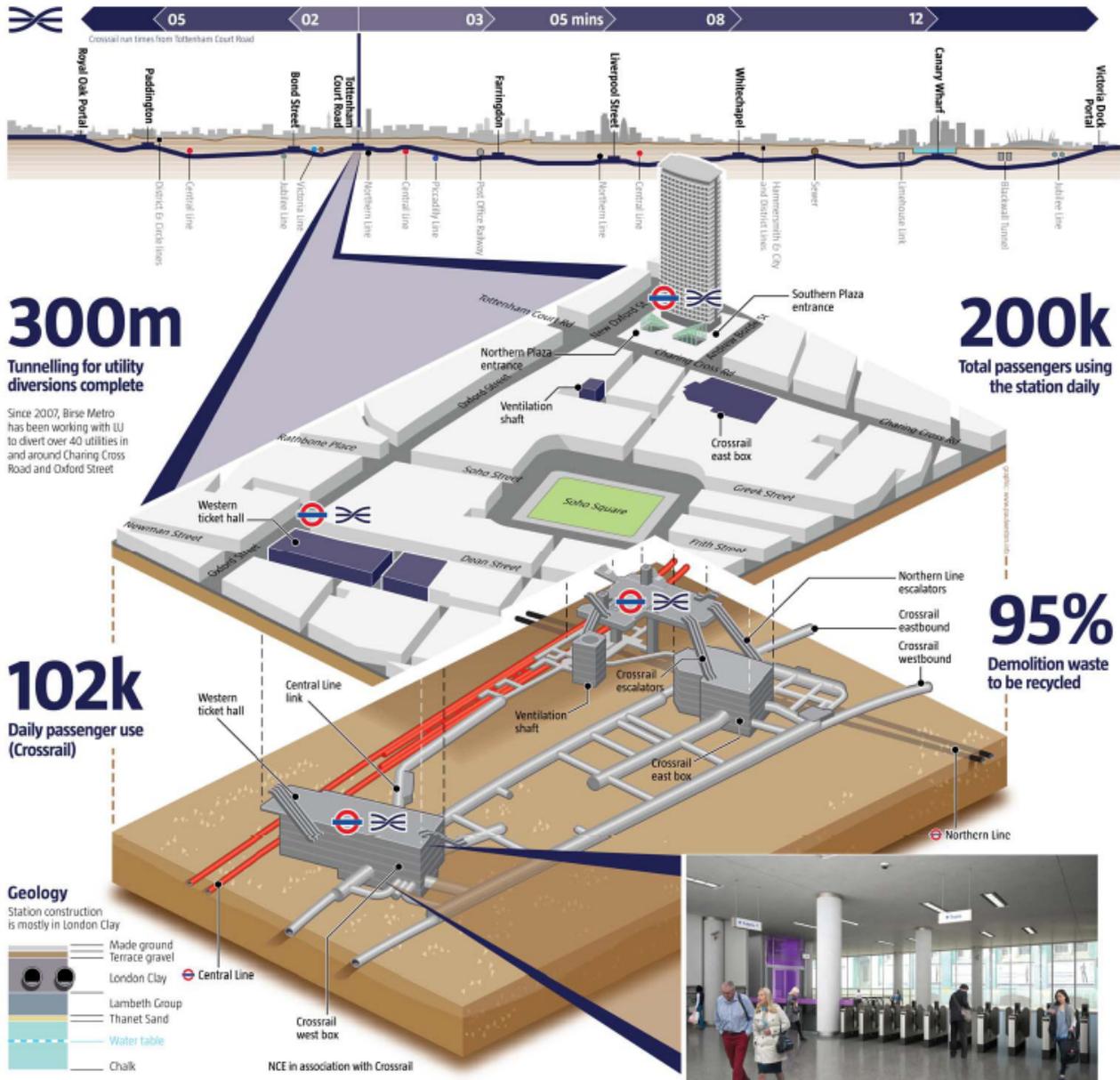
Tunnel Boring Machine

The running tunnels are driven as separate bores using a Tunnel Boring Machine (TBM) and the type to be used are Earth Pressure Balancing type. These machines have a cutting head rotating about its centre with teeth to suit the nature of the ground with positive support being provided at all times. Support to the ground being excavated is achieved by balancing the rate of muck discharge from the screw conveyor with the TBM's rate of advance.

In wet or bad ground conditions compressed air can be used within the sealed Plenum Chamber to balance the water pressure and stabilise the material being excavated. The permanent tunnel support will be achieved by means of pre-cast concrete segments built within the machines tail skin and the annulus filled under pressure with cement grout as the TBM advances. Depending on discussions with the contractor and further detailed investigation of the chalk beneath the Thames on the tunnel alignment it may be necessary to employ a Slurry TBM in preference to an Earth Pressure Balancing machine on this stretch.

The Station tunnels have on average an excavated diameter of 11.00m. The tunnel face is advanced in short sections with spray concrete being applied immediately to provide temporary support. Thereafter a waterproof membrane is installed and further layers of spray concrete are applied to the required design thickness and the finished internal

diameter. The external walls to the ticket halls and concourses above the station tunnels will be either use diaphragm walling or piling techniques both of which are ideally suited to London’s ground conditions. The diagrams which follow clearly demonstrate the complexity of the station layouts and the work to be undertaken and their increased size compared with the existing Underground facilities and especially the platform tunnels which are twice as long – 250m to accommodate the 10 or 12 car Crossrail trains.

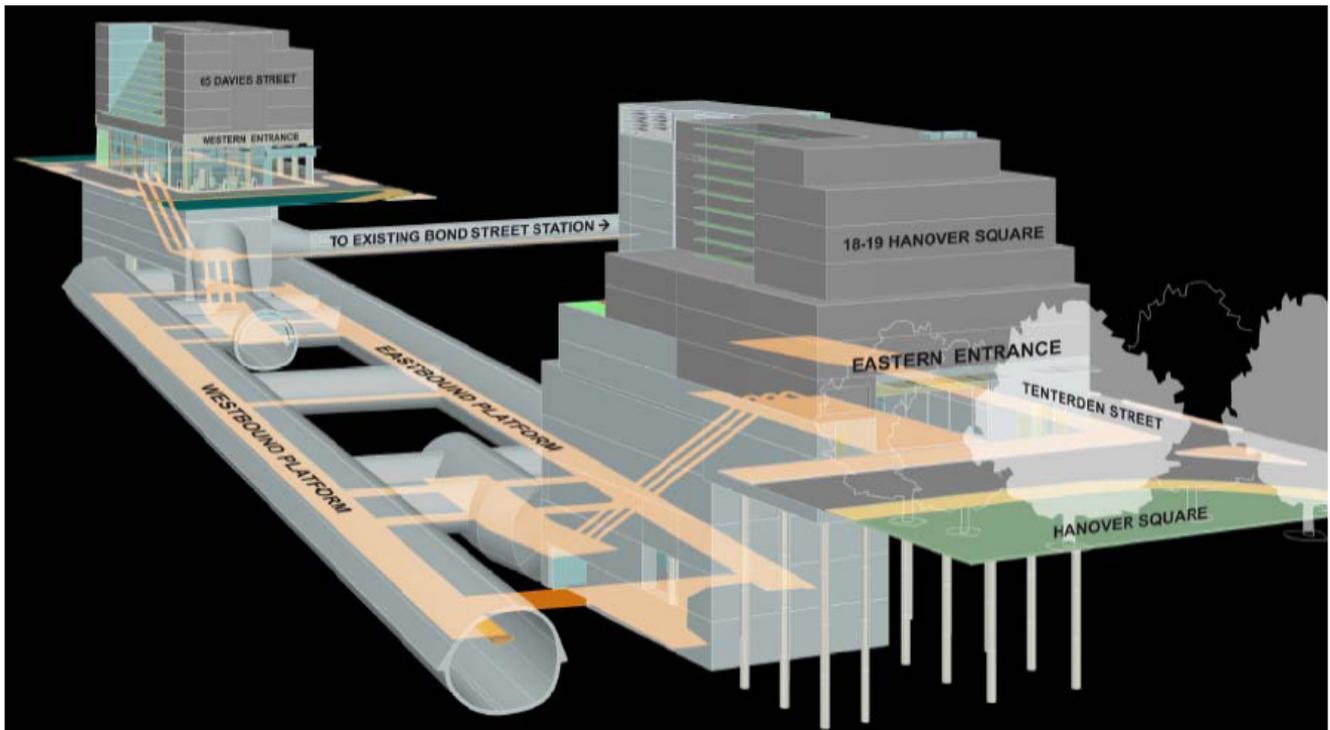


Tottenham Court Road Station

Works Partners

The 90km of surface railway to be upgraded is a major challenge especially on the extremely busy approaches to Paddington Station as will be the electrification to Maidenhead and the integration of new signalling system. Not surprisingly this work is being undertaken by Network Rail on our behalf albeit Crossrail retains the overall responsibility for the programme and commissioning. As our Partners Network Rail are also undertaking major works on the Eastern section and both Farringdon and Abbey Wood Stations. London Underground is undertaking the upgrade works at both Bond Street and Tottenham Court Road Stations. The Canary Wharf Station and the station box at Woolwich are being respectively built and financed by the Canary Wharf Group and Berkeley Homes.

Over site developments



Over-Site development at Davies Street and Hanover Street

Crossrail provides an excellent opportunity for new development especially in conjunction with many of the station sites. This was recognised during the Bill's passage through Parliament and the Secretary for State entered an Agreement of Collaboration with developers who owned 80% or more of property over key stations in the central area. This enabled developers at their own risk to commence design before Royal Assent and in conjunction with the Crossrail designers create an integrated development. This has worked well and the stations in the West End when complete will create greater areas of urban realm than previously existed.

The nature of these developments includes residential, retail, housing and entertainment and will have been through a process of extensive consultation before being finalised. Every effort will be made to optimise the revenues from this source.

Logistics

As is the case with most major engineering Programmes no matter how complex the secret of success often lies in the logistical management. Crossrail is no exception to this with numerous working sites spread throughout the length of the railway and has to remove 7.3 million cu m of spoil arising from the tunnels and stations. This will occur between 2010 and 2015 and at the peak 200,000 cubic metres will be moved per month, 14% by rail, 39% by barge and 47% by road.

The challenge is not only the disposal of the material but how it may be best used or recycled. Crossrail has been able to reach agreement with the Royal Society for the Protection of Birds (RSPB) that the majority of the excavated material generated will be used to create a huge new wildlife reserve on Wallasea Island in Essex. All the material will be transported by ship and the Island will be transformed from arable farmland into 607 hectares of tidal wildlife habitat. This project is very sustainable and the type of habitat when created will soak up carbon at the rate of 2.2 tonnes per hectare per year. The delivery of materials is also crucial especially in the central area for if uncoordinated could cause major congestion which must be avoided. It is intended to build on the good work achieved by the Olympic Delivery Authority and continue to use their consolidation centres together with others to be established.



Wallasea Island

Rolling Stock and traction power

As has already been mentioned the rolling stock is not included in the Outturn cost but Crossrail is involved with the Sponsors and Network Rail in determining its characteristics. The intention is that the trains will be lightweight and energy efficient with no wasted space to maximize the passenger capacity. In order to lower energy consumption and minimise CO2 emissions the vehicles will have regenerative braking preventing excessive heat energy being released into the tunnel which also reduces train maintenance.

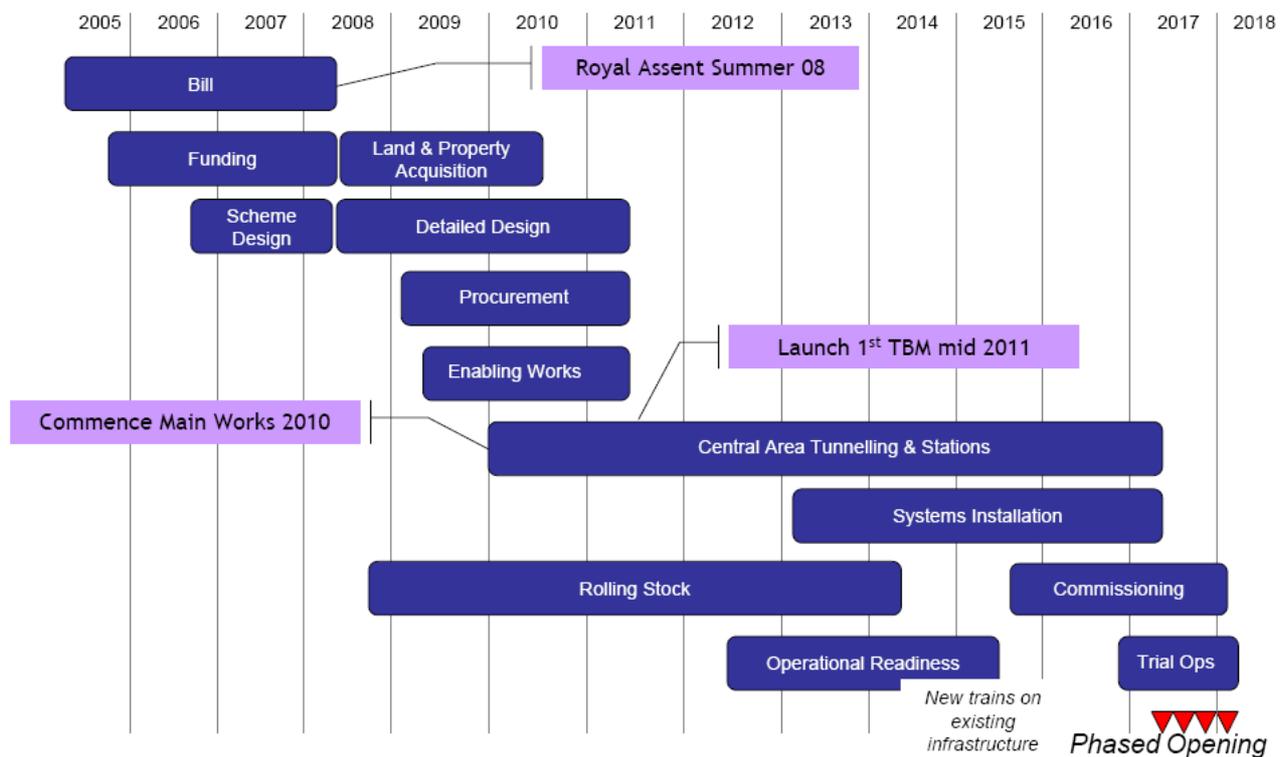
A fully integrated traction power design has been developed which will ensure 100% receptivity of the overhead supply to optimise the benefit of the energy being returned as a result of regenerative braking. The use of a low resistance fixed bar catenary within the tunnels will help minimize systems losses. In cooperation with the National grid and the supplier EDF the bulk power supply points will allow any excess energy to be fed back into the Grid.

Programme

Given the extensive volume of work to be undertaken the programme is demanding but achievable. The acquisition of land and property commenced shortly after Royal Assent and is expected to be complete by mid 2010. Likewise the detailed design commenced through a series of framework contracts let in the summer of 2008 and will continue through until mid 2011. In the spring of 2009 the task of procurement commenced along with the start of the enabling works which are extensive in terms of utility diversions, demolition and site clearance. Both tasks are expected to be complete by mid 2011.

Laing O'Rourke was the first contractor to commence the construction of the permanent works on the of the Canary Wharf Station working for the Canary Wharf Group. London Underground followed on shortly after with Tottenham Court Road Station. The construction of the stations and tunnels in the central area should be complete by early 2017. The installation of the all important systems commences in mid 2013 and will again be operational by early 2017. Late 2008 saw the start of the rolling stock design along with discussions with manufacturers. Sets of trains are scheduled to start arriving in 2014. Operational readiness, commissioning and trial running are seen to be of paramount importance and this is especially so where trains run on the existing network. Even though sections over which we

run have been upgraded with a new but proven signalling system together with advance technology, cab equipment, other passenger and freight trains not so modern have access also.



The Programme

The preparation for the central tunnel sections although different and unique to Crossrail will be no less onerous. Not surprising therefore these activities run through from the summer of 2012 until the end of 2017. As I said earlier in this lecture the railway is a system and not a series of engineering masterpieces not delivering the functional requirements and hence this phase of the project cannot be given too much attention.

The phased operation of the trains for public use is expected to commence from the summer of 2017. However Crossrail trains will be taking over from the existing surface franchises on both the Great Eastern and Great Western lines from 2015/16.

Skills and Education

The lack of capacity and skills are a concern to many walks of life and the engineering and construction industry is no exception. The shortfall in many areas is not only limited to the UK but is global and is not helped by the huge demands being placed on the economy by China and India in particular.

Crossrail has been supporting the various government lead initiatives in graduate and apprentice training schemes which in time should produce results. The contract documents for the Project meet the GLA's requirements in terms of training, diversity and providing the deprived and unemployed with opportunities. It would certainly be wrong for the project not to provide such opportunities of employment when it passes through some of the most deprived London Boroughs.

The tunnelling activities require skilled and well trained labour to ensure the safe progress of the Works and there is a real lack of operatives and technicians and especially those needed for spray concrete lining. Crossrail, originally with the support of Ken Livingstone and now Boris Johnson together with industry, has taken matters into its own hands by establishing a tunnel Academy. It is expected to open and ready for the first intake of students before the end of this year. Always key to overcoming these problems is the ability to capture the enthusiasm of the young. Crossrail has been at the fore in this approach for the past 5 years with its "Young Crossrail" programme which links over 700

schools and through its own news sheet “The Link” has direct contact with 300,000 school children. Various programmes are run for all and many of the projects are linked with the Construction Industry Training Board (CITB) and London Gifted and Talented. The programme creates opportunities to involve teachers, pupils, parents, engineers, architects, planners and other professionals in a stimulating and interactive environment.



Crossrail with Future Engineers

In higher education Crossrail is involved with research programmes; Cambridge University and Imperial College for tunnelling research and monitoring the behaviour of the ground and the tunnels and the University of York for systems. In addition we have relationships with the University of East London which is strong in surveying and The College of North West London (formerly Willesden Technical College where I studied in the 1950's and early 60's).

Crossrail's Legacy

I believe that with the attention Crossrail has received throughout, the constant scrutiny, the constant review and adoption of Best Practice, the quality of the teams being built, the determination of the Board and staff of Crossrail, the Sponsors and the Consultants all working as one team despite any differences the product will be delivered.

“A World-Class Affordable Railway”.

But it will, I am sure, be seen to be much more than a fine railway for its legacy will be that people who had never been involved with engineering and may not have even had a job before Crossrail will then become part of a skilled workforce able to deliver a first class product and be part of Engineering the Future to overcome the complex issues that face mankind.

Douglas Oakervee

Acknowledgements

I am grateful to the following organisations and individuals for the assistance and support they have given me in the research and preparation of this Lecture:-

The Directors of Crossrail Limited, City University, The Worshipful Company of Engineers, Liveryman Keith Berryman, Patrick Griffin, Clinton Leeks OBE, Michael Perrins

ELECTION COURT, SERVICE AND DINNER 2nd March 2010

As engineers we place our confidence in numbers and measurement. The Chaplain preached for 8 minutes and 20 seconds, the Master-elect spoke for 3 minutes 40 seconds and the Master's toast to the new liverymen lasted 6 minutes and 15 seconds, to an audience of 57 liverymen and their guests.

Now we've quantified the evening, we can move on to the content. The other quality that engineers hold in high esteem is innovation, unconstrained by narrow-minded convention. With that in mind, the Chaplain delivered an address on the meaning of Christmas – in March. Not stopping there, he moved smoothly from where Jesus was or was not born through to the apocalypse and His second coming. Both innovative and broad reaching, and also thought provoking.

I cannot leave the Service without mentioning the final hymn. Many of you will know the hymn "God of concrete, God of steel", sung to the tune more commonly associated with "As with gladness, men of old". I had not heard it before and found it inspiring, although I'm not sure that my electrical or software colleagues would agree. When I was a student, engineers had a Song. Now they have a Hymn – cleaner and shorter but just as much ours.

We were entertained to a first rate dinner and wines, followed by the never-dull show of guests grappling with the ceremony of the Loving Cup. The Gallant and Learned Clerk then announced the results of the



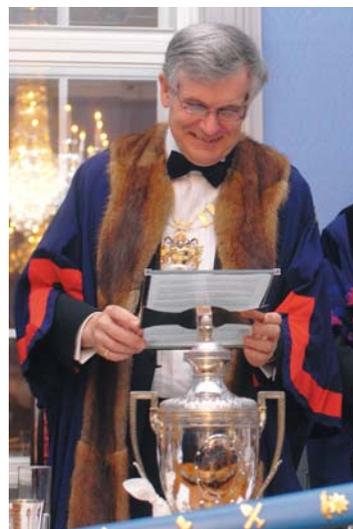
elections earlier in the afternoon. The first was the Master-elect, John Robinson FREng, who spoke about

the need to implement the strategy developed under the leadership of the current Master. He also drew attention to the relatively low level of charitable giving by the Company and our relatively high administrative costs for processing donations. Both were in his sights for the next year. He also committed himself to preventing the Company from becoming an old man's club and avoiding domination by a clique. The Clerk then announced the other election results. To the great



amazement of all present, John Banyard OBE FREng is to be Senior Warden, David Scahill is to be Middle Warden and AVM Graham Skinner CBE is to be the new Junior Warden.

The Master then rose to propose the toast to the new Liverymen and invited them to introduce themselves. Eur Eng David Hirst is engaged in missionary work, using the disciplines of engineering to educate the economists and bean-counters in risk management, in his case at Drax Power Station. He praised his thorough training at French Kier and confessed to being a Yorkshireman from a family tradition of engineers. Jim de Waele is the MD of Keller UK and, like David, spoke highly of his graduate training at Cementation. He put down his need to work on the built environment to growing up in flat Suffolk with expansive skies that can cause agoraphobia.



The Master then continued his address. He commented on the Christmas theme adopted by the Chaplain. It might be thought 3 months late but since Livery is often accused of being 600 years behind the times, this was an improvement. The Lord Mayor is committed to running the London Marathon this year and is seeking

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sponsors. Two of our Liverymen, Peter Blair-Fish and Andrew McNaughton, are also seeking support for their cycle ride from Land's End to John O'Groats.

The Master then drew attention to the paucity of jokes in the past year. He put this down to political correctness, the financial crisis and dour politicians, although he clearly took heart from George W Bush riding into obscurity. In order to restore some balance, he offered the following, preceded by a health warning that it is not PC.

A group of liverymen (and it has to be men) decided to have a celebration dinner on becoming eligible for bus passes. After debate they agreed to dine at the Café du Marche because of the charming waitresses wearing little black dresses.

Five years later they decided to dine again to celebrate receiving old age pensions. Again there was debate and they chose the Café du Marche because of its good food and wine.

Another five years passed and they planned another dinner. They debated and chose Café du Marche because of its peace and quiet, with no piped music.

Five years later, they had to choose a restaurant again. After extensive discussion they chose Café du Marche because it has wheelchair access and a lift.

Five more years passed and again they met to choose a restaurant. After long debate they chose Café du Marche, which they all thought a great idea because they hadn't been there before.

Chris Elliott

VISIT TO CITY UNIVERSITY 10th March 2010

It is only a few weeks since we were at City University for the Bridge Lecture on Crossrail given by one of our Liverymen, Doug Oakervee. This afternoon we returned to City University and the School of Engineering and Mathematical Sciences. These two events highlight the importance of developing beneficial links between our organisations.

To quote from one of the University web pages:-
'The City University was created in 1966 and the name 'The City University' was officially adopted at the same time. This was to reflect the University's close links with the City of London. It was agreed that the lord Mayor in office should be invited to become the

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Chancellor and be installed annually at the degree ceremony in Guildhall.

The objectives of the University are to advance Knowledge, wisdom and understanding by teaching, research and professional training, particularly in science and technology, both within the University and in close association with industry and commerce and by example and influence of its corporate life to benefit society.

Over 23,000 students from 156 countries, all benefit from more than 100 years of teaching and learning at City. The staff highlighted their aeronautical links to Frederick Handley Page since 1908 and therefore over 100 years of teaching Aeronautics Engineering.



One of the Cars during Construction

This time we were here to see some of the University's unique teaching and research laboratory facilities. Before touring the laboratories, we had a briefing from Professor Chris Atkin, Dr Keith Pullen, Dr Jamshid Nouri and Roger Valsler. Each talked about their specialist areas and highlighted some of the areas we would visit on the tour.

City University has some of the most advanced engine development and testing facilities in Europe. Here, Dr Jamshid Nouri explained some of the testing and development he has been doing on gasoline and injection systems.

Students develop complimentary practical skills through the Institution of Mechanical Engineers Formula Student competition. Each competition car has new features and the team are currently developing a car with an alternative engine and flywheel. Roger Valsler explained how the "Go-carts" scheme and "F1 in schools" programmes engage with local young people and have been very successful in encouraging some talented young people to enter a career in engineering.

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At the wind tunnel laboratories, used for low speed and transonic testing, we saw a selection of demonstrations and had interesting discussions about a corn sculpture bending in the wind.

The aeronautical department includes a flight simulator and some of us had our flying abilities tested with very variable results which I do not think impressed the demonstrators very much.



The Editor trying to work out the controls before crashing!

During the tour, the Acting Vice-Chancellor, Professor Julius Weinberg and Professor Ken Grattan arrived direct from a Senate meeting. In the current climate of significant financial constraints, they have plans to build on the strengths of the teaching and research assets.

At the end of the visit we climbed to the fifth floor for an excellent supper. Before this the Master thanked Ken Grattan, his team and the staff of City University who had made us most welcome. He particularly thanked Richard Valsler and Nanette Strong for their excellent planning which ensured that we all moved around the labs in our 3 separate groups and returned to the starting point at approximately the same time, ready for supper.

Isobel Pollock

Strategy 25 plus for the Worshipful Company of Engineers A Summary

The challenge that I set myself as the new Master in April 2009 was to undertake a review of strategy. After celebrating the Company's 25th anniversary the previous year, it was time to look ahead and determine the way forward, building on the outstanding

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achievements of its first 25 years. The Wardens and the Clerk joined the Master in a strategy working group, which reported to the Finance & General Policy Committee, before submitting the "Strategy 25plus" Strategy Review Report to members of the Court at the end of the year. The process continued into the first two Court meetings of 2010, by which time many contributions had been received and woven into the report, which with its conclusions and recommendations was adopted by the Court.

The strategy review started by looking at the Objects of the Company and of its Charitable Trust Fund, asking how the Company had developed in the light of them, and asking if the Company should be aiming to be more influential, more charitable, more engaging of its members, or what? It aimed to start a process of development, rather than to necessarily produce all the answers during the first review cycle. Reassuringly, the Objects were found to serve the Company and its Charitable Trust Fund well, although some of them were not being fully exercised.

Advancement of Education is the first theme of the Objects and while our Service Awards are very effective, and at low cost, some of our Civilian/Academic Awards could benefit from development. A specific strategy sub-group will develop recommendations, after considering the possibilities of adjusting some awards; aiming for a sponsorship award for a UK post-graduate student; working with other awarding bodies (so long as our Company's identity is enhanced, not reduced, by doing so), and, considering our approach to the needs of those heading towards Engineering once we see the results of our newly established sponsorship of Arkwright Scholars.

Promoting Engineering is the next theme, specifically "promoting Engineering in the City" and "engaging with those who benefit from it". Our programme of activities and vigorous participation in other City activities, as well as our increased participation in the Lord Mayor's Show, and the parliamentary Engineering groups, all address this, as does our Bridge Lecture, especially if in a City-facing style and with high profile guests from City businesses and practices (as in the 2010 Bridge Lecture by Liveryman Doug Oakervee on the subject of Crossrail). The recommendations include a second lecture series, interlacing with the Bridge Lectures to make our lectures annual events, as well as maintaining the City-facing style and using prominent Liverymen as lecturers whenever possible. The "Engineering the Future" theme developed by the Royal Academy of Engineering and the Engineering

Institutions is something that the Company seeks to be involved with, helping get its messages to the City. The Company will develop its relationships with the Academy and the Institutions for this and for mutual benefit.

These first two themes are connected with the Company being influential, and you will see that through developing them, we aim to be more influential.

Relief of Hardship, and Support for Charities is the following theme. We will extend our patronage of RedR, as our prime charity, beyond the agreed 4 years, to fully cover the likely year of Liveryman Michael Bear as Lord Mayor, with RedR as one of the nominated charities of his Appeal. We have set a policy to change our prime charity from time to time. Relief of hardship of members, dependents and former members is enabled by the Objects but has not been practiced until recently. Practical help has recently been given, at modest cost, to a former member and this is recommended as a precedent for future cases. Keeping in touch with dependents of former members and offering advice is another feature that can be beneficially developed, with the engagement of members of the Company, and a sub-group is being established to work up a plan for this.

Helping with professional development of engineers is addressed through our occasional admission of non-Fellows as Freemen and appointing Liverymen to mentor them towards Fellowship of their Institutions, and this approach is one which we will publicise more. For those heading towards Engineering, we have our new Arkwright Scholars and have allocated Liverymen to each of them to help them develop their understanding of Engineering, and to arrange job shadowing and work experience. Other Livery Companies and commercial and philanthropic organisations sponsor Arkwright Scholars, so we will aim to be among the sponsors every year and may offer the same kind of professional support to scholars whose sponsors are not in a position to do so.

A number of other factors, not specifically drawn from the Objects, were considered by the strategy group. The first of these was the “look and feel” of the Company. Here, it was recognised that the Company had gained an outstanding reputation, better than would be expected for its position in the precedence of Companies, and that this should be cherished and maintained. The Company does not seek external sponsorship and support, except for its award funds, and the independence that this assures contributes to the good feel of the Company. Swordsman, with its

contributions from members and editorship by Past Master Raymond Cousins, and the web-site, keep the members well informed, and the latter could be developed further. We need to cultivate our Royal connections and will need to engage with one or more of the younger members of the Royal Family, probably in association with the Royal Academy of Engineering.



Chris Price OBE FREng, Master 2009-2010

The recent proactive approach to membership has been successful, and needs to be continued, striving to keep reasonable balance with the range of disciplines within Engineering, and encouraging suitable candidates from beyond the 16 Chartered Institutions that existed at the formation of the Company. It is recognised that if we reach the Company’s Livery limit we will have members waiting as Freemen for Livery vacancies, and while this is perfectly satisfactory, we just need to make sure that candidates for membership know that they may have to wait for full membership as a Liveryman. No recommendation was made to increase the Freeman membership.

Raising more money, in order for the Company to be more charitable, was addressed through the better informing of members about the charitable activity; the promotion of regular giving by members; and the provision of information about legacy giving. Gifts to the Company, rather than to its charitable trust, are unusual, but it was agreed that a process would be established to handle them. The Company’s treasures, largely in the form of silverware, were agreed to be more than sufficient, so further such gifts will be discouraged unless the Muniments Committee

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identifies a specific need. It will also have to propose a plan for silverware that is not used. The administrative cost burden on the trust fund is justifiable, but our giving could be increased significantly if it could be reduced, so this will be an objective in the coming years.

International membership is a feature of a few Livery Companies, but these do not have associated professional bodies with strong international dimensions as Engineering does. We want our members to be active in our activities, mainly in London, so will not push overseas membership, except when such members frequently visit London. We are willing to support an initiative to assist the Lord Mayor in his overseas visits, and in entertaining overseas visitors in London, through a register of our members' overseas interests.

Some points about the operation of the Court have been clarified, to further improve participation and efficiency of meetings.

Greater involvement of members of the Company has been mentioned in several of the items above. The appointment of a Master's Steward and assistant stewards will fill a need and provide additional opportunities for involvement, as will a policy to rotate the roles of Awards Coordinators. At least 5 non-Court members will be appointed to committees of Court each year, and the opportunity to participate in the Lord Mayor's Show will seek new volunteers from the membership each year.

An ongoing strategy review process has been established, under the Finance & General Policy Committee. This will both pursue the implementation of the agreed improvements and encourage the development of strategy themes not fully developed during the first year, adding and changing other elements as necessary, and as agreed by the Court from time to time. Thinking of the 50th anniversary of the Company, in 2033, the review process will keep in mind the possibility of targeting a major new focus or development to characterise the second 25 years of the Company.

I am most grateful to the Wardens, the former Clerk and all the other contributors to the review.

*Chris Price
Master 2009-2010*

FOOD ENGINEERING

An Award is presented yearly by the joint Food Engineering Committee of the IMechE and the IFST

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for the 'Food Engineering Paper of the Year'. The committee comprises 26 members from various parts of the food industry and includes 5 Liverymen, Don Ives, David Everington, Norman Harris, Douglas Marriot and Hugh Vinson

The award is selected by committee members of the universities at Queens Belfast, Reading and Bristol who judge the subject and technical content to be of a high standard and value to the industry.

The award is sponsored by the international PM Consulting Group and comprises a prize of £1000, a certificate of achievement and a lunch with the committee at Butchers Hall.

The winning paper entitled '*Development of a Design Tool for Recirculated Air Curtains used on Refrigerated Display Cabinets for Food Retailing*' was written by Ed Hammond and this year the high standard of papers was considered by the judges to justify a second award and this was awarded to Liveryman David Everington for his paper on '*Application of Vacuum Technology to Food Processing*'.



Past Master Tony Roche presenting the Prize and Certificate to Ed Hammond

The presentation was made by Past Master Tony Roche and took place after the committee meeting at the Butchers Hall on Wednesday the 10th of February and was followed by an excellent lunch in the Grand Hall.

If you are interested in the food Engineering group, or have a paper you wish to submit for next years prize consideration, please contact Don Ives at don@ives-consultants.co.uk

Don Ives

RedR ENSURING SAFE WATER AND SANITATION FOR HAITI'S DISPLACED

A personal storey of Brett Maynard who is a RedR-trained Water, Sanitation and Hygiene (WASH) specialist, currently deployed with Save the Children UK's WASH response in Haiti. Now two months into his assignment, Brett is responsible for helping to provide 110,000 displaced people living in camps with access to safe drinking water and sanitation facilities.

An experienced aid worker, Brett is on Save the Children UK's Emergency Roster for water, sanitation and hygiene and was called to go out to Haiti within 48 hours of the earthquake, which devastated the island on 12 January, claiming over 220,000 lives and leaving an estimated 1 million people homeless.

As Emergency WASH Advisor, Brett has been responsible for helping to set-up and managing Save the Children's water and sanitation programmes in Leogane, near the epicentre of the quake, and in the capital Port-au-Prince. Brett's role as Emergency WASH Advisor has been highly challenging, as he had to help set up a large-scale programme from scratch under difficult circumstances:



Brett Maynard in a Hygiene Promotion Training

Save the Children had a programme in Haiti prior to the earthquake, but no WASH activities – so we started completely from nothing. We knew the response would be big, and we had to very quickly put together a large team and programme to use the resources made available and respond to the needs of the affected population. This involved recruiting approximately 100 national staff, including WASH Team Leaders, Water Engineers, Sanitation Engineers, Hygiene Promoters, and support staff.

Working as an Emergency WASH Advisor is a very diverse role, which involves everything from assessing and selecting water supplies and sanitation sites within camps, to the technical design of WASH programmes and ensuring coordination with local and international aid agencies through the UN-led Cluster system.

The scale of the destruction, predominantly concentrated in urban areas, and the large number of people affected, means that this has been an extremely complex and large-scale humanitarian response. The importance of ensuring safe drinking water and adequate sanitation facilities for the hundreds of thousands in the many temporary camps cannot be underestimated.

In the wake of a major disaster such as this, coordination and information-sharing, to ensure relief efforts are directed where they are most needed and avoid duplication of work, is absolutely essential. In Haiti, where currently over 950 registered agencies, and an unknown number of unregistered organisations, are currently involved in the response, the need for coordination between all the different actors is a primary concern.

The 'Cluster system' is a way of coordinating the response of all organisations involved in an emergency in 11 identified sector areas including; Emergency Shelter, Logistics, Health, and Water, Sanitation and Hygiene (WASH).

Working with Unicef, RedR is responsible for training Coordinators for the WASH Cluster, a course which Brett attended in 2008. For Brett, this training has been a clear benefit at the field level in Haiti: The training has given me an excellent understanding of the WASH Cluster systems and increased knowledge of coordination. I have worked with both the Leogane WASH sub-cluster and Haiti National WASH Cluster in Port-au-Prince to coordinate activities and share best practice with other agencies in the cluster.

RedR has also set up a training programme in Haiti with French training organisation, Bioforce, as part of the Disaster Response Support Services (DRSS), which aims to train and support both national and international aid personnel in key areas such as WASH, Shelter, Logistics and Security. The DRSS programme integrates coordination with the Cluster approach to humanitarian response and key quality initiatives such as Humanitarian Accountability Project (HAP), Sphere and People in Aid. The training programme is already proving beneficial to agencies such as Save the Children and their staff. As Brett highlights: Although many of our national staff are

technically excellent, and are highly committed, they have never worked in an emergency response of this scale and had to coordinate their work with so many other organisations. There is therefore a need to train national staff to help them do their jobs in the most effective and efficient manner. RedR has been instrumental in the in the training of these. For example, RedR is working with Save the Children to train newly recruited hygiene promoters and there are obvious opportunities to work together on other areas of training required by our technical staff.



Haitian Children carrying a Latrine Slab

Latrine Construction in an IDP camp in Leogane

Brett has extensive experience as a relief worker and has worked all over the world in response to natural disasters and man-made conflicts, including in Afghanistan, Gaza, Ethiopia, Sudan, Uganda and in Sri Lanka and Indonesia following the 2004 Tsunami. In Haiti, both Leogane and Port-au-Prince where he has been working, have experienced destruction on an unprecedented scale. As Brett comments, the evidence of the quake is felt everywhere: This was a massive earthquake and the impact has been devastating – it is apparent in almost every part of Port-au-Prince and has completely devastated the centre of Leogane and surrounding areas. Because much of the damage is localised in just a few key areas, it makes it all the more evident. This disaster is without doubt one of the most striking I have been involved in to date in my career. My first impressions of the earthquake brought back memories of Tsunami response – it is an emergency almost of the same scale. This is an extremely complex humanitarian emergency for organisations to respond to.

Hundreds of thousands of survivors are currently living in temporary camps in Port-au-Prince and the surrounding towns where there is a high risk of flooding, landslides and communicable diseases. With the imminent onset of the rainy season and the start of the hurricane season in June the dangers are all too real.

The next few months will be challenging for the people of Haiti and the international community, Brett warns. The scale of displacement following the quake was huge and many people, whose homes were completely destroyed, will remain in camps for Internally Displaced People for the foreseeable future. Relocation from spontaneously formed camps to planned camps with adequate service previous is underway – but it is a complicated process and will take a long time, he continues. As Haiti struggles to recover from the most powerful earthquake to hit the already impoverished country in over 200 years, it is also clear that this is a disaster which will require a long-term and sustained international effort to rebuild homes, national infrastructure and public buildings. However, despite the challenges ahead and the difficult long-term prospects of rebuilding Haiti over the coming years, the spirit of the Haitian people has deeply impressed Brett: The resilience of the Haitian people has been amazing! It must have been an extremely horrific day for them and many of our own staff where heavily affected by the earthquake -losing their homes, family members and friends. But their strength and commitment remains and they continue to put a huge amount of effort into their work.

From The RedR web site. Photos by Brett Maynard

THE MANSION HOUSE SCHOLARSHIP SCHEME

The Mansion House Scholarship Scheme funds scholarships for students and young business executives from overseas to travel to the United Kingdom to study or to undertake training or work experience in the Financial Services Sector.

The Scheme was established in September 1998 by the then Lord Mayor, Alderman Sir Richard Nichols. Each year the Lord Mayor travels extensively,

promoting the City of London as the world's leading international financial and business centre. Sir Richard was particularly struck during his overseas visits by the high regard in which London is held by foreign business communities and by the number of students who wish to study at British Universities or undertake training or business attachments in the City of London. A number of Government and academic organisations already provide funds to assist in this process, as do a number of major companies. Nevertheless, Sir Richard felt that the establishment of a fund specifically identified with the City would raise the profile of London as a place where business students from around the world would continue to aspire to visit, to study and ultimately in which to invest and do business.

He was strongly supported in this suggestion by the Master of the Drapers Company, Sir Michael Craig-Cooper and the Master Mercer, Mr David Tate, both of whom felt that the support provided by Livery Companies to the mayoralty should not be limited merely to making donations to the Lord Mayor's chosen personal charity of the year, but should instead be much more focussed on supporting him in his principal role of promoting the City of London around the world.

The Scheme has now been running for eleven years and successive Lord Mayors have been able to appoint some eighty-eight Mansion House Scholars, with recipients selected from forty-one countries. Awards vary in size but have usually been in the region of £5,000 to £7,500 and restricted to those applying to study or to undertake training in the financial services sector or in subjects related to financial services. The majority of scholars take Masters Degrees at British Universities, whilst others attend training courses or undertake business attachments within the City of London. During their time in the UK, they meet many members of the City's financial community, as well as attending at least one of the formal events hosted at Mansion House by the Lord Mayor. All return to their own countries with warm memories of their time here in the UK and as they become more senior and influential in their own financial sectors they become some of the best ambassadors that the City could wish for.

The Scheme is currently funded primarily through donations by the Livery Companies. Almost half of the 108 City Livery Companies now offer generous support to the Scheme, many on an annual basis, and see their support for the Scheme as an excellent way to become more closely involved with the Lord Mayor's promotional activities abroad - thus reinforcing the

link between the Livery, the Mayoralty and the Financial Services sector of the City. The funding available through the Livery Companies, who have many other calls on their charitable giving, is limited however and thus support from the many commercial organisations and firms who are based within the City of London is also actively sought. It is the Lord Mayor's hope that individual members of City Livery Companies will also encourage their firms or businesses to support this Scheme and to contribute to its continuing success.



The Lord Mayor and Sheriffs with scholars from Vietnam and Brazil - Sept 2009

The scholars themselves highly value the Scheme, as the quotes below will testify:

"I can honestly say that the scholarship was the best thing that happened to me in business terms. During my stay in UK I have managed to establish good relationships with leading UK and international law firms, including Freshfields, Simmons and Norton Rose, all of whom now keep sending us clients. Our law firm has grown in size as a result and is now one of the leading law firms in Croatia, with more than 25 lawyers." (*Croatia*)

"I enjoyed every single moment of the programme and learnt so much. Overall, my experience in the UK has been the most challenging and exciting of my life. Being in London in such turbulent times (*July 2005*) has contributed to the development of my personality and I would like to extend my admiration of Londoners faced with these atrocities." (*Tunisia*)

"The experience of studying in London was extremely beneficial, enjoyable and interesting. The education in the British Universities in general is second to none. Receiving the Scholarship and gaining international experience in London have clearly enhanced my career prospects." (*Finland*)



Sir Michael Craig Cooper with a Scholar from Uzbekistan

“My programme was more than an academic experience, it was a life experience. Besides the amazing courses attended, the professors and academics that I met and having access to impressive legal resources in libraries across London, the programme offered me an amazing and unforgettable experience of getting to know the British lifestyle. It was a year when I came in touch with the UK realities, with British culture, environment and lifestyle. I became richer by getting to know a people that I used to know only from literature.” *(Poland)*



Sir Michael Craig Cooper with Scholars from Oman and China

The Scheme is administered as a Charitable Trust, with Sir Richard Nichols as Chairman and Past Masters of the Mercers, Grocers and Drapers Companies, together with a Junior Alderman, as appointed Trustees. Advisers to the Scheme include an ex-ambassador, the Master of Birkbeck College and a retired City Banker. Nevertheless the selection of scholars remains in the personal gift of the Lord Mayor, based on

recommendations by the Ambassadors and High Commissioners in those countries which he visits.

Brigadier Neill O'Connor

INSTALLATION COURT MEETING, COMMON HALL AND DINNER, FISHMONGERS' HALL, 20th April 2010

A full evening commenced with a Court Meeting which finished with three new Members of the Company being invested with the Livery in Common Hall. The Master then gave his report on the year. (Ed)

Annual Report of the Company

The written Report of the Masters and Wardens for year ending 31st December 2009 was circulated with the calling notice for this Common Hall. It is now my pleasure to give you a summary of the activities and proceedings of the Engineers' Company contained in that report, and for the early part of this year.

Mr Anthony Roche FREng was the Master until April 21st last year and it has been my privilege and honour to be the Master since then. Talking to Masters of other Companies recently, we concluded that a Master's year can well be described as an adventure as there are so many surprises and delights in what we do in furthering the traditions of the Livery and the City. I have certainly enjoyed a hectic adventure leading and representing the Company over the last 12 months and Sylvia has enjoyed much of it with me.

Membership of the Company rose by 5 to 332 during 2009 including 311 Liverymen of whom 23 were clothed during the year. This maintains the recent positive trend in membership numbers, despite a few losses in the year including the death of Founder Liveryman Mr Douglas Simpson. The Membership Committee continues to ensure recruitment remains positive and that we get a balance of new recruits from across the range of Chartered Engineering Institutions.

The Senior Warden will report shortly on the detail of the Company Accounts but I would just like to say that, although it has been a challenging year for everybody's finances, the Company achieved a small overall surplus for the year, thanks in no small measure to very strong support of members for Company events.

Turning to the Charitable Trust Fund, some aspects of the general financial climate improved somewhat during the year and the fund saw some recovery in its assets, with its managed investments increasing in value by 14%, although overall income from investments was lower. Major new donations were received, with £20,000 from the estate of Mr Douglas Simpson and £10,000 from Rolls-Royce for the Stephenson Award Fund. This fund has also received over an additional £8000 since the year end from Liverymen who are members of IMechE. My letter to members towards the end of the year to encourage them to make their donations to the trust fund through regular giving will see an increase in assured trust fund income of a very worthwhile £6000 each year.



Despite the reduction in trust fund income in 2009, the Company made its full range of Awards in both the civilian and military sectors, although runner-up prizes were not awarded. The full range of awards will be made again this year. A notable first for the Company was the funding of

two Arkwright Scholarships for sixth-formers from London schools who are preparing to study engineering at university. The number of requests, to the Clerk, from individuals or other Charities for help with the relief of poverty was, surprisingly, somewhat lower than the previous year but was still over 100. I thank Court Assistant Commodore Malcolm Shirley for his help in adjudicating on those requests. A number of other Charities were in receipt of donations from the Company including RedR for which we again raised £3,500. In total our giving in 2009 were in excess of £21,000, around £5000 less than in the previous year.

As I mentioned, the year's events have been very well supported. Speaking at the dinner after my installation as Master, Lord Broers mentioned his first assignment in the House of Lords when he discovered he was being treated as the expert on pandemic diseases. The following weekend we heard that Swine Flu had emerged as just such a pandemic, and it could have

devastated our programme of events. Fortunately that threat did not grow as predicted. Our events have ranged from as close as St Paul's, with the Surveyor to the Fabric, to as far away as Budapest, with the Master's Lady. All are mentioned in the annual report. I would like to record my appreciation to those who have helped with the events, facilitated their organisation, lectured or reported them in the Swordsman, under the diligent editorship of Past Master Raymond Cousins, who I thank too.

At the last event of 2009, we said thank you to AVM Graham Skinner CBE for seven years of dedicated and exceptional service as our learned and gallant Clerk. Among his many achievements was one which his wife Margaret made a big contribution to as well, that of making our events even more welcoming and friendly. It is a great pleasure to know that we will be installing Graham as Junior Warden, albeit not this evening as Graham and Margaret are stranded in Beijing due to the current volcanic ash flight restrictions. Of course, the challenge that the new Master faced exactly a year ago was how to replace Graham as Clerk. Fortunately, he had help, not least from the retiring Clerk, and in due course we selected a Clerk-designate to join the staff of the Company from October to prepare to take over in January this year. It was particularly satisfying to find that the best candidate and one with extensive knowledge of Livery and the City was a Liveryman of the Company, Wing Commander Tony Willenbruch, now, our learned and gallant Clerk.

The challenge that the new Master set himself was to undertake a review of strategy. After celebrating the Company's 25th anniversary the previous year, it was time to look ahead and determine the way forward, building on the outstanding achievements of its first 25 years. The Wardens and the Clerk joined the Master in a strategy working group, which reported to the Finance & General Policy Committee, before submitting the "Strategy 25plus" Strategy Review Report to members of the Court at the end of the year. The process continued into the first two Court meetings of 2010, by which time many contributions had been received and woven into the report, which with its conclusions and recommendations was adopted by the Court. I am most grateful to the Wardens and all the other contributors to the review.

I have written a summary of the strategy report and this is included on page 23 of this Edition of the Swordsman.

My Master's year has been much more than the "hectic adventure" I mentioned earlier. Leading and

New Master's speech in Common Hall after Installation

representing the Company on a hundred occasions has been a great honour and privilege. Successive Masters and Liverymen have built an outstanding reputation for our Company and it has been my pleasant duty to continue the work of promoting the Company and Engineering both within the City and more widely, as well as pursuing activities in support of our Charter and Trust Fund Objects.

As Master I have enjoyed and appreciated the support and guidance of the small team that really runs the Company, the Clerk and the Assistant Clerk & Beadle, assisted from time to time by the Honorary Chaplain. I am sure that it is fair to say that we have worked well as a team through the transition to our new Clerk, ensuring the effective running of the full programme of Court meetings, major dinners, Out of Town Meeting and many more Company events, at which we have hosted numerous Company Guests.

A year ago, I said that Sylvia and I looked forward to seeing you at Company events during our year, and that we greatly valued the friendships which are such a strong feature of our Company. We sincerely thank for your strong support for us throughout our year, for your enthusiastic participation, and for your warm friendship. My own special thanks go to Sylvia for her support during the year.

And may I conclude by emphasising my thanks, and those of the Company, to the Wardens, to the Court, to Honorary Chaplain Michael, to Assistant Clerk & Beadle Stephen and especially to our learned and gallant Clerks, Graham and Tony, for the support, guidance and the hard work that they have put in over the last year.

I wish our incoming Master John Robinson every success and I hope he and Doreen have great pleasure in the year ahead.

Chris Price OBE FREng, Master 2009-10

After The Annual Report the Accounts were presented and then John Robinson FREng was invested as the New Master by the Chris Price. John then invested John Banyard and David Scahill as Senior and Middle Wardens respectively. The new Junior Warden Graham Skinner was delayed abroad by the closure of UK airspace as a result of the ash cloud from the volcano eruption in Iceland. Some twenty guests who were planning to be at the dinner were stranded abroad but by diligent work by the Clerk and Assistant Clerk all these spaces were filled by those who had been unable to leave the Country! (Ed)

Wardens, Past Masters, Liveryman, Ladies and Gentlemen

I am hugely honoured to be elected and installed as Master for the coming year. I would like to express my thanks to members of the Engineers Company for electing me.



It will be a privilege to represent the Company and continue the work of Past Masters, to maintain and enhance the reputation of the Company in the City, academia and with professional bodies.

Immediate Past Master Chris did great work in leading us to a new strategy. This is very much evolutionary, not revolutionary. Our task this year is to embed the strategy.

Doreen and I look forward to welcoming you to events in the year. Most of us have formed strong friendships in the company. I hope we can extend that by making it easier for newer and younger members to feel truly part of us. The timing of our Out of Town Visit is an experiment to making it easier for people forging a career.

As you know, I am a Chemical Engineer. My career has largely been in medical devices and healthcare, from bioengineering to tissue engineering, with a substantial deviation into house building – and other Chairmanships in manufacturing, coal and railways. Much of my experience is unusual for most engineers being about small things, not big things. Some would even question whether it is engineering at all. I hope to give the opportunity for some exposure in these rapidly growing areas.

It is an honour and privilege also to congratulate Chris on a most successful year – and to Chris and Sylvia on making such a contribution to the Company. The year has been very enjoyable. And behind the scenes, unseen by most, things have moved on apace.

It is with great pleasure that I now install Chris with his Past Master's gown, and present him with his Past Masters Badge and certificate



At the end of the Common Hall the Master announced that John Baxter had been re-elected to the Court for a second term together with Alderman Michael Bear and Bjorn Conway for their first term. (Ed)

Liverymen and their guests then assembled to enjoy a fine dinner, wine and conversation and to hear from the new Master, John Robinson FREng, and the principal guest, Professor David Drewry, former Vice-Chancellor of Hull University and Director of the British Antarctic Survey.

The Master thanked the Immediate Past Master, Chris Price OBE FREng, for guiding the Company through the last year and in particular for promoting debate about the future of the Company through the strategic review and his brave decision to organise an out-of-town visit to Hungary. The strategic review has brought well-received focus to the work of the Company.

The new Master set out his thinking for the coming year. Whoever wins the election will need to be persuaded that engineering and innovation are essential ingredients for a strong and growing economy. The Company should also not forget its charitable purpose – in the coming year Liverymen would be encouraged to do more for charitable causes such as RedR – the charity which improves disaster relief by recruiting and training relief workers particularly engineers.

Three new Liverymen and three new officers of the Company - John Banyard OBE FREng, Senior Warden, David Scahill, Middle Warden and Air-Vice Marshall Graham Skinner CBE, Junior Warden - were welcomed to the dinner. Wing Commander Tony Willenbruch, was congratulated on establishing himself as an effective and efficient Clerk.

Finally the Master welcomed the other principal guests - Sir David Brewer CMG JP, Her Majesty's Lord-Lieutenant of Greater London and Lord Mayor of the City of London in 2005-2006 and Alderman Jeffrey Evans and thanked the musicians, caterers and many others who had worked behind the scenes to make the evening possible.

Professor Drewry gave a witty address with some serious remarks about the debate about climate change. His early research in glaciology, as a former Director of the British Antarctic Survey and Scott Polar Research Institute gave authority to what he had to say.

Climate science faces many tough questions from the sceptics whose challenges have increased since the furore surrounding the hacked e-mails from the Climatic Research Unit at the University of East Anglia, the failure by the Intergovernmental Panel on Climate Change (IPCC) to scrutinise effectively the Fourth Assessment Report and some inappropriate remarks by the IPCC Chief Executive. However, there is solid scientific evidence on climate change which everyone needs to be made aware of.

The Antarctic ice cap provides a wonderful historical record of past climate and the changes in atmospheric concentration of carbon dioxide. International teams of scientists and engineers including many from the United Kingdom have developed ice core drilling and analysis techniques which has enabled ice dating back over 500,000 years to be recovered from depths of up to 4 km. Extraordinary engineering challenges are required to do this; engineers and scientists are working in isolated camps on the Antarctic ice cap at the end of very long logistic chains, braving temperatures from -40 to -60 Celsius.

Isotopic analysis of the oxygen in the ice from the cores using the ratio of O₁₈ to O₁₆ isotopes can be used to estimate historical atmospheric temperatures. Samples of the gases in the air bubbles in the cores is used to estimate atmospheric concentrations of carbon dioxide, methane and other gases. These observations show clear correlations between global air temperatures and carbon dioxide concentrations. The cores also hold volcanic ash layers that provide critical age markers. Ash clouds have been shown to cause atmospheric cooling. Piecing together this evidence and evidence from sediment cores and tree ring data has enabled scientists to put together a record of past global climate changes for the last 500,000 years and to test global climate models.

In the last 200 years carbon dioxide concentration has increased by an unprecedented 40% above the pre-industrial value. This compares to a 25% rise of carbon dioxide concentration and a 6 to 7 Celsius rise in temperature when the earth came out of the last ice age which saw the melting of the large European and North American ice sheets.

Recent observations using data from ground stations, satellites and indirect observations such as tree rings are highly persuasive that changes are taking place. Observations of ice mass balance, permafrost melting, sea ice thickness thinning and the Arctic sea ice cover minimum of 2007 show how the Polar Regions are lead indicators for change. There are important feedback mechanisms at work – permafrost melting releases methane. Methane is a gas that warms the atmosphere many times greater than carbon dioxide through the greenhouse effect.

The atmosphere and ocean coupled system is complex but the weight of the science evidence is to argue that the question to be answered is not “is warming occurring?” but “where and by how much will warming occur?”



The calling of an election and the economic downturn has moved the climate change debate to the sidelines – the debate about what government should do to respond to climate change should be brought back onto the agenda. Engineers have an important role to play in the climate change debate.

Professor Drewry ended by toasting the Company on behalf of the guests – “may it flourish and root and branch forever, particularly in the year of the Mastership of the excellent John Robinson”.

Footnote: The IPCC Fourth Assessment Report is available in full on the web. A good summary of the arguments is set out in the Summary for Policymakers – see www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf . Recent criticism of some evidence put forward by the IPCC does not invalidate the underlying argument.

Dougal Goodman

Master’s Speech at Dinner

Past Masters, Wardens, (Wardens/Masters of other Livery Companies), Liverymen, Guests

Welcome to Fishmongers’ Hall! A magnificent Hall. The home of the Fishmongers’ Company, granted their first Charter by Edward 1st in 1272, but known to exist long before then. This is the Fishmongers’ third Hall – the first Hall was the first Livery Hall to be destroyed in the great fire of London. The current Hall dates from 1831. It was designed by Henry Roberts, but much more interesting, for me, is that a very young Giles Gilbert Scott, designer and modifier of many Victorian churches, prepared many of the working drawings.

Please join me in thanking the Fishmongers’ for use of their Hall today. Also, thanks to our caterers for an excellent dinner and, not least, to the Connecting Brass Quintet for their entertaining music.

I have so far been able only to thank very briefly Past Master Chris Price and Sylvia for all they have done for the Company during their year. They have been superb in every way. They have been excellent hosts at large and small events, and the year has been one of growing friendships for many of us. The Out of Town visit was both brave and highly successful. Hungary is Sylvia’s birthplace which gave the visit special relevance. From a meeting with the Hungarian Academy of Engineering to tours of the city, the visit was very special. Behind the scenes, Chris led the Strategic Review, which will stand us in good stead for the next few years. It required much thought and consultation, and much rewriting. A sterling effort on our behalf! He has been meticulous at representing us within the City, and has created several opportunities for us to become closer to like minded Companies. Thank you from all of us, Chris and Sylvia!

At the start of every year, every Master must think “what am I going to do?” I follow an illustrious list of Past Masters who have all made their contributions to make the Company what it is today. Much is not optional, and all Masters strive to represent the Company to the best of their ability. The main danger is becoming even more overweight! It is singularly appropriate that coinciding with our own Strategic Review, the engineering profession, led by the Royal Academy of Engineering, has produced its own “Vision for Engineering”. This gives five priorities for a thriving UK economy based on engineering innovation. We must follow up on our own Strategy, but also support the profession as a whole in any way that is appropriate. We are in the middle of a General

Election, and we must do our best to ensure that, whatever the Government, investment in engineering skills, innovation, and the science and engineering research base becomes embedded.



But Charity is a major feature of Livery companies. The Livery as a whole gives over £40 million a year to charity. Ours is small, even compared to some companies who are smaller and younger than us. The numbers of Liverymen giving regularly increased last year, but I appeal to those who still do not contribute to think

again about their obligations they have as Liverymen. I will be leading a review, thinking again through matters such as the charges made to the charity by the Company for administration, the split between capital and revenue accounts, and policy on distribution. These are important matters when the demands on all charities are almost infinite! Our Awards and Bursaries are much valued, along with our significant contributions to our principle charity RedR. But I would like us to be more ambitious. Funding for PhD students in the UK is difficult – yet they are vital for the future of the UK. It costs £20,000 per year, beyond our current means. But isn't that the sort of thing we should be doing?

I am delighted that we have clothed 3 new Liverymen today. They are Air Vice-Marshal Christopher Bushel, John Oliver and Michael Goulette. We welcome you all and your partners to dinner this evening.

We also have 3 new members of Court, John Baxter who is elected for a further term, Bjorn Conway, and Alderman Michael Bear. Michael, of course, was a Sheriff in the City of London in 2007/8 and has been successfully appraised by the panel dealing with Aldermanic Progression. Like John, his many duties mean that he is unable to Join us this evening, but his membership of the Company and Court is a huge honour for us.

Graham Skinner is now Junior Warden – and everybody else moves up one. Graham joins the other side of the fence after 7 highly valued years as Clerk.

Tony Willenbruch is now well into the Clerk's role and I very much look forward to working with him.

Among our guests this evening we are very pleased to welcome several people. Our Ward Alderman for the Ward of Cheap, Alderman Jeffrey Evans. Alderman Sir David Brewer is Prime Warden of the Blacksmiths, was Lord Mayor in 2005/6, and is currently Lord Lieutenant of Greater London. Deputy Master, Junior Warden and Clerk of the Chartered Architects and Constructors, CEO of the IET and also RedR, the Rector of St Vedast alias Foster, our Parish Church and the partner from our Accountants. And I particularly welcome our wives, husbands, partners and friends.

My Principal Guest this evening is Professor David Drewry, accompanied by his wife Gill. David is the recently retired Vice Chancellor of the University of Hull. David did an outstanding job lifting the quality and reputation of that institution over 10 years. For some of that time I was Pro-Chancellor and Chairman of Council, and we have become firm friends. Previously he was Director of the British Antarctic Survey and was responsible for measuring CO2 levels over the last 150 years by taking cores through the ice, which led to understanding of global warming. He is now on the international lecture circuit.

So Liveryman, please join me in a Toast to our guests.

THE LADIES BROOCH LUNCHEON 21st April 2010

The Ladies Brooch Luncheon was held in the home of the Engineers' Company at Wax Chandlers Hall.



Sylvia Price presenting the Company's Ladies' Brooch to Doreen Robinson

The Swordsman

The event was preceded the evening before, when the new Master, John Robinson was installed.

Sylvia Price, the outgoing Master's Lady, hosted this year's lunch, held in the downstairs dining room where the Company's Royal Charter is displayed.



The Immediate Past Master's and New Master's Ladies with the Company Coat of Arms

It is always a most pleasurable and special event, which was inaugurated by Mrs Joan Clerehugh in 1994. Fifteen Past Masters' Ladies attended this year, with apologies from Elaine Barlow who was unwell, Moira Smith, and Margaret Skinner who was unfortunately detained in Beijing due to the volcanic ash crisis!

The reception was followed by a welcoming speech by Sylvia Price. She thanked everyone for their support and friendship during the past year, and outlined the highlights which included dinner with Princess Anne at St James Palace, the Royal Garden Party, the out of town visit to Budapest, and the golf weekend in Stratford.



The Ladies enjoy their conversation after a splendid repast

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She concluded by wishing John and Doreen Robinson a most happy and successful year, and presented Doreen with the Master's Ladies brooch.

In reply Doreen thanked Chris and Sylvia for their support, and looked forward to the coming year. She thanked all those responsible for organising the lunch, and presented Sylvia with her replica brooch.

A delicious meal then followed with fine wine and convivial company. It was much enjoyed by all the ladies.

Christine Jackson

PERSONALIA

At the Court Meeting on 12th January 2010 Air Vice Marshal Graham Skinner formally retired from the Office of Clerk to the Company and was elected as Honorary Treasurer to facilitate the preparation of the Company and Charitable Trust Accounts for the year to December 2010. Wing Commander Tony Willenbruch took the oath and was duly installed as the New Clerk to the Company. In addition two new Liverymen were invested and their photographs and their introductions to the Court are included below. After the dinner Graham Skinner and Jean Venables spoke to the Court about their careers and their speeches are also included

Mr Gordon Grier Thomson Masterton BA, MSc, DIC, FEng, FRSE, FICE, FIStructE



Gordon Masterton graduated in Civil Engineering from Edinburgh University with follow-up MSc and DTech qualifications. He is a Fellow of both the Institution of Structural Engineers and the Institution of Civil Engineers, where he was President in 2005-6. Experienced in tunneling (Keilder Project), buildings, bridges and marine works. He became a director of the Babcie Group in 1993 and established an office in Malaysia from 1995-6. He is now Vice-President of Jacobs UK (formerly Jacobs Babcie) managing a staff count of 1200 people in the environment business. Mr

Masterton is also a Fellow of the Royal Academy of Engineering and the Royal Society of Edinburgh.

Assistant Air Vice Marshal Graham Skinner CBE, RAF, FIMechE, FCILT, FRAeS

Mr John Neil Loughhead FREng, MSc, DIC, BSc (Eng), FIET, FCGI



John Loughhead has been involved with energy systems, power conversion, and electrical generation, transmission and distribution over a long career which began as a research engineer with GEC Power Engineering in 1975. Thereafter he has moved upwards in responsibilities through GEC Thermodynamics

division, GEC Engineering Research, GEC Alstrom R&D Director and then Corporate Vice President for Technology and Intellectual Property. He is presently the Executive Director of the UK Energy Research Centre. Mr Loughhead is a Fellow of City and Guilds, a Fellow of the Institution of Engineering and Technology and the Institution of Mechanical Engineers. He is also a Fellow of the Royal Academy of Engineering.

I must begin by saying that it seems unnatural to be standing up in front of you in a capacity other than as your Clerk – and as far as that part of my life is concerned I must thank you all for your generous wishes and gifts to Margaret and me in recognition of my service to you. However, to speak now does give me the opportunity to acquaint you with my non-clerking experiences during my time in the Royal Air Force before the Engineers Company and then my parallel professional activities since.



I joined the RAF directly from school and they sent me to Bristol University where I gained a degree in Aeronautical Engineering but, more importantly, I met Margaret. Early tours on helicopters, maintenance units, back to staff college and then university again (for an MSc in Engineering Management), weapons technology particularly

during the Falklands war period, fast jet training aircraft engineering operations at RAF Anglesey in North Wales (our only overseas tour) – thereafter I became a classic HQ staff officer. Overall my time in the Service had 2 major themes: risk management of aircraft called ‘airworthiness’ and the bringing together of RAF ‘engineering’ and ‘supply of materiel’ disciplines into the new combined arrangements of ‘logistics’.

The New Clerk Wing Commander Tony Willenbruch MA, CEng, FIMechE, FCMI, MRAeS



The New Clerk being decorated with the Clerk’s Badge by the Beadle and Assistant Clerk

I led the Engineering Authority for the RAF’s transport fleet – VC10, Tristar, Queen’s Flight and Hercules which was particularly concerned with sustaining the airworthiness of aging airframes. This did fit me well to become the 1-star RAF airworthiness policy specialist in 1995 – devising systems of engineering delegation, metaphorically long screwdrivers of accountability, intensive aircraft annual reviews of safety and operational risk mitigation. I tried hard in that role to produce a robust framework using the philosophy embedded in our Company’s badge. Here in the crest above the helmet is Smeaton’s lighthouse to remind us all that not only do we bring light and guidance but that safety comes

above all else in all the contributions that engineers make.

With my 'logistics' responsibilities I served a period as the Support Authority for Tornado, Eurofighter and Air Weapons and my final appointments in the RAF were associated with the demise of the individual Service support operations into the new joint service Defence Logistics Organisation. As the last Commander in Chief of RAF Logistics Command my task was to hand over all the assets appropriately so that as I pulled the flag down on the HQ at Brampton the 'phone would stop ringing. This I achieved at the turn of the millennium decade, I then went off into the sunset at my normal retirement date, aged 55, satisfied that I could be honourably discharged.

55 years old is an awkward time to 'retire' – one felt at the peak of a professional skill and needed to pass this on – there was also a matter of 'finances'. Luckily our children had just about become self-sustaining and I had the option to attempt a 'portfolio' of tasks. Firstly, I was asked to become a visiting professor at the Royal Military College of Science at Shrivenham and I lectured in defence logistics policy. Industry was also keen to try to understand the new SMART procurement processes of the MOD and to fathom its reorganisation and I became a consultant on these areas to Marshall Aerospace as Military Adviser to the board and over my time with them the balance of work has moved from 50/50 civilian/military to 80% military with life time support for the RAF fleets.

On the civilian aerospace side, I am also a Non-Executive Director of Short Brothers in Belfast. Shorts is now owned now by the Canadian firm - Bombardier Aerospace, the largest manufacturing organisation in Northern Ireland with around 5000 workers is a world-leader in composite technology and is a company brimming full of engineering excellence in aerospace.

However, when I look back over the last 10 years – juggling the Engineers' Company administration duties with my defence and aviation business consultancy plus keeping up with RAF matters – one of the most satisfying areas has been where it has been possible to bring various threads together in a new and useful way. For the Livery and the RAF, this is exemplified by the opportunity to involve the RAF with this year's Lord Mayor. This occurred because Alderman Nick Anstee, a son of a RAF wing commander, asked me 3 years ago how he might help the Service in the knowledge that he could be Lord Mayor in due course. After arranging for Nick Anstee to dine with the AF Board, I was asked by CAS to plan a 'RAF' year with the potential Lord Mayor to raise the profile of our Service as well as give charitable

opportunities to the veterans. For the major event, we noted early on that September 2010 would be the 70th Anniversary of the Battle of Britain. However, it became clear that this should not detract from King George VI's decree of an annual national commemoration at Westminster Abbey on the Sunday nearest to September 15th – the turning point of the Battle. After about a year of negotiation we agreed that the City of London should salute the RAF on the anniversary of the first German bomb falling within the City on 7th September 1940.

The key City event will be at St Paul's Cathedral this summer and will be led by the RAF Association but embrace the existing RAF membership and all the RAF veterans agencies – a 'royal' service, fly past and flag parade followed by a reception given by the Lord Mayor in the Guildhall. There were other events planned – you may have noticed the distinct RAF flavour to the Lord Mayor Show – the RAF Central Band and the Queen's Colour Squadron was at the Mansion House for the Lord Mayor's inspection as his guard of honour. The RAF Benevolent Fund will be arranging its major fund raising dinner in the Guildhall this year and there are various other linkages in train. Overall, the RAF will have a real opportunity to make its imprint in the City this year.

I have been grateful for all the various professional experiences in the past that have now come together and fit in so well with the aims and ethos of The Worshipful Company of Engineers – active support of HM Forces, promotion of the excellence in engineering including risk management, and the raising of funds for worthy charitable causes. In my position now as a Member of The Court of Assistants, I look forward very much to developing those aspects.

**Assistant Jean Venables OBE, FREng,
FICE, MCIWEM, MCIArb, CEnv,
FCGI, BSc(Eng), MSc**



Master, Wardens, Ladies and Gentlemen. Thank you very much for the opportunity to speak to you.

As many of you have heard me say before, I am proud to be a civil engineer, and very proud to have been President of the Institution of Civil Engineers last year. I am also delighted to have

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been elected a Court Assistant for the Company, and look forward to my developing role here.

My year as President took Roger and me to eleven countries and all of the regions of the UK, some of them more than once. We met many hundreds of members, shared many dinners – from more than 900 in Glasgow to 7 in Halifax, Nova Scotia. And we enjoyed many opportunities to celebrate excellent civil engineering, whether in Award presentations or site visits, and the contribution of engineers, and civil engineers in particular, to the way we live our lives today.

One of the most common questions was: ‘Why has it taken so long for there to be the first woman President? Well, first of all, when I told my teachers at Dover Grammar School that I was going to study civil engineering, they said: ‘But girls don’t *do* civil engineering!’ and when I got to Imperial College I discovered that they were right, not that I would ever give them the satisfaction of knowing it!

Then Imperial said I would never become qualified because I would never work on site – but two summer vacations for British Rail and Mowlem put paid to that argument! So I did succeed in becoming qualified – as only the 12th woman to become a Chartered Civil Engineer in 1974 – and then became only the 12th woman to become a Fellow of the ICE in the mid-1990s. So it is hardly surprising that it has taken until 2005 for the first woman to be nominated to become President. I hope for another soon ...

Active involvement in the Association of London Graduates and Students characterised my early involvement in the ICE and then, upon becoming qualified, stood successfully for Council as a young Member. In addition to mainstream ICE affairs, a long-standing interest has been the Benevolent Fund, which does so much good work assisting ICE members and their dependents when they are in distress or have fallen on hard times. Another spell on Council was then followed by election as a Vice President, before election to succeed to the Presidency.

My career in parallel with ICE involvement has focused on water, with an MSc in Public Health Engineering, research into how the main Thames Barrier might be operated, lecturing and, more recently, a focus on flood risk management, water level management and the potential impacts on both of climate change.

And climate change was one of the major themes of my ICE Presidency – and especially the need for

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adaptation as well as mitigation. Adaptation is going to test our engineering ingenuity, but we will *need* that ingenuity to solve its challenges. The need for mitigation is more controversial because of the continuing debate in some circles about the extent to which CO2 emissions from human activity is the cause of climate change. It is in my view essential but, even if you are a sceptic on these matters, it is surely wise to reduce our consumption of a vital and finite resource.

And it is not just about our direct use of energy. We need to think particularly about the embodied carbon in materials and water. You can’t see any black bits of carbon in tap water, but significant amounts of carbon emissions are associated with the treatment and pumping of potable water, so even saving water saves treatment chemicals and energy, and thus CO2 emissions.

So, a fantastic year has been concluded, leaving us with many many memories of people, places, engineers and engineering. And overall, a clear belief that we – engineers and our practice of engineering – are vital to the continuation and development of civilised life. As I said – I am proud to be a civil engineer!

At the Election Court on 2nd March two new Liverymen were invested and welcomed into the Company by the Master and the Court

EurIng David Michael Hirst BEng (Hons), MBA, CEng, FICE



David Hirst is a Fellow of the Institution of Civil Engineers and has an MBA from the University of Bradford. Currently he heads up Commodity Risk Management for Drax Power Limited, having previously been responsible for managing Strategic and Operational Risk for RWenpower. After his Civil and Structural Engineering degree from the University of Sheffield he completed his professional training with French Kier Construction, and worked developing modular buildings for what has now become the ubiquitous drive through restaurants. After building a power station he joined the energy

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business, initially building Combined Heat and Power plants before moving across into energy trading.

David has chaired the Editorial Panel of the Energy Journal, part of the ICE Proceedings, sat on the Energy Board, as well as being on the steering committee behind the Defending Critical Infrastructure State of the Nation Report. He also sits on the Energy standing committee of the UNESCO sponsored World Federation of Engineering Organisations (WFEO).

James De Waele BEng, CEng, FICE



Jim is currently Managing Director of Keller Limited, the UK arm of the largest geotechnical contractor in the world. A civil engineer, Jim started his career in the 90's with Cementation before moving to Stent, the Balfour Beatty subsidiary where he ended up as MD.

He has served the specialist geotechnical industry since graduating from Aston University both in the UK and overseas. Some of the projects he has been involved with over the years include the Channel Tunnel, the construction of the M60 motorway around Manchester, the Commonwealth and Olympic Games and Wembley Stadium. He is currently vice Chairman of the Federation of Piling Specialists and sits on the Advisory Board for the faculty of Civil Engineering at Nottingham University. Jim is married with two children and lives in Staffordshire.

At the Installation Court on 20th April three new Liverymen were invested and welcomed into the Company by the Master and the Court in public at the start of Common Hall

Air Vice Marshal Christopher Ronald Bushell MA, BSc, CEng, MIMechE, FRAeS

A graduate in Aeronautical Engineering who joined the Royal Air Force as an Engineering Officer in 1984. He has served on a wide variety of units operating Tornado fighters and Puma helicopters, as well as the Red Arrows. His senior appointments included Personal staff officer to the

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Chief of the Air Staff, Station Commander at RAF Cosford, an



aeronautical engineering training unit, and one of the Directors of Equipment Capability before becoming Typhoon Integrated Project Team Leader; he is currently Director Typhoon Project Team in UKTI Defence & Security Organisation. AVM

Bushell is a Fellow of the Royal Aeronautical Society.

John Richard Oliver BSc (Hons) Mech.Eng, MBA, CEng, FIMechE, FAPM, MEI, MIoD



Has had a long involvement with the technology related to natural gas production and transportation, the development and construction of subsea and onshore facilities and clean technology. Starting as an engineering manager with BP in 1984, he moved

upward in responsibility through Enron Europe, looking after projects in Eastern Europe and the Former Soviet Union, as Vice President and Director of Operations for Dynegy Europe then with BAA as a Terminal 5 Project Leader and Head of Transport Strategy. On moving to BG Group he became Head of Project Management with a wide range of projects from very large subsea developments to onshore Natural Gas processing facilities, pipelines and power generation. Mr Oliver is a Fellow of the Institution of Mechanical Engineers.

different situation to that when I was President of the Chemicals ten years ago.



He has been with Rolls-Royce since 1965. The first half of his career was in materials research and applications. Latterly he has had project management and engineering leadership of large and small teams and he currently runs the central engineering technical support teams in his

capacity as Director of Engineering Systems and Services. Mr Goulette is a Fellow of the Royal Academy of Engineering.

A Postscript by the New Master John Robinson FREng

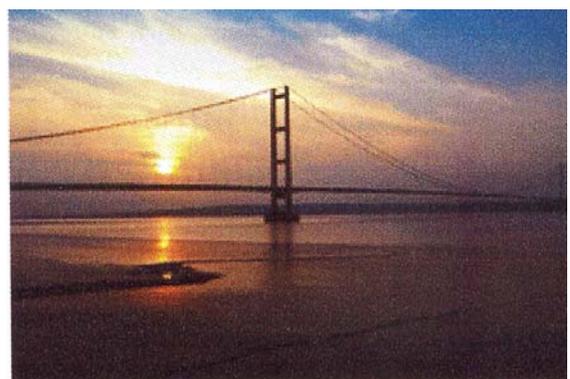
I write this a mere week after my Installation as Master at Fishmongers Hall

For me, as I hope for all those attending, this was a memorable occasion in superb surroundings. But much more important, was the strong feeling of people of like mind enjoying themselves in an atmosphere of warmth, friendship and fellowship. The noise of excited conversation over dinner said it all! This spirit has been created by our predecessors and I am determined to continue and hopefully extend it. David Drewry's speech was both entertaining and very serious – again typifying the best of the Companies spirit.

My diary is filling rapidly with functions when it is my duty to represent the Company. Our own next major function is the Awards Dinner on July 6, a glittering occasion, but one where we can take stock and be proud of the pleasure, support and encouragement we give to young engineers in many fields. Our Principal Guest is Sir Anthony Cleaver, an ex colleague of mine, currently Chairman of Engineering UK and previously Chairman of IBM in Europe. Sir Anthony has done much to foster the spirit of cooperation which has emerged between the Royal Academy of Academy of Engineering and the Institutions. Energies are now largely directed towards the common good - a very

And then we have the Out of Town Weekend in East Yorkshire. Numbers are already over Budget, but we can take more! This year we start on Friday lunchtime, not Thursday – a deliberate experiment to make it a little easier for those of you with high pressure jobs. Some may wish to come only to the dinner at Castle Howard on Saturday evening. Doreen and I will look forward to welcoming everybody

I look forward to meeting with as many of you as possible in the coming year, and representing you to the best of my ability.



*Come and join the Master at the Welcombe Golf Club
in July and on the Humber Bridge in September*