

# The Worshipful Company of Engineers

(Incorporated by Royal Charter 2004)

## The Swordsman Newsletter



Issue 21



January 2009

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Bottom Right Centre	PM Ted Willmott checking a replacement member of the Ironbridge.
Bottom Right	Plaque commemorating the Company's contribution to Blists Hill at Ironbridge.

## FUTURE EVENTS

10th February 2009	Flight Simulator Demonstration	Warfield
3rd March 2009	Election Court, Service and Dinner	Wax Chandlers' Hall
17th March 2009	Visit to the House of Lords and the Jewel Tower	
27th March 2009	United Guilds' Service	St Paul's Cathedral
21st April 2009	AGM and Installation Dinner	Painter Stainers' Hall
12th May 2009	Sons of the Clergy Service	St Paul's Cathedral
21st May 2009	New Members' Evening	Wax Chandlers' Hall
24th June 2009	Election of Sheriffs	Guildhall
26-27th July 2009	Golf Visit	Stratford
24-27th September 2009	Out of Town Meeting	Budapest
29th September 2009	Election of the Lord Mayor	Guildhall
21st October 2009	Ladies Luncheon	Apothecaries' Hall
30th October 2009	Annual Banquet	Mansion House



## OUT OF TOWN VISIT SHROPSHIRE 11-14 September 2008

A slightly eventful journey to Shropshire this year as a car and trailer overturned just in front of us on the M54. We managed to get by but the motorway was closed later on delaying many Liverymen's arrival. However, all safely arrived at the Buckatree Hotel at the foot of the Wrekin to be welcomed by the Master and Jeanette with the Clerk and Margaret.



The hamlet of Buckatree is named in the Domesday Book and dates back to Anglo Saxon times. The original meaning of Buckatree being "the well where the deer drinks". The hotel has been traced back to 1820 when it was a hunting lodge belonging to Lord Forrester. At the beginning of the 20th Century it was the home of Sir John Bayley – founder of Wrekin College. The original house has been much extended on all sides to enable it to accommodate all the Engineers and some wedding parties at the same time!

On arrival Janet and Richard Groome were selling Railway Stations at a £1 each, in aid of the Charitable Trust, from a country wide map of the railway system (courtesy of Andrew McNaughton).

After a fine dinner in the hotel where we sat at round tables named after notable people born in Shropshire, members of the Court gave excellent, off the cuff speeches, describing those after whom their tables were named. A certain amount of bluff and fabrication was evident about some of the names which was very entertaining. The Master



deemed the best story was by John Robinson, who hosted the table 'A E Housman', and who was supported by Cecil French delightfully rendering part of Wenlock Edge remembered by heart from his schoolboy days.

At the end of dinner the Master revealed the pre-chosen station as Lockerbie and the prize of a model railway set was won by Steve Grundy. The second prize of a railway computer game for the nearest station on the same line was won by Nick Hargreaves and both were delighted with their trophies. The map was then auctioned and is enroute to Richard and Lindsay Trim's grandchildren.

The railway game raised over £200 for the Charitable Trust.



Richard and Janet Groome also organised a raffle and the total proceeds for the Charitable Trust during the weekend including the mystery bottle auction at Weston Park were about £1200. Many thanks to Janet and Richard for their hard work.

At the conclusion of the railway game the Clerk gave us a final briefing on the programme for the weekend and the following contributions by my excellent reporters give you a flavour of a most enjoyable weekend.

*Raymond Cousins*

*Photographs:-The Buckatree Hotel, Choosing the train stations and Steve Grundy admiring his prize of a Model train set.*

The first excursion of the Out of Town Meeting saw two coach loads of us departing after an excellent breakfast at the Buckatree Hall Hotel, into a light drizzle along the section of the M54 that was to become very familiar over the next three days. Arriving at Royal Air Force Cosford we passed around the edge of the airfield, on which a group of students at the Defence College of Aeronautical Engineering were being initiated into the arts of aircraft ground handling and marshalling.



*Cold War Exhibition Building – RAF Cosford*

In the distance, on the far side of the airfield, the stark shape of the Cold War Exhibition building of the RAF Museum loomed against the skyline. Passing by a Bristol Britannia turboprop aircraft of the former RAF Transport Command which several of the party remembered well from air trooping flights in the 1960s, our arrival at the Museum site provided an opportunity to admire the vast bulk and daring structure of the main Exhibition building. Inside, we were escorted to the lecture room where we heard a fascinating account from the Curator, who explained how the money for the construction of the building had been raised by an ingenious conflation of EU and National Lottery heritage funding in conjunction with grants from the West Midlands Development Agency.

In engineering terms the building project had posed some significant challenges; a quite steeply sloping site with poor natural drainage, and the need to minimise costs by hanging many of the heavy aircraft from the roof to accommodate the complete collection within a minimum of floor area.

Other features of note included the provision of natural internal lighting through the end walls of the building made of translucent plastics material similar to that covering the Millennium Dome at Greenwich, and the

use of natural rust as a protective coating on the structural steelwork, and bare concrete for internal buildings. These measures will greatly reduce the ongoing costs of running and maintaining the building over its working life. By a serendipitous accident, the steep slope of the site had imposed a two-level floor plan with the sloping main walls meeting in a sharp ridge, which can be interpreted as a metaphor for the tectonic collision of East and West during the 50 years period of the Cold War.

In addition to the exhibits of the Cold War period, of which more later, we were also shown around a separate hangar containing a unique record of the experimental aircraft and prototypes that had explored the radical implications of the enormous increase in aircraft engine performance brought by the invention and development of the jet engine. Notably, we saw the Avro 707 which tested the aerodynamics and handling of the tailless delta platform as the one-third scale precursor to the Vulcan bomber. Also to be seen was a Gloster Meteor fitted with an extended nose section with a control position for a pilot lying in a prone position to minimise the effects of high g acceleration forces during violent manoeuvres; the Short SC3 experimental aircraft used to explore the



*Gloster Javelin All Weather Fighter*

use of directed air jets for lifting and control that played a big part in the conceptual development of the Harrier vertical take-off aircraft; and the Bristol 188 stainless steel supersonic aircraft, variously described as a research experiment or a prototype for a subsequently-cancelled supersonic bomber or reconnaissance aircraft. In the main building we were able to inspect the three V-bombers that sustained the British nuclear deterrent from the late-1950s until the transition to the submarine-launched Polaris missile in the 1970s. A disassembled Polaris was also to be seen, together with examples of the all-British nuclear free fall bombs and air-launched cruise missiles. An



## *The Swordsman*

open panel on a prototype of the still-lamented TSR2 revealed several cubic feet and hundredweights of computer equipment, providing rather less number-crunching power than one of today's mini-laptop computers. Examples of the long-lived Canberra bomber (*which Mike Brown flew, Ed.*) and the Lightning supersonic fighter were also on view, together with other interesting aircraft and specimens of British and Soviet guided missiles and armoured vehicles.



*Guided Missiles and Dakota*

On the lower floor was an extremely interesting film display of the Berlin Airlift that demonstrated the resolve of the Western Powers to confound the Soviet attempt during 1948-49 to starve the population of West Berlin by closing the land corridors to West Germany. An example of the Avro York transport aircraft that equipped many of the RAF squadrons engaged in the Airlift provided a graphic example of the scope of the operation.

Whilst some of the lady members of the party may have been bemused by such a vast array of 'boys toys', there was much to interest engineers of all disciplines, and a youth-reviving trip down memory lane for those with experience of the aircraft industry or of RAF service.

*Mike and Ruth Brown*

## **VISIT TO SEVERN VALLEY RAILWAY 12 September 2008**

Following our visit to Cosford two coaches unloaded their cargo of engineers and their partners at Bridgnorth station, starting point of the Severn Valley Railway and location of a local beer festival which

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some felt an ideal place to await the arrival of 'The Engineers' – a specially named train on which Company members would dine. Others, largely the camera clad variety, explored the station and adjacent shed, capturing the atmosphere, which included the locomotive designated to haul the train.



*Waiting on Bridgnorth Station*

Eventually, GWR 'Manor' class locomotive 7802, 'Bradley Manor' appeared from the adjacent shed, and was coupled to an awaiting rake of dining carriages. 'Bradley Manor' was built in January 1938 at the Great Western Railway's Swindon works to a design by Charles Collett. It is one of 9 preserved locomotives in this class, from an original fleet of 30 locomotives. A 4-6-0 locomotive, number 7802 develops a tractive effort of 27,340 pounds. It operated from Old Oak Common, Aberystwyth and Machynlleth sheds before being withdrawn from service in 1965 and being sent to the infamous Barry scrapyards in 1966. It was rescued by the 'Erlestoke Manor Fund' for use as spare parts in 1979, but in 1983 a decision was taken to restore the locomotive fully, which was achieved in 1993. It remains owned by the 'Erlestoke Manor Fund', based on the Severn Valley Railway.



*The Train 'The Engineers' (Bradley Manor)*

## *The Swordsman*

The Severn Valley Railway is a standard gauge (4' 8½") railway, staffed almost entirely by volunteers. It was in 'commercial' existence from 1862 until 1963, although it was never entirely financially viable. Built between 1858 and 1862, it linked Hartlebury, near Droitwich, with Shrewsbury, a distance of 40 miles. It was absorbed into the Great Western Railway in the 1870's and in 1878 a link line was constructed from Bewdley to Kidderminster. This enabled trains to run direct from the West Midlands industrial area, although most Kidderminster to Bewdley trains continued to run via the Wyre Forest line to Tenbury Wells and Wooferton. At Buildwas Junction, Severn Valley trains connected with services from Wellington to Much Wenlock and Craven Arms. Although it provided an essential service in the development of the area, freight trains (mainly agriculture and coal) provided most revenue. Once motor lorries appeared in the 1930's, decline of the line was in sight – only delayed by its strategic use in the Second World War.

After boarding, and taking places in either the first class or third class dining carriages, the party departed Bridgnorth for Kidderminster. With memories of breakfast not far distant, and the prospect of a formal dinner later, the party consumed two large courses with some enthusiasm whilst watching the Shropshire countryside amble by – fields, floods and a herd of elephants. The familiarity of misted windows, wheels



*The Master, Tony Roche and Jeanette in front of the Engineers train at Kidderminster*

on jointed track and the inevitable soot generated much nostalgia in some, and in others brought back memories of the difficulty and cost of maintaining heritage infrastructure in comparison to modern permanent way. Passing through Hampton Loade, Highley, Ardley and Bewdley (this was, after all, a non-stop express) the party arrived at Kidderminster to view the restored terminus station and museum.

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The museum housed considerable railway memorabilia, from a variety of railway companies. As may be expected, engineers gravitated towards various exhibits featuring lights, levers and bells (signalling interlocking frames). It is to be hoped that the discovery of a 'do not operate the levers' sign after many had done just that did no lasting damage. The museum also featured an exhibition of railway paintings from several artists, and the inevitable tea and souvenir shop.



*Replica of Trevithick's 'Catch me who Can' Locomotive*

The return journey saw us completing a further course with coffee to stave-off potential hunger, and arriving back at Bridgnorth in time to see a replica of Trevithick's 'Catch me who can' locomotive (original built in 1808 by Rastrick and Hazledine at their foundry in Bridgnorth, and demonstrated on a circular track in Bloomsbury, London) in steam in the sidings.

The trip was greatly enjoyed by all. Thanks are due to the staff and volunteers of the Severn Valley staff who contributed to this experience.

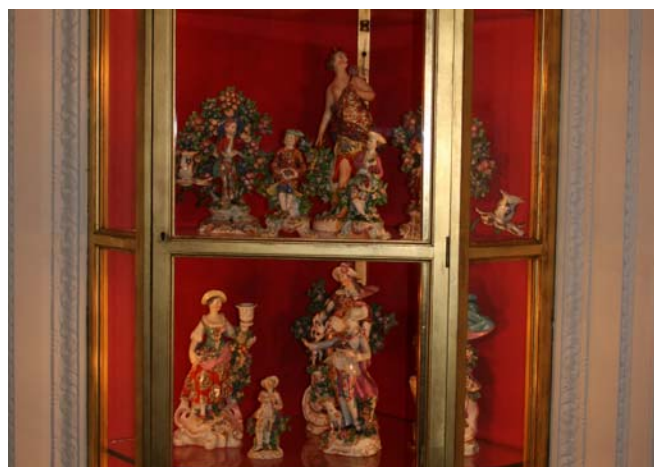
*David Johnson and Marilyn Wedgewood*

## **DINNER AT WESTON PARK 12 September 2008**

We knew it was a fine country house, but for many of us Weston Park, our venue for the Friday black tie dinner, was a complete revelation. Set in 1,000 acres of Capability Brown grounds, this beautiful 17<sup>th</sup> century Georgian mansion, for 300 years the seat of the Earls of Bradford, was left to the nation some 20 years ago. Now in the care of a private trust, it has been beautifully preserved and retains the feel of a sumptuous family home.



As we arrived we were immediately met by guides who took us off in small groups of a dozen with a glass of Champagne in hand. Packed with treasures, our guided tours before dinner revealed fabulous furniture, porcelain and silver, as well as a stunning collection of



*Some Porcelain Treasures*

paintings, including works by Stubbs, Constable, Holbein, Caravaggio, Reynolds, numerous Van Dycks and many more. Adjoining the fine 30,000-book library was a salon hung with breathtaking Gobelin tapestries dating from the 1760s.



*The London Tapestry*

Dinner in the fine Victorian orangery began with a fascinating introduction by the house archivist, who informed us that Weston had previously hosted royalty and more recently a G8 away weekend. At this President Clinton had demanded the only room with a

TV so that he could watch football, and a fridge had to be specially provided for Denis Thatcher. With events at this level it was no surprise that our food and service were superb, from a particularly delicious mushroom soup, gravedlax and Gressingham Duck to a trio of desserts, all presented by charming and attentive staff. The mood of bonhomie and goodwill was rounded off following the loyal toast by an upbeat speech by the



*'They do not know what they have bought'*

Master, the announcement by Richard Groome of a significant sum raised for charity the previous evening and then a mystery bottle auction. In the coaches back



*I thought it was only Gentlemen who aired their knowledge after dinner*

to the hotel the only talk was of a delightful and memorable evening.

*Malcolm and Lucilla Shirley*

## VISIT TO IRONBRIDGE 13 September 2008

As we settled into the coach, ready for our visit to Ironbridge, we were warned “Now listen in. We have a full programme at four locations and a strict timetable. Remember your coach number and don’t be late. And keep thinking positive thoughts: The sun *is* going to shine.”

We might have guessed that we were going to be so organised. The leaflet we had all been given told us we needed eight hours to visit the four locations.

So began our day to this fascinating World Heritage Site, the first industrial site in the world to be so classified. Our guide and organiser was David de Haan, Director of the Ironbridge Institute, and what a find he turned out to be. With thirty years of experience at Ironbridge, he not only knew everything, easily handling even the most technical of questions, but was clear and precise with his presentation.



*The Bellows hole at Abraham Darby’s Blast Furnace*

First up was the holy grail itself, Coalbrookdale, where we reverently admired the pile of bricks commemorating where the Industrial Revolution began, Abraham Darby’s blast furnace. Some broke off to make a visit to the Darby Cottages (up wind of the Furnace), while David de Haan took the bulk of the party into the Museum of Iron. Here we learned of how it was that this spot became the cradle of modern industry; the fortuitous coming together of mineral resources (iron-ore, coal, limestone and clay) and physical resources (river and steep-sided valley for creating dams). The Museum had many fine examples of ironwork. We particularly admired the full-size Andromeda chained to the rocks and much fondled over the years.

Iron has been made at this site for 300 years and still is, though Coalbrookdale’s supremacy lasted only 100 years until the resources ran out and the river system stopped being looked after. In that time it claimed many firsts, including the first iron wheels, rails, cylinders, engines and locomotives.



*The Ironbridge*

We then visited the iconic Iron Bridge itself, built 230 years ago and the first ever of its kind. But our wonder at its graceful beauty and its historical importance was diminished somewhat when David de Haan told us that it was built as a PR exercise, since it served no practical purpose at all, joining nowhere to nowhere. Moreover, even cursory examination revealed huge breaks in the iron struts (82 in total), and also uprights and curved bends being considerably out of true, caused by a combination of land movements and inconsistencies in manufacture. The bridge only stands because of sizeable rectification work, mostly out of sight under the river.



*Victorian Ceramics at the Jackfield Tile Museum*



On to the Jackfield Tile Museum, which didn't sound too fascinating to many, but turned out to be possibly the best museum (and shop) in the whole of Ironbridge. The Craven Dunnill Company flourished here in the late Victorian era when decorative tiles and ceramic mosaics were all the fashion. Examples of these were beautifully presented in many varied styles from Art Deco to Gothic Revival. Also memorable was the recreation of Victorian offices, with quill pens and huge ledgers.

After a good lunch it was on to the Blists Hill Victorian Village where the first stop was the Bank to buy our Victorian currency. There were many shopping opportunities – where else can you buy a bag of fudge for 1½d – and refreshments were also available. At the New Inn glasses were raised in memory of the late Joy Ryley who had visited the pub with her husband, John, on a previous OOT meeting. However this particular visit did not appeal to all: one senior Liveryman was heard to ask repeatedly “Why are we here – we don't need any more Victorian Heritage sites.”



*Part of the Victorian Village*

Finally on to Coalport, famous for its fine porcelain which in its heyday was worth more than its weight in gold. Here in a series of displays we learned about jiggers, jolleys and blinging, and saw a particularly fine example of a sagger maker's bottom knocker's mallet.

So we came to the end of a full and totally satisfying day. Even those who had visited Ironbridge many times before were fascinated by all the knowledge that David de Haan had passed on. And so positive were our thoughts that the sun absolutely blazed down.

*Nicholas and Georgina Hargreaves*

## **A TASTE OF COALBROOKDALE** **13 September 2008**

Coalbrookdale is as much a slice through the 300 years of industrial history as the dale itself slices through the geology of Shropshire so providing the raw materials of the revolution which would “change the world” – clay, coal and iron. Not too many souls would try and “do” quite so much of this amazing valley in a single day as this hardy bunch of Engineers; but then few would have a guide providing a running commentary with the expert knowledge of our own Bryan Gibson – or with his obvious commitment to and affection for the whole enterprise.



*View from the Darby Houses up wind of the Furnace*

The statistics flow like the very Severn; of the progress over the 41 years since the quietly mouldering valley, fortunately by-passed by rude developments and improvements since most production ceased in the 1920s, was recognised for its place in the history of the modern world; of the work that led to the award of “world heritage” status (the site first in Europe) in 1988; of the contributions by the Livery Companies, led by our own, in the last 25 years with each of their donations leveraging national and European grants over forty-fold as much, of the contribution to education through the 60,000 organised school trips hosted, and so forth.

But what struck me most, as a first time visitor, was the scale of the valley; that is, just how compact it is and so how remarkable that the few miles from end to end could have created such an impact on life as we know it. And also, how through its very success lay the seeds of its demise as the industrial processes it created demanded greater space, more materials and labour than such a small area could ever provide, it quickly reverted to craftsmanship as mass production moved elsewhere. How fitting that in its reincarnation,

we should see a new generation of craft workers being nurtured in the shadow their forebears.

The day quickly turned into an amazing educational experience. Our coach called first at the China Museum where, behind the glory of the exquisite ware, one was confronted, for the first of several times in the day, with the uncomfortable realisation that the industrial revolution was fuelled by the unlimited resource of child labour as anything hewn from the ground. That the Potters of the late 1700's were lauded as enlightened for setting the minimum age for boys turning the handles to power their wheels at a constant speed for 10 hours a day at eight years old rather than the six that was the norm.



*Inside the Sweetie shop*

The Clay Museum workshops set out clearly, in conjunction with the lucid explanations of the potters on duty, the rapid advances in the early C19th, led by John Rose, to the point where the finest Cornish clay could be turned into items to win the Gold Medal at the 1851 Great Exhibition. Poor ladies, rarely have they been so grilled about the technology and engineering of pottery making through the ages rather than the finished products themselves! They did enjoy teasing us with tales of the suspicions that not all the bones, manually stripped and ground up by the young ladies of the valley, that went into making the bone china came from animal stock – that maybe more than one “Burke & Hare” was profitably engaged in material supply! The social history of the Works made for grim reading: pneumoconiosis from dusting plates

clean after firing, or lead poisoning from the glazes and paints, or infections from maggots on bones being stripped, saw off many of the young women by the age of 30. I wonder if the statement that “beer was thought to ward off such diseases” was a little 21st century whimsy?



*Part of one of the Kilns (cut away)*

The show rooms contained an excellent selection representing the most famous lines produced before the works were sold and production finally moved to Stoke in 1926. But what caught my eye, and wallet, was an item being produced by one of the current potters – a plate commemorating the 200<sup>th</sup> anniversary this spring of fare paying passenger locomotive hauled railway (Trevithick's Catch Me Who Can was built at Bridgnorth). Given the railway flavour of the Master's weekend, this was unmissable. Speaking of our Master, we finally got to see what on earth he had been meaning when going on about Bottom Knockers.

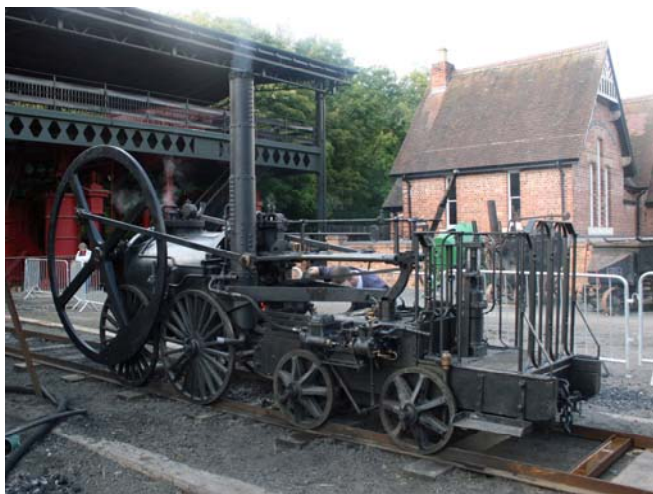
And so to Blists Hill, where a Victorian village is being painstakingly recreated. I have been impressed by similar ventures elsewhere but this is on an altogether grander scale. The visitors' entrance had a board announcing lessons in the school at noon, a sing-along in the pub – and creating, predictably, an instant queue of Engineers – a working sweet shop, was just the first example of how the Village, as with the others in the Ironbridge gorge, is a *very modern* museum dedicated to bringing history alive without turning it into just an empty “attraction”. How fitting that immediately opposite the sweet shop was the chemist with its “in store” dentist's room complete with chair,



instruments (of torture?) and door with the words “Teeth Extracted Carefully” optimistically etched into the glass.

Then there was the mine to bring us back to the significance of the valley once again; red clay extracted at 350’ down, coal at 430’, ironstone at 480’ and firing clay at 520’ before more coal was reached at 600’ – huge depths for the technology of the day, but all the ingredients for a revolution in one place. We saw where the fund raising of the livery companies and their Masters was contributing to a new narrow gauge railway both to expand the site further and add an extra dimension to the visitor experience.

At which point we hastened to the fairground where, beside a simmering steam traction engine, a small ceremony was held. Tony Roche presented a plaque commemorating the Worshipful Company’s part in developing the village to its Manager, Tracey Trix-Dixon and Curator, John Challan, with short but sincere speeches of goodwill and support, and of thanks, from the respective parties. What an impressive place – coping with vast crowds in high summer but capable of offering a more personal and intimate experience out of season.



*Replica of the World’s first Steam Locomotive built at Coalbrookdale for Richard Trevithick*

Lunch! A chance to refuel at the Tile Factory new visitor centre, done in the modern style and proving imaginative architecture and materials can sit elegantly alongside historic buildings. We dined well, looked after by an attentive young staff, before diving off into the Tile Museum itself – and more revelations. The moulds from every design produced were kept so tiles could still be re-manufactured to this day. We were reminded that this was the home of tiles for God and Mammon - Rochester Cathedral and Harrods Food

Hall - alike, and not forgetting our railway theme, Covent Garden Tube station. Craven & Dunnill may have moved production away finally in 1950 but, thanks to the Ironbridge Gorge Museums, the area around the Tile Museum once again is home to, albeit small scale, tile production. On a personal note, for me the most striking memory was of the large peacock designed into the floor at the entrance of the Museum itself – a perfectly observed rendering of the bird staring straight at you.

And so to... The Bridge; both practical means of connecting the two banks of the Severn to effect improved communications and a marvellously conceived marketing tool by Abraham Darby III to highlight the breakthrough in iron making in the Gorge. His reputation, and that of iron itself, was made just four years later when the new-fangled bridge was just about all that was left after a particularly violent flood – the Severn can be a daunting force of nature.

Again I was struck with the pace of change being engendered in a society which hitherto had measured change in centuries. The bridge was opened in 1791 to show the possibilities of iron on an industrial scale but by the time of the 1851 Great Exhibition, and with the British Empire arguably at its zenith, the Ironbridge Gorge area which had made it all possible had reverted to splendid award winning decorative ironwork – magnificent gates, fireguards and the like. And with the ending of the Victorian age came the backlash against ornate decoration which saw the death-knell of the whole valley by the early 1920s.

Our last visit of the day was to the Museum of Iron, the Darby furnace - and Houses where the successive Darbys could work, rest and play within sight and sound of the iron making itself.

I wonder what had the most impact on our rapidly fading, tired but happy, band of Engineers? Was it the site of the ironworks itself, carefully excavated and now preserved under its glass pyramid, where we could see how the fourth element needed to make Ironbridge successful, water, came into play, being harnessed by huge waterwheels to drive the bellows to keep the furnace going relentlessly day in, day out? The furnace itself maybe, manned (if such a term can be used) by yet more eight year old boys working 12 hour shifts which when reversed at the end of the week gave the opportunity for a continuous 24 hour shift? Perhaps it was the visitor centre that reminded us how Ironbridge made Sussex the beautiful county we love today because before Abraham Darby’s great

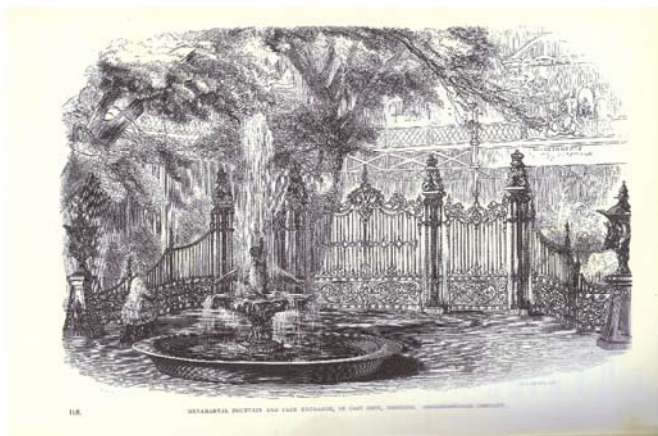
invention Sussex was the most polluted county in England! Was it the immaculately preserved houses themselves, but with no pictures of the men who “changed the world” because they were Quakers? Or was it the extraordinary workmanship displayed in the Museum itself such as the boy and swan sculpture in the gates from the 1851 Exhibition?

As we retired to our coach for the last time, it seemed impossible to pick a highlight out of so many. An extraordinary day in an extraordinary place – no wonder it has captivated Bryan Gibson, and so many others, for so long.

*Andrew and Jane McNaughton*

*Court Assistant, Malcolm Shirley, who is Secretary to the Royal Commission for the Great Exhibition of 1851 has also contributed the following note. The Royal Commission remains active as a permanent body to dispose of the profits of the Great Exhibition to ‘increase the means of industrial education’*

When Liverymen visited Coalbrookdale, many noticed the magnificent swan fountain on the lawn between the original Darby furnace and the car park for the Museum of Iron. This was exhibited at the Great Exhibition of 1851 together with the famous Coalbrookdale Gates, both fine examples of the quality of ironwork from the Ironbridge manufacturers. The gates too remain on display – in Hyde Park, at the end of Exhibition Road and close to the site of the Crystal Palace itself and the exhibition.



*The illustration above is from the catalogue of the Great Exhibition – Plate 108 showing both the Fountain and the Gates*

The catalogue entries (Class XXII Entry 641 (p659)) describes the exhibits as follows:-

### The Gates

Ornamental park entrance of cast-iron, bronzed; consisting of a pair of principal gates, hung on iron pillars of new construction, combining lightness and strength, having finials, emblematical of Peace, supporting an insular crown; also on either side an ogee fencing, terminating in stag’s head vases, suggestive of a park. In all comprising a frontage of 60 feet. Each of the four gates was cast in one piece. English design: C Crookes.



*The Fountain and the Museum of Iron*

### The Fountain

Ornamental fountain of cast-iron, bronzed, seven feet wide by eight feet high, with a group of ‘Cupid and the Swan’. The group forms the jet and occupies the centre of a tazza, ornamented with the decoration of the white and yellow water-lily. English design: John Bell.

## **25th ANNIVERSARY DINNER 13 September 2008**

After a brief return to the hotel, to change into more formal attire, the members of the Livery and their partners once again boarded coaches to return to Coalbrookdale.

At Coalbrookdale, the pre-dinner reception was held in “Enginuity,” the latest addition to the Ironbridge museums, conveniently located close to the Museum of Iron. Unlike its neighbour, Enginuity is a collection of hands on exhibits which allow visitors of all ages to interact with modern technology. Faced with this unparalleled opportunity to play with big boys toys, members of the Livery needed no persuasion to try

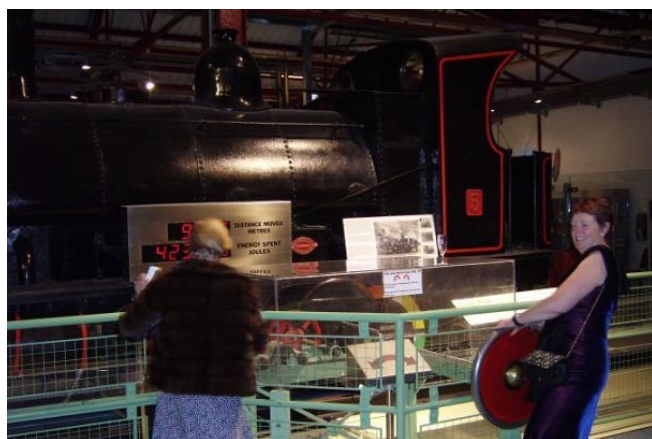


their hands. The technology ranged from relatively straightforward devices that explained the materials and functioning of everyday objects such as kites or photographic film, to complex processes requiring a number of individuals to cooperate to sort into separate streams the components of mixed waste.



*Playing Games*

The members of the Livery and their guests rose to the challenge, and successfully demonstrated how to generate hydro electric power from a cascade of dams, albeit at times at the modest cost of flooding villages. The workings of the Archimedean screw proved challenging as there was no gearing and it was left to the younger members to provide the necessary manual effort. Gearing was provided to assist with the manpower needed to move a full-scale locomotive, but



*Power to Penny's elbow*

again as to be expected the effort required was significant. The exhibit that represented the lifting and carriage of gravel was equally challenging as up to eight individuals were required to work in harmony to ensure that the gravel (represented by plastic beads)

completed the circuit rather than falling out of the process and onto the floor. Great fun was had by all, and it was a slightly exhausted but invigorated group that eventually made their way into the Engine Shop for dinner.



*The Master and Principal Guests*

An excellent meal was followed by a speech from the Master, which included an announcement that the engine, which will in future run on the narrow gauge mine railway being constructed at the Blists Hill museum, will be named after our Founder Master Sir Peter Gadsden.



*Belinda with Astley and Diana Whittall*

Lady Belinda Gadsden, our principal guest, gave a charming response and proposed the toast to the Worshipful Company of Engineers; thus bringing a most enjoyable evening to an end.

*John and Judith Banyard*

## **JUBILEE CELEBRATION SERVICE** **14 September 2008**

On Sunday morning, some fifty members of the party attended a Service to mark the first twenty five years of the Company. The Service which was held in the Board Room at Coalbrookdale, was conducted by the Chaplain, Rev. Michael West. The music was provided by our own Past Master Brian Gibson and the Service included readings by the Middle Warden and by the Master who told the parable of the Good Samaritan - most apt for a Livery Company!

In his address, Michael reminded us that jubilees were not only occasions to celebrate past achievements but that we need also to reaffirm our aims for the future. We need to meet regularly together both to support each other and also to develop our caring for the wider community such as by our support for RedR.

During the Service a collection was held for RedR and for the Ironbridge Development Trust and raised £358.

Following the Service, The Chief Executive of the Museum, Steve Miller, gave an illustrated presentation on the history of the museum and on its plans for future development including a mention of the part which the Engineers Company have played and are playing in these developments.



*The Senior Warden, Chris Price and Sylvia in Rosehill House and dreaming of Budapest*

Lunch was then taken in the Gallery which gave an opportunity to inspect some of the very fine examples of paintings and prints from the Elton collection of industrial archaeology memorabilia, with particular reference to the Severn Gorge and Coakbrookdale.

And so we departed, very happy after another excellent Out of Town Meeting, with thanks to the Master and Clerk for the impeccable organisation and dreaming of next year with another overseas trip, this time to Budapest.

*Cecil and Shirley French*

## **COUNTING SHEEP AND FREEMEN**

**19th SEPTEMBER 2008**

Red, white and blue. You couldn't have chosen more traditional colours to swathe London Bridge on the sunny morning of 19 September. Pikemen, a drummer and musketeers of the Honourable Artillery Company led the procession clothed in the red uniform of Charles I, followed by a flock of Romney sheep (with their usual white ewe-niforms) accompanied by Liverymen and Freemen, some dressed in robes of blue.

Such an event could only take place in London with its deep sense of pageantry. Liverymen and Freemen were driving sheep across London Bridge. Why? Because it is a right that is seldom exercised, and of course there was a little matter of raising money for the Lord Mayor's charities. The aim was to raise £40,000.



*The Sheep Drive*

(AP Photo/Lefteris Pitarakis)



The right to drive sheep has existed since the Middle Ages when Freemen were entitled to bring livestock into the City free of charge, saving them the bridge tax. So, when given the opportunity to join a group of 500 Freemen and Liverymen, I signed up and so did the Master, Tony Roche, his wife Jeanette and John Hanford, Ken Hambleton, Peter Morgan, Doug Marriott, Ian Nussey, Ted Roberts, Richard & Janet Groome and Patrick McHugh. A good turn out by the Engineers.

The event was well organised by The Worshipful Company of World Traders in aid of the Lord Mayor's two charities, Orbis and Wellbeing of Women. Advance instructions on how to deal with your sheep had been metered out, including "Be aware at all times that sheep can move in any direction at any time", "Greet it by name, or say walk on", "Be alert, think ahead of the sheep" and most importantly, "If the sheep jumps over the side of the bridge... let go!" The protocol sounded daunting!

On the day, Dolly and her friends were on leads so less herding and more cajoling was involved. I'm sure when my sheep, who I thought was called Baabara, was handed over to me, her handler from Hadlow College said "After ewe". We walked as a flock along our allotted section of the bridge until the next shepherds took charge.



*Ian Nussey being led across London Bridge*

Just in case you're wondering about whether the animals would have been traumatised by the hustle and bustle of London, let me put your mind at rest. The sheep had been especially trained by the farmer, Mr George Horne, walking behind the flock every day for six weeks banging dustbin lids – I'd no idea that

walking with a Liveryman was such an ordeal (though my wife might tell you differently!)

It was a lots of fun and all for a good cause – raising £48,000. If you'd like to participate in one of the organised drives you might have to wait for a few years but if the opportunity arises, grab it (and the sheep) by the horns.

*Bjorn Conway*

## **ELECTION OF THE LORD MAYOR 29 September 2008**

The scene around Guildhall on Michaelmas Day is indeed a colourful one, as the preparations unfold for one of the most traditional ceremonies in London and indeed in the land. The office of Lord Mayor of London (originally Mayor of London) dates from the 12<sup>th</sup> century, before which the City was ruled by sheriffs. Nowadays the Sheriffs, who are elected on Midsummer Day (see article in *The Swordsman*, Issue 20, August 2008), supervise the election of the Lord Mayor at Common Hall and assist him in his duties throughout the year.



*The Ward Beadles preparing to escort their Aldermen*

Since 1406, the election has been preceded by a religious service, which is now held in the Church of St Lawrence-Jewry-next-Guildhall, and to which the Lord Mayor, Sheriffs, Aldermen, senior officials and Masters of the Livery Companies may be seen processing in full ceremonial dress.

While the service is in progress the liverymen make their way into the Guildhall and gather in the ancient

Great Hall to await the procession and the election ceremony. We engineers were very fortunate to have the guidance of our Clerk, who led us in good time to claim a seat near the front of the hall for a strategic view of the proceedings. The Great Hall was packed to capacity and it was very easy to see why attendance at Common Hall, which was formerly open to all Freemen of the City, has been restricted to Liverymen since the 15<sup>th</sup> century because of the size of the congregation.



*The Master joins in the Procession*

Common Hall is opened by the Common Cryer and Serjeant-at-Arms, after he has purged the hall of non-liverymen “on pain of imprisonment”, and the Common Serjeant reads a list of eligible candidates.

Candidates for election as Lord Mayor must be Aldermen and must have been Sheriffs. Nowadays, in addition, Aldermen must have been approved for progression. There were four candidates, from whom the Liverymen in Hall were invited ceremonially to choose two, whose names would go forward to the final stage of election by the Aldermen in a separate room.

While the Aldermen are away making their selection, the Assistant Town Clerk takes the opportunity to address the livery in a unique blend of mirth and earnest. In between suitable stories and jokes, we were appraised of some of the services provided and executed by the Corporation of London, including animal welfare and the provisions of the Clean Air Act of the 1950's, and informed of the work in hand to deal with the ever-growing problem of disposal of the City's waste. The near-exhaustion of the landfill site at Mucking (!) is driving the initiatives for less waste

production, more recycling and the production of electricity from the burning of waste.

Upon the return in procession of the Lord Mayor, Aldermen, Sheriffs and officials, the election is declared to the Livery by the Recorder. Thus the Lord Mayor elect is Alderman Ian Luder, a Cooper and a Tax Advisor, who has selected the First Cardiac Responder program of St John Ambulance, and the Lord's Taverners as beneficiaries of the Lord Mayor's appeal in 2009.

After the election was announced, the Lord Mayor elect declared his assent and addressed the Livery on the work of the City and its importance in the prosperity of the nation, stressing the ethics of equity, integrity, fairness, work, charity and ingenuity. There later followed votes of thanks to the Lord Mayor and the Sheriffs and their responses. From these it became clear that although we had just witnessed an ancient and dignified ceremony, there was clearly a great deal more to the Lord Mayoralty than tradition alone. With the Lord Mayor spending between 25 and 35 per cent of his time travelling the world in support of London and “UK plc” in addition to his home duties, this time-honoured office has clearly developed into a highly relevant role to promote the City in the modern world.

It was a great privilege to participate in the election process, and a most interesting facet of the livery function, which I hope all liverymen will try to attend on at least one occasion.

*Edmund Morgan-Warren*

## **THE LADIES LUNCHEON** **1 October 2008**

The Men in Shorts, otherwise known as the Register of Engineers for Disaster Relief, RedR. The very name is intriguing.

The annual Ladies Lunch was held on 1 October at the Wax Chandlers' Hall and RedR was the topic of the after lunch talk. It was, as usual, prefaced by a welcome speech from the Master's Lady, Mrs Jeanette Roche, and an introduction to the speaker, Mrs Helen Caulfield, the Director of RedR.

RedR is a service which has excited the interest and admiration of all who have had any contact with it or heard about it. Mrs Caulfield related its history from



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1982, when it was formally established as a charity, to the present day, mentioning en route such heart-stirring happenings as the Myanmar cyclone and the major earthquake in China and the impressive response to these catastrophes from RedR forces.



*The Master's Lady, Jeanette Roche and Helen Caulfield*

We are awed by the amazing willingness of all the volunteers who have never failed to answer the call of need and respond to any crisis anywhere in the world, whatever their day-to-day commitments. What amazing skills and qualities are demonstrated by the volunteers. They are the second line, coming after such 'critical' organisations as Save the Children and Oxfam, for instance, who will go out first to any emergency.



*Helen Caulfield, Director of RedR*

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Red R does not only supply personnel at times of crisis, it has a huge back-up of equipment which can be called upon at short notice. The volunteers need to know, for example, how to extract a landrover which may be stuck in a sand dune. They need to be trained in security, how to recognise the signs of a hostage situation developing and other delicate circumstances which may arise at any time during an emergency. Engineers with seismic experience are needed.

The volunteers are assessed for their suitability to do this work and, of course, they have to have the backing of their families and the goodwill of their employers. They have amazing personal resources; they are always cheerful and committed to whatever they have to do. There is an increasing intensity of disasters.

It is heartening to know that in these hedonistic days, when so many organisations are finding it difficult to attract volunteers, here is a group of people which has caught our imagination and which can act quickly to alleviate distress and need in an emergency.

Mrs Sylvia Price gave the vote of thanks and stressed the importance of RedR to be more widely publicised.

*Hilary Mitchell*

## **MANSION HOUSE BANQUET**

**31st OCTOBER 2008**

Our banquet at the Mansion House this year was held the day before the 25th Anniversary of the Company's Grant of Livery in 1983. We were pleased to welcome the Lord Mayor with both the Sheriffs and their ladies.



*The Master, Wardens, Lord Mayor, Sheriffs, their Ladies and the Principal Guests*

Seven of the founders (being Freemen of the Company before December 1983), Robert Dunn, Raymond Cousins, Sir William Barlow, Gerry Clerehugh and Peter Hammersley, all Past Masters, together with Rev. Michael West, the Chaplain and Peter Nicholson were present.

Also present were seven founding members (being made Freemen of the Company between January and May 1984) Terrel Wyatt, Roger Voles, William Ritchie, Robert Barnes, Peter Jost, John Mott and Bryan Gibson, Past Master and Former Clerk. It was excellent to see 10% of those very early members of the Company able to support on the 25th Anniversary.

The attendance, to match the occasion, was the best that we have had for several years and a good time was had by all. The Lord Mayor was in excellent form as he neared the end of his period of office as also were the Master and Sir Peter Williams, the Vice President of the Royal Society whose speeches are included below.



*The Lord Mayor*

Amongst the guests were the Masters of three Companies who were Engineers, one who was a major Contractor together with the Masters of four other Companies

*Raymond Cousins*

### **MASTER'S SPEECH**

Wardens, My Lord Mayor, Sheriffs, Visiting Masters, Past Masters, Distinguished Guests, Ladies and Gentlemen.

A very warm welcome to the 25<sup>th</sup> Anniversary Banquet of the Worshipful Company of Engineers, and especially to our Company Guests, and those here as the guests of our Liverymen, and if I may say, also to my personal guests.

Our thanks go to the Right Honourable, The Lord Mayor of the City of London, Alderman David Lewis for the privilege of holding this special event in the splendour of his residence in the Mansion House. We are delighted you are here and are accompanied tonight by Theresa the Lady Mayoress; by Mr. Alderman and Sheriff Roger Gifford and Dr Clare Taylor and by Sheriff George Gillon and Miss Delva Patman

Our thanks to The Connecting Arts Symphonic Brass Quintet for their splendid music and also to the staff of Mansion House for the fine banquet we have enjoyed whilst sitting in the wonderful surroundings of the Egyptian Hall.

In our 25<sup>th</sup> Anniversary year there are a number of milestones to celebrate. The first formal meeting of the Company was held on 29<sup>th</sup> June 1983 and only 5 days later on the 4<sup>th</sup> July, supported by the signature of 41 Chartered Engineers, we submitted our petition for the Grant of Livery to the Lord Mayor and the Court of Aldermen. It was received favourably by the Court on the 12<sup>th</sup> July. The Letters Patent was issued just 10 weeks later on the 13<sup>th</sup> September 1983. These timescales from the first meeting of the Company, with a total of 13 days for the acceptance by the Court of Alderman and 10 weeks to receipt of Letters Patent I believe remains not only a proud record for the Company, but a tribute to all the Founder Members; some of them are here tonight and we are especially delighted to welcome them.

Some 21 years later came the granting of our Royal Charter in 2004, the first Company to have received this honour for 47 years.

Whilst the Company is only 25 years young we are strong in number with some 320 Liverymen and with a unique blend of all the disciplines of engineering from across the academic, business, military and public sectors. With these strengths we are well positioned to communicate the role and importance of engineers and engineering to the Business community. This addresses one of the principal objectives of our Company which is to form a bridge between the world of engineering and the City of London.



The combination of Science, Technology and Engineering has played a major role in the development of London over several centuries. Engineering innovation and entrepreneurial spirit was particularly evident in major infrastructure projects in the second half of the 19<sup>th</sup> century.

Sir Joseph Bazalgette, a Civil Engineer, was responsible for the construction of the Victoria Embankment and in one superb project came major benefits; the utilities duct and the new sewerage system on the South side provided more healthy conditions for the residents of London and with much beneficial effect on the eradication of diseases, particularly Cholera. At the same time, the underground railway on the North side provided an ever growing rail system for alternative travel in London. In later years came many additions to the Underground Tube System and whilst the engineering problems were challenging the greatest difficulty, as can often be the case, was to obtain funding for the projects.

But what of the future; it is said that as long as you can see lots of massive tower cranes across the skyline of London, then it usually means the City is continuing to modernise and prosper. However, it should also be recognised that deep beneath the ground here in London, great works are planned or underway with enormous Tunnel Boring machines able to cut through the sub strata of London at speeds approaching 40 metres per day when creating tunnels of up to 6 metres diameter. They will create the new infrastructure for Crossrail, for massive new drainage tunnels, for new underground power cables, for Information Technology cable systems that serve the City Business community. Together they will help to create 'fit for purpose' infrastructure to support the London of tomorrow, and it's the combination of engineers and financiers that will enable such investments to be made.

This partnership of engineering and financial skills and capabilities has a much wider application in addressing the existing and future problems of the wider world. Engineers will play a major role in creating solutions to address the problems of shortages of food, water and energy across the globe, but financing these major initiatives will require an equally critical involvement and support from the financial community.

These global problems create threats to the stability of the world, as do the various acts of terrorism and these can close to home with our armed forces being deployed in several parts of the world. Our Company

has strong links with Her Majesty's Armed Forces and we salute the many brave sailors, soldiers and airmen fighting the war on terror, and in so doing express a deep appreciation of the risks taken on our behalf by those men and women.

My Lord Mayor, those of us who attended Common Hall in September will have heard details of your most hectic and successful year. At this time of difficult world trading conditions your commitment to representing this great City, particularly your overseas visits to 23 countries and also in entertaining overseas delegations here in Mansion House will be much appreciated in the wider context of UK plc. In this you have been ably supported by the Lady Mayoress and the Sheriffs.

Another of our Company objectives is to support the Lord Mayor, Aldermen and Corporation of the City of London in all matters relevant to the life and dignity of the City and it has been a particular pleasure to support you My Lord Mayor during your year. In addition to supporting the ongoing Mansion House Scholarship Scheme, you have chosen to support two specific charities with the theme of investing in healthy lives, healthy vision and healthy futures. It therefore gives me great pleasure to present you, My Lord Mayor with a donation from our Charitable Trust Fund for these excellent causes.



*The Master, Tony Roche*

Over and above the regular grants we make to engineering focussed Charities, the Company typically receives well over 100 applications annually for Charitable Grant support. We are able to meet a small but significant number of requests and in concluding I wish to mention just two that have particular links with this evening's event. Since the early days of our formation, the Engineers Company has had a strong

working relationship with the Ironbridge Gorge Museum. We have made a number of grants to them over the years and more recently from our Heritage Engineering Fund. From this, the Museum can generate 48 times our gift in matched support, largely from European Funding. The combined funds will be used to reinstate the Blists Hill Mine Railway at Ironbridge, the birthplace of the Industrial Revolution.

I was delighted to announce during our Out of Town Livery Dinner at Ironbridge in September that the Museum Trust have agreed to name the locomotive 'Sir Peter Gadsden, who was our Founder Master and Lord Mayor of the City of London in 1979/80.

In a second example we provided a grant in 2007 to a Mechanical Engineering Degree student at Leicester University who had lost his original Sri Lankan Company sponsorship as a result of the Tsunami. The young man has now graduated with a Degree in Mechanical Engineering and Best Student Prizes for each year of his studies. We have received letters from him and Leicester University expressing their gratitude for our support and including a photograph of the presentation Ceremony with the student accepting his Degree document from my Guest speaker tonight, Sir Peter Williams.

Peter is Honorary Treasurer and Vice President of the Royal Society, Chancellor of the University of Leicester and Chairman of the National Physical Laboratory. He is a non-executive director of GKN plc and of W.S. Atkins plc and a Trustee of Marie Curie Cancer Care. He has held a wide range of senior roles in the past including Chairman and Chief Executive of Oxford Instruments plc, Master of St. Catherine's College Oxford, Chairman of Trustees of the Science Museum, Chairman of the Engineering & Technology Board and Chairman of the Particle Physics and Astronomy Research Council.

He was knighted in 1998 and is a Fellow of the Royal Society and of the Royal Academy of Engineering.

Sir Peter, we are delighted you are here and look forward to your response on behalf of the Guests in proposing the traditional Toast to the Engineers Company

I end by asking you to rise and propose the Toast: 'The Lord Mayor, The Corporation of London and the Sheriffs'.

## **SIR PETER WILLIAMS' SPEECH**

Master, Wardens, My Lord Mayor, Sheriffs, Visiting Masters, Ladies and Gentlemen.

It's over 20 years since I first rose to my feet at Mansion House to address a gathering such as this *and*, My Lord Mayor, the splendour of this wonderful room is undimmed by the passage of time – quite the opposite. Tonight, of course, it is a special pleasure to be amongst fellow engineers – and it is an honour to respond on behalf of my fellow guests with our warm thanks for a magnificent evening.

I have, as usual, spent much of the past twelve months in the company of engineers one way or another, many of them the engineers of the future – or I should say 'of the very distant future'. Last year, I was tasked by the Secretary of State for Children Schools and Families with reviewing the state of mathematics in the nation's primary schools. I spent the year since in schools and nurseries the length and breadth of the land.

Apart from now being an expert on 'Bob the Builder'- very useful training for grandparenthood, by the way - it has brushed up my knowledge of early years mathematics – as you might imagine, the world of education has moved on a little since my day.



*Sir Peter Williams*

The picture I found was generally an encouraging one and the Government's response to my review has been very positive. My principal recommendation was that there should be at least one specialist mathematics teacher in each and every primary school in the land. I'm delighted to say that a pathfinder pilot has already commenced in a number of local authorities and



schools, prior to a full national roll out next September. Other recommendations are also in implementation, including help for those children who encounter genuine learning difficulties in mathematics specifically.

So in the years to come, I hope we will have laid the foundations for better understanding of maths by *generations* of young children. Remember, the ‘Bob the Builder’ child of today will be the designer of everything from silent aircraft to zero emission automobiles in the decades to come. But that said, apart from being the *language* which we engineers and scientists use, does maths really matter?

The answer to this question may of course seem obvious here in the heart of the City of London – mathematical algorithms abound in dealing rooms throughout the global financial system.

Not that the financial world is without its problems at the present time. The issues at the centre of the present crisis are of course extremely complex and serious – far be it from me to attempt to address them - but continuing my mathematical theme, may I pose two questions?

First, is there, in fact, too *little* mathematical rigour in our approach to financial services? Perhaps, in our headlong rush to embrace leverage and growth, we have forgotten some elementary fiscal principles – the rather ordinary mathematics, if you like, of the balance sheet.

Or conversely, is there simply too *much* mathematics, in the shape of instruments from derivatives and credit default swaps to CDO’s and the like – mathematics which is incompletely understood by many who use it? Friends who are eminent cosmologists and engineers *balk* at the sheer complexity of the tools employed here in the City.

Either way, a new order will emerge from the present crisis - a very different one from that of the recent past. The opportunities for recovery may take novel forms – perhaps including a ‘Green New Deal’, for example, encompassing the development of clean technologies to addressing global warming. *That* will tax the inventiveness of engineers *and* financiers alike.

Personally, I look forward to something of a re-balancing of the UK economy with engineering and other new industries coming more to the fore – not at the *expense* of financial services, but alongside them, in recognition that our global competitiveness will be

tested in the days to come against other nations which currently enjoy greater *diversity* in their economies than does the United Kingdom.

In conclusion, Master, I remain an inveterate optimist despite present circumstances - and engineering is central to that optimism. It therefore gives me great pleasure to invite you all to stand and join me in a toast to the Worshipful Company of Engineers; may it flourish root and branch forever’. Thank you.

## LORD MAYOR’S PROCESSION

**8th November 2008**

For one of our 25th Anniversary celebrations the Engineers Company participated, as part of the Modern Livery Companies section, in the parade of the 2008 Lord Mayors Show on 8th November. The Master was accompanied by three of our youngest Liverymen, Mark Hunt, Penny Taylor and Bjorn Conway. The four gathered at Wax Chandlers for an early morning Cuppa and for Gowning up, before joining the parade at 10.15 in St Martins Le Grand being number 62 in a total of 160 entries. Penny, Mark and Bjorn walked the route whilst the Master travelled on the upper level of the ‘open top’ bus.



*The Procession starting outside the Wax Chandlers’ Hall*

What a day! It started out grey, gloomy and overcast and progressively got wetter and wetter, but it didn’t dampen the spirits of the assembled throngs – either those parading or those watching and what a great time we all had. The parade was spent waving to the crowds as we passed by, chatting to ‘The Launderers’ –

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sympathizing with a lady in Puritan Costume as to how long it would take for her to wash her white apron all spattered with mud; 'The Security Professionals' – who told us they had left their dark glasses at home for the day!; 'The Risk Managers' – never did really get to the bottom of what they did and 'The Fuellers' with rather dashing robes with flames on the edging.

During the walk Penny, Bjorn and Mark spent the next few hours together, so it was a great opportunity to chat, share ideas, experiences and plans. Sadly our placard, bravely carried by Mark, didn't last the duration of the event and failed catastrophically in a gust of wind about half way round, but we were undaunted and carried on without it to the end. We did feel some sympathy for the Guards Colonel who was trying to marshal us with continuing cries of 'bunch up, keep together' as we were too busy having a good time to take much notice!



*Outside the Hall*

On the bus the Masters from the various Modern Livery Companies also got involved, waving to the scores of spectators who braved the rain and supported the procession. Despite the downpour it was a most rewarding experience and with all its pageantry, the Lord Mayor's Show celebrates what is still great about Britain, epitomised by the modern livery companies of which the Engineers are the vanguard.

The Engineers Company was selected to be one of a small number of Livery Companies, including the Great 12, who were invited to welcome the new Lord Mayor, Alderman Ian Luder, when he returned from the procession to Mansion House. The Master was greatly privileged to be in the receiving line and along

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with Jeanette to attend Luncheon with the Lord Mayor in the Egyptian Hall.

As part of the days activities some further free events were laid on and after the parade Bjorn and his family went along to St Pauls to enjoy a performance of Dick Whittington with the specially commissioned words of Michael Symmons Roberts brought to life through the music of Guy Bovet and acting of Julian Rhind-Tutt as Dick Whittington and David Schneider as the marvellous cat.

Involvement in the parade provides a great opportunity for networking with the Modern Livery Companies, and from experience along the route the crowds seemed more able to relate to the professions and trades that we all represent. For the small annual cost the Company would benefit from similar participation in future years

All in all, an excellent day with great company and it will stay in our memories for a long time'.

*Tony Roche, Mark Hunt, Penny Taylor, Bjorn Conway*

The day ended as usual at the Riviera Restaurant to view the fireworks display before enjoying an early supper. This year the whole of the restaurant's first floor was taken up by our party with nearly 50 of the Livery and guests. This was twice the number of the last few years and constituted the maximum number that can be accommodated. It's funny to think that it is only five years ago that we called in to enquire of the restaurant owner, the location of the firework display and to have a meal before heading home! Of such happy accidents are traditions made!

The fireworks as always were magnificent and for all those assembled for the "after the Lord Mayor's Show" event, the good food good company and good wine ensured that everyone left for home with smile on their faces and many happy memories of the day.

But be warned, as the Riviera cannot accommodate any more than gathered this year, and as neither the firework barge nor the restaurant can be relocated, you will need to book early for next year if you want to join us!

*David and Gillian Scahill*



**THE WARDEN'S LECTURE AND  
LUNCHEON  
12 November 2008**

**The World Water Crisis – An  
Engineer's perspective**

**John Banyard OBE, Junior Warden**

*This years Warden's Lecture was presented, as is traditional, by the Junior Warden John Banyard who gave a lecture on his expertise of water supply and treatment. The origin of the paper was an invitation by the Institution of Civil Engineers to give the Brunel Lecture in 2004. John gave this lecture some 30 times in 15 different countries and the purpose of this presentation was to bring it up to date with developments since that time. It introduced a large number of issues at a fairly high level in order to produce discussion, which it most certainly did. Peter Gray has edited a number of the issues raised for publication here.*

*Raymond Cousins*



*The Junior Warden, John Banyard*

“Water, Water Everywhere, nor any drop to drink”, Coleridge, *The Ancient Mariner*

Some thirty liverymen and guests enjoyed the privilege of listening to and debating John's

carefully crafted, instructive and challenging lecture.

Did you know that:

*More than 15% of deaths of under 5 year olds in the developing world are attributed to lack of water supply and sanitation,*

*When first introduced in 2000 the Millennium Development Goals, adopted by the UN, only sustainable access to safe drinking water was included and basic sanitation was totally ignored. After intensive lobbying this was corrected in 2002 but Water is still a target within a broader goal, rather than a goal in its own right; (is this an Engineering, Political or Governance issue?)*

*In Asia and Africa, healthy sanitation is a prerequisite to education for all, since families withdraw girls from secondary school unless there are separate toilets for each gender?*

The Romans enjoyed clean water and safe sanitation. (This is witnessed by the huge toilet facility, with a beautiful view, at Leptis Magna, Libya; it has many holes for sitting, all provided with clean running flushing water, and was recognised as a facility for social interaction.)

After the Romans, the technology became lost. The “Rochdale Pan System”, a communal building with a remote disposal facility, created as a low cost alternative to sewers in the 19<sup>th</sup> Century cannot be in any way comparable. We are indebted to Pasteur and Bazalgette for 19<sup>th</sup> century progress.

By about the 1920s, we possessed all the necessary technology to secure clean water and safe sanitation, but it had to be installed and used, which involved a significant financial burden that many municipalities were slow to incur.

Subsequently, there have been improvements and sophistications, including better process control, and we now have the infrastructure, that underpins modern western society. Unfortunately, as with so much other infrastructure that the majority of

the population and, regrettably their politicians, take for granted in the Developed World it will eventually wear out, and some of the assumptions as to asset lives are somewhat optimistic, e.g. 400 years for sewers, despite the use of modern preventative maintenance techniques.

In the foreseeable future, all Developed Countries will face problems and the associated cost of infrastructure renewal. We may rightly be proud of the sewerage system commenced in London by Bazalgette: it may be magnificent but that does not guarantee it an endless life. In Developing Countries this problem of finite life is often exacerbated by lack of planned maintenance, which means that many assets do not meet their theoretical lives, and in fact fail after a relatively short period of time.

In the Developing World, problems are more basic with access to clean water and good sanitation paramount, as witnessed by many statistics. Sadly, Sub-Saharan Africa is making negative progress on both clean water and sanitation.

Even when a Developing Country solves its current problems of lack of infrastructure, it will graduate to having those of Developed Countries, with assets that inevitably deteriorate over time.

Many consider population control to be an essential component of reducing the scarcity of clean water and sound sanitation. However, to introduce politics again, there are developing country leaders concerned that the emphasis on population control could be a conspiracy to continue the subjugation of their countries by the opulent "First World"?

John challenged us with question "Is clean water a social good or an economic good?" The majority of the audience opted for the former, although John offered the same number of academics arguing for each! Whichever it is thought to be, it carries a cost, which has to be financed in some way. The UN and the World Bank have adopted the "economic" stance.

He was asked about water wars, and to the surprise of some, considered that there would be

wars with water as the excuse, but not necessarily the reason.

We also moved towards the rhetorical question (rhetorical not only because we had insufficient time for it) "Is water an engineering, education, or governance problem"? What is the balance appropriate between engineering, education, enforcement and enlightenment?

Should we expand Tredgold's definition that "Engineering is the art of directing the great sources of power in nature for the use and convenience of man" to reconsider what constitutes the "the great sources of power in nature", and to include economics, sociology, finance and governance? Maybe there is a future lecture here.

Population Growth, education and corruption were but three of the topics for which John had no time. Perhaps the Programme Committee will consider this for future discussion.

The debate moved, in its closing stages to the question "How should, and could The Company promote sensible and serious debate and recognition of the pending issues about water, not only in the Developing World, but in our own "back yard", the "Developed World"? Respecting that The Company is not a lobbying body, we wondered whether there might be a role for the Bridge Lecture with invited guests and media to shine a light on the topic in an objective and enlightened manner.

And then there is Climate Change!

Not only all that to think about, but also the fellowship and the food were excellent. At the reception before lunch Past master Bryan Gibson gave a description of many of the Company's treasures which were still on display from the new Members' evening the day before. After lunch the animated discussion continued.

*Peter Gray*



## **VISIT TO THE COLLEGE OF ARMS 25 November 2008**

The College of Arms, first incorporated in 1484, is a branch of the Royal Household, the only one remaining in the City. Best known for its responsibility relating to the grant of legally protected armorial bearings (coats of arms) to individuals and corporate bodies, its duties also include responsibility for Coronations, and State Openings of Parliament.

The Master, the Immediate Past Master, their Ladies and fifteen other Members and Guests attended.

We were welcomed in the Earl Marshal's Court by Windsor Herald, Mr William Hunt, who gave an interesting talk on the history of heraldry and the role of the College. The Earl Marshal's Court is intended for the hearing of heraldic disputes but it has not been used for this purpose since the 18th Century.



*The Earl Marshal's Court and the Windsor Herald's Court Dress.*

There are currently eleven officers responsible for the work of the College with three rankings; in order of seniority: Kings of Arms, Heralds and Pursuivants.

The Waiting Room is where personal enquirers are seen. The Herald here gave a clear explanation of the architectural development of the College.



*William Hunt, Windsor Herald, preparing the guests for their visit to the Record room.*

The building was commenced following destruction of its predecessor in the Great Fire of 1666. The Record Room was added in 1842 and the splendid entrance gates in 1956, having been moved from Herefordshire.

In the Record Room the boundless enthusiasm and energy of the Herald became most apparent; he can achieve instant retrieval from the vast collection of records dating from the Middle Ages, without any computerisation. We were shown records ranging *inter alia* from Queen Elizabeth I through Lord Nelson to Sir Harry Secombe and Lady Thatcher.

Finally we returned to the Waiting Room for an excellent buffet supper; and the Master presented the Herald with an engraved wine goblet and a History of the Company.

*Gerald Holdcroft.*

## **CAROL SERVICE AND RIVER CRUISE**

**17th December 2008**

It was a chilly evening waiting to enter into the HM's Tower of London from the Traitor's Gate. We were eventually checked-in and then passed gloomy and threatening walls, along cobbled

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walkways to finally enter the Chapel Royal of St Peters ad Vincula.

The carol singing commenced with “Once in Royal David’s City”. First a solo voice, then the Choir and eventually the organ and congregation adding their voices to the harmony. Hearts and minds were warmed by the enthusiasm and especially the choral singing as they exhibited spectacular ranges in voice, pitch and volume during this rousing start. We were then welcomed by the resident Chaplain, Revered Roger Hall, and the bidding prayer was presented by our own Reverend Michael West. Carols inter-dispersed with prayers followed with the choir, the organist and the congregation maintaining their enthusiastic singing throughout the service. There were seven readings by our Company Warden’s, the Master, the Master’s Lady and by our Clerk and Chaplain. As the final carol ended, and we departed, comments were heard “That was a carol service and a half”, “marvellous service”, “that certainly raised my Christmas spirit”, and so on.



*The South Bank from Tower Pier*

We then proceeded to the ship “The Dixie Queen”, a replica of a 19<sup>th</sup> century Mississippi Paddleboat, where we were greeted with a welcoming glass of champagne. Then on to the foredeck to view the raising of Tower Bridge as we slowly passed beneath. This was a very special experience, especially for those witnessing it for the first time. Dinner with most favourable wines followed. A humorous presentation by the Clerk and an Ode by the Master, which said everything,

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capped off another most memorable event in the Company’s programme.

The Master’s words:

“Wardens, Past Masters, Liverymen, Guests  
Thank you for coming to our end of year fest  
Thanks to the staff of the ship, Dixie Queen  
For food, wine and service that was truly supreme  
Thanks for the Chapel, the Reverend, the Choir  
A Worshipful treat for this time of year.

Our 25th year has had lots of challenge and fun  
But that’s thanks to the Livery; and most everyone.

To the Company team of Michael, Steve and Graham

Thanks for delivering an entertaining programme  
To the Court and Wardens, thanks for steadfast support;

To Liverymen, Guests and Partners for your friendly rapport

To everyone here may Christmas bring all that you wish

But gentle on the Turkey and the Christmas pud dish

Best wishes for the future in 2009

Of one thing I’m sure, our Company will continue to shine

And finally I wish you a safe journey home

Goodnight, God be with you, wherever you roam”



*Under Tower Bridge as we Return*

*Harry Carrier*

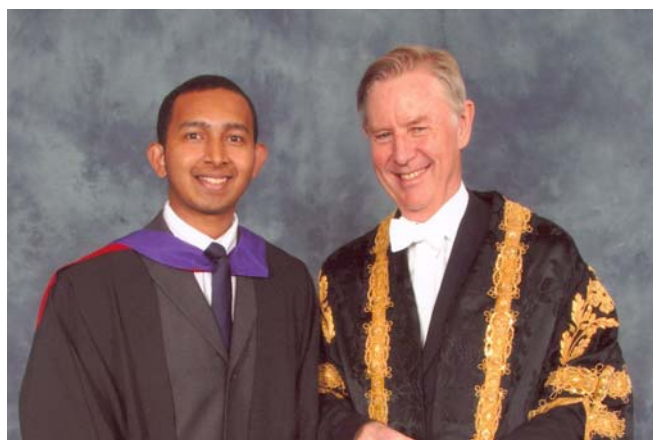


## **CHARITABLE MATTERS**

It is often difficult to get feedback of the results of donations which have been made by the Charitable Trust so we were pleased to receive the letter below from Mohamed Zahras Duwahir.

We have also had a report from Dr William Mayes, a year after he was won the first Fiona and Nicholas Hawley Award.

The Company supported Zahras in 2007 following the Boxing Day Tsunami when his sponsor's business was lost. He has now graduated with a first class honours engineering degree, a top student earning five prizes during his four years at Leicester University.



*Mohamed Zahras M Duwahir on his graduation, with the Chancellor of the University of Leicester, Sir Peter Williams*

*“Dear All*

*I would like to start this letter with my heart full of thanks to all for your support towards me. Today I stand with a degree, which sometimes I had felt that I would not be able to get. Your kindness and support has finally carried me to this level.*

*As an international student in a foreign country, I was amazed to see the support you showed towards me. I am pleased that I enjoyed some of the best part of my life in a country like this.*

*In future I will return back to my home country Sri Lanka and try to build it with the skills I have learned. It is going to be hard to build my country, due to the corruption and war. I ask for*

*your prayers, that one day my country also would become one like UK.*

*If I am lucky enough to study further and I get the required funding I will come back to UK to live the memories again.*

*Thank you*

*Mohamed Zahras M Duwahir  
General Engineer (BEng Hons) – 2008 Graduate  
University of Leicester”*

### ***Treatment of wetlands for highly alkaline industrial drainage – one year on from the Hawley Award for Environmental Engineering 2007***

In October 2007, Dr Will Mayes of Newcastle University was awarded the inaugural Fiona and Nicholas Hawley Award for Environmental Engineering. His submission to the Worshipful Company of Engineers demonstrated the feasibility of engineering treatment wetlands for extremely alkaline waters that arise from the weathering of a variety of globally important industrial by-products such as steel slags, fly ash and lime and cement spoil. Such alkaline drainage can have acute and long-standing impacts on the ecology of recipient water courses. Measurements



*The problem: highly alkaline water (pH 12 – similar to domestic bleach) draining from slag mounds at Coatham Marsh Nature Reserve, Teesside. The white calcium carbonate crusts that form in the stream at such high pH significantly limit the establishment of aquatic flora and fauna.*

from natural wetlands receiving highly-polluted caustic waters at former steelworks sites suggested that engineered wetlands to treat the volume and constituent of a range of discharges at polluted sites in the UK would be economically viable. Engineered wetlands harness a range of natural biogeochemical processes, as well as physical settlement processes that can assist in the removal of pollutants from wastewater streams. In addition, wetlands provide a far more environmentally sensitive alternative to conventional treatment options for alkaline waters such as direct chemical neutralisation with acids.

Dr Mayes has used his prize money to further the dissemination of the research which has led to some fruitful developments. Since the award in October 2007, Dr Mayes has attended a major UNESCO Institute for Water Education supported conference: *Wetland Pollution Dynamics and Control* in Tartu, Estonia attended by over 200 experts from 40 countries. An address on the novel application of treatment wetlands for both extremely acid and alkaline waters was well-received and led to an invited review paper in the highly acclaimed journal *Science of the Total Environment* with collaborators from the UK and Estonia. Shortly afterwards a proposal to trial the first constructed wetland for highly alkaline waters in the UK with the UK Natural Environment Research Council was successful. The UK Research Councils put great emphasis on industrial and societal beneficiaries, and the application was strengthened substantially through being able to cite a recent major national environmental engineering award from an esteemed group of experts! The research project is running from April 2008 until mid-2009 and has seen the first wetland specifically targeted for treating extremely alkaline waters in the UK (and perhaps the world) built at the Redcar Steelworks site in Cleveland with the assistance of Corus and volunteers from the Tees Valley Wildlife Trust. The system was built in early April 2008 and is now well-established and showing very promising performance. In addition to evaluating the performance of the Redcar system and demonstrating this to regulators, the current research also puts emphasis on liaison with other potential industrial end-users. The success of this scheme has led to discussions with industrial clients about possible application of the wetlands for treating bauxite processing leachates. Waters draining such residues, known as 'red mud,' can have a pH up to 13 and be similarly detrimental to aquatic habitats in many parts of the world. While these waters have a slightly different chemical signature to steel slag drainage,

there are numerous geochemical and ecological parallels that suggest testing of wetlands for red mud drainage warrants future research effort.

Further dissemination of these recent developments is being facilitated by the Hawley Award to fund travel for Dr Mayes to Indore, India in early November 2008 and present some of the preliminary work from Redcar at a major International Water Association conference: *Wetland Systems for Water Pollution Control*. This conference will be attended by international specialists and provide opportunity for dissemination in a global region where opportunities for applying this treatment technology are becoming increasingly apparent.

In addition to the developments in alkaline treatment wetlands, which the Hawley Award has played a major role in advancing, Dr Mayes has led in the development of a number of other novel environmental engineering applications in the past year. These include the use of recovered iron hydroxides (a by-product of the Coal Authority's coal mine water treatment programme) as a low cost filter media for the removal of contaminant metals (such as zinc and lead) from wastewater streams, and the development of bioreactors for metal removal from abandoned metal mine discharges.



*The solution: 6 months after construction, the reedbed is well-established. pH of the waters has fallen to 8-9 due to the accelerated removal of calcium carbonate in the wetland. This process rapidly occurs in the wetland due to high partial pressures of CO<sub>2</sub> in the water – a product of microbial respiration, which highlights the importance of biological activity.*



## PERSONALIA

*Welcome to Eur Ing Duncan MacPhee B.Sc. C.Eng. FIMechE. who was invested with the Livery on 7th October 2008*



Duncan was an industrial Scholar with AEI, Large Steam Turbine Division in Trafford Park where he completed his initial training and graduated from St Andrews University as a Mechanical Engineer.

On completion of his apprenticeship he worked in the development and automation of manufacturing processes

on the shop floor before transferring to the petrochemical industry with ISR in Southampton where he was part of a small team responsible for the design and build of new process facilities at Fawley and Grangemouth. After 4 years with a production company, he realized his interests lay more in the design and build of major process facilities, than production and maintenance and he transferred to an International Contractor, joining Constructors John Brown Ltd in 1973 with whom he effectively remained for the rest of his career. His experience in the design and build of major oil & gas facilities, on and off-shore, pipelines, petrochemical, and energy related projects worldwide is extensive and includes projects in North & South Africa, UAE, Iran and Iraq, Russia, Azerbaijan and Georgia, The Benelux and Germany in addition to the UK. He took up his first Board appointment in a joint venture company in 1982 and a Divisional Board appointment overseas as Director of Engineering in 1990. In 1996 he returned to London head office as Director of Project Operations and became largely responsible for the London Business unit operations through subsequent acquisitions under Kvaerner, Yukos Oil and CBI. In 2004 he was appointed a Group Vice President within CB&I and Operations Director of CB&I John Brown Ltd. On his retirement last year he was Director of Engineering for CB&I's Europe, Middle East and Africa Operations, responsible for the establishment of a new, low cost high value global engineering centre in Ajman UAE, in addition to his role as Operations Director of CB&I UK Ltd.

He was an active member and past Chairman of the British Chemical Engineering Contractors Association (BCECA), a founder member of The Netherlands branch of the IMechE and is presently Deputy Chairman of the Process Industries Board at IMechE.

His other interests include offshore sailing, skiing and golf in addition to spending more time with his wife and six grandchildren in UK, Germany and Houston, Texas.

### *In Memoriam*

We are very sorry to report the deaths of several very influential members of the Company. We are very grateful to them all and our sympathies go out to their families

#### ***Sir Denis Rooke, OM, CBE***

Sir Denis Rooke OM, CBE died on 2 September 2008. Sir Denis was a founder of the Company and the second Master. A very distinguished Engineer who was Chairman of British Gas and President of the Fellowship, now Royal Academy, of Engineering. Sir Denis was always hugely supportive of the Company and will be very sadly missed. An obituary follows.

#### ***Clare Curtis***

Clare Curtis, one of our Lady Liverymen, died in mid September. Clare joined the Company in 1999 and was always very supportive of the Company. I have published some of her reports on events in The Swordsman.

#### ***Douglas Simpson***

Douglas Simpson, a founder of the Company died on 19th November 2008.

#### ***Robert Dunn***

Robert Dunn, a founder of the Company and the fourth Master died on 23rd November 2008. Enormously supportive of the Company right up to this year. I hope to publish an obituary in the next edition.

#### ***David Mitchell CBE***

David Mitchell died on 13th December 2008. David was Master in 1998-99 and edited the Swordsman for several years. Again I hope to publish an obituary in the next edition of the Swordsman.

## SIR DENIS ROOKE OM, CBE 1924 - 2008

*Sir Denis Rooke, the Company's second Master, died 2nd September 2008. A Service of Thanksgiving for his life was held at Southwark Cathedral on 26th November. The cathedral was completely full and tributes were given by two other Past Masters of the Company, Gerry Clerehugh, a former director of Research and Technology at British Gas, and Sir William Barlow, President of the Royal Academy of Engineering from 1991 to 1996. These tributes are reproduced below.*

Denis Rooke was a true Colossus on the world gas scene. He had earned this position and respect by his achievements in a long and distinguished career in British Gas and its predecessors. Basically he was an Engineer with a first class education in Mechanical and Chemical engineering at his beloved University College London, of which he subsequently became a Fellow. His engineering skills were honed in India, where he served in the REME, rising to the rank of Major by the age of 26.



He joined South Eastern Gas at the end of the coal carbonisation era. As an obvious high flyer, he was seconded to the LNG project at Gas Council. This culminated in him being our representative on the commissioning team and first voyage of the Methane

Pioneer from Lake Charles, Louisiana to Canvey: The first transoceanic voyage of LNG. Just look at the trade now.

Then a whole new era dawned with the discovery of North Sea Gas. This raised formidable problems but cometh the hour cometh the man. Denis Rooke with his managerial and technical skills and leadership ability fitted the bill: first as Development Engineer then Member for P&S in Gas Council, and then Deputy and finally Chairman of the new British Gas Corporation.

Mammoth projects were undertaken:-

Joint ventures in offshore exploration and fields

New shore terminals

LNG Storage

A new cross country grid of all welded, steel, high pressure pipes.

The old cast iron mains started being replaced by yellow polyethylene.

Every single appliance in the country individually converted to burn the new gas.

All this produced the nuts and bolts of the gas industry we have today.

Successful years followed and Denis was honoured first with a CBE and then with a well deserved Knighthood.

At this time he was very proud of the fact that we were the only Nationalised Industry who was able to lend the Government money. He also had strong opinions about where gas could be used. I never dare tell him that I had an ornamental gas fire.

Eventually the clamour came for more competition and privatisation, following the political tide of the time. Denis' fight to keep an integrated Gas Industry is well known. Bowing to the inevitable, he led the "Tell it to Sid" privatisation campaign, which was so successful with thousands of investors. I think he went out on a high.

He didn't forget gas after he retired. He was a good supporter of the Institution of Gas Engineers, having a lecture named after him. He also kept up his contacts with GIIGNL, the LNG importers group. Much to his surprise, we built a brand new Research Centre in his University backyard at Loughborough. Now the University have perpetuated his name on the site with



the Denis Rooke Building, complete with an excellent bronze bust.

All the industry and a much wider engineering community rejoiced when Her Majesty the Queen appointed him to the Order of Merit. A very, very special award for all his efforts.

His work could be said to have been his hobby, but he did seem to relax in an engineering environment. He loved to get away from the office and dabble in the nitty gritty. I well remember him appearing out of the blue at the end of an inspection run trial in Lincolnshire to find out how it was going and to treat us to steak and kidney pie and the odd pint of beer. Although fine Burgundy, red or white, was more his metier.

Throughout his career he put into practice his strongly held belief that successful technical companies need a good scientific and engineering development base to keep ahead of the game. He was like a pig, with two tails when British Gas won the Royal Academy McRobert Award for Engineering Innovation.

He had a great love of music, especially opera and attended performances regularly. Can one forget the marvellous series of British Gas Cathedral Classics by the London Festival Orchestra which he staunchly supported.

He had a lifetime passion for flower photography. He liked Rugby football and supported the British Gas Challenge, the annual England v Wales match. Fortunately for his home life with Brenda, Wales managed to win most times.

Brenda and Denis almost reached the Diamond milestone in their marriage. Sixty odd years on from their meeting at Swansea University to where UCL was evacuated in the War. Denis, as a man totally dedicated to what he had in hand, was indeed fortunate to have such loyal and understanding support throughout his career. He was so proud of their daughter Diana, a woman with a technical bent, just what he wanted.

He was often thought of as austere and autocratic, but he was much the better for knowing. He didn't show his soft side often, but it was there all the same. Underneath he was very rather caring. He had a sense of humour and was be a good companion and friend. He made a difference for good in everything he turned his hand to. We all will miss him.

*Gerald Clerehugh*

I knew Denis Rooke for over 30 years and we had much in common. As I used to remind him, he was older than me having been born a few months earlier in 1924. We both received most of our engineering education during the war and then saw active service, he in the Army, and me in the Royal Navy. We were both knighted in 1977 and later that year when the government was trying to persuade me to leave the private sector to chair a nationalised industry he was the first man I went to for advice. With some others here today we fought many a battle together with the Treasury. And later I succeeded him as President of the Royal Academy of Engineering and Master of the Company of Engineers. It is thus a privilege for me to give this tribute to Denis.

I know how honoured he would be that Her Majesty the Queen and the Duke of Edinburgh are represented here today as are the Prince of Wales and the Duke of Kent.

Denis was gifted with a first class brain and was a brilliant engineer who achieved high standards himself and did all he could to help young people who wanted a career in engineering to follow in his footsteps.

Prince Philip helped engineers to create an equivalent organisation to the Royal Society and Denis was one of the early fellows of the then Fellowship of Engineering in 1977. He was also elected an FRS in 1978.

He became the third President of the Fellowship and in the next five years he developed the Fellowship to having 1000 eminent engineers and negotiated its Royal Charter which led to it's renaming as the Royal Academy of Engineering. He liked ties and the tie I wear today is his design for the new Academy. As President he used his strength of character, leadership and ability to drive forward the Academy's objectives of promoting excellence in engineering, inspiring the next generation and producing informed public policies in matters of great importance to our country.

He felt that successive governments failed to understand the importance of engineering to every aspect of modern life and its potential for wealth generation for the economy. The same applied to the financial world.

He never missed an opportunity to speak out on major engineering problems and the need for a national strategy for engineering, technology and energy. In his five successful years as President of the Academy he raised the profile of the engineering profession.

With the objective of impressing on the City the importance of engineering to the economy a group of us formed a new City Livery Company to act as a spearhead, The Worshipful Company of Engineers, of which Denis was the second Master. Forming a Livery Company from scratch called for many decisions and I smile now when I recall how Denis rejected any notion of spending day working time in its court meetings. The traditional long lunches of livery companies were not on the agenda. He insisted on maintaining a high qualification for entry which quickly made it an influential company. He encouraged the company to support engineering education and as a wartime REME major he understood the engineering needs of the armed forces and formed links with them. He attended court meetings and events throughout the whole 25 years of the company's existence and when we celebrated our first 25 years at the Mansion House four weeks ago he was greatly missed.

If Denis served an organisation you could depend on his presence – never late – always doing his duty, always willing to help with wisdom and advice often offered with a dry sense of humour

When he retired from British Gas he made a policy of declining paid appointments so that he could spend all his time (and I mean all his time - ask his wife Brenda) in positions where he could help with education and engineering progress. When elected Chancellor of Loughborough University, he devoted much effort in supporting its Vice Chancellors and winning support for the University. In this, as in all his appointments he was loyally supported by his wife Brenda who attended thousands of engineering occasions with him up and down the country and countless journeys to Loughborough.

He was particularly keen on encouraging women to train for a career in technology and engineering and it must have given him great pleasure that his own daughter, Diana, chose a career in science.

I can't mention all the appointments he held at various times. I think only Mrs. Warren, his secretary, could do that, they ran to dozens- but His Chairmanship of the Science Museum, the National Museum Of Photography, Film and TV and The Royal Commission of the Exhibition of 1851 stand out.

Of course his successes brought him awards. The CBE, Knighthood , many university Hon Doctorates, Fellowships at home and overseas and personal gold medals They are too numerous to mention but nothing

equalled his pride and pleasure when HM The Queen appointed him to The Order of Merit which is represented by Lord Fellowes here today. We engineers were really happy for him as we believed he did richly deserve a very select honour.

I think of Denis as like the Rock of Gibraltar – big, strong, wise, kind hearted and a staunch, loyal friend who never allowed issues to be fudged and stuck to his principles. He was always there to help people of all ages, and will be greatly missed but I think he would be pleased to be remembered as a great engineer.

*Sir William Barlow*