IESF
Société des Ingénieurs et Scientifiques de France
British Section
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2018. THE YEAR OF ENGINEERING

Newsletter
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AGM and President's Lecture

"2018: The year ahead and how did we get here" by Jean Venables at the Royal Academy of Engineering, 29th January 2018

Andrew Graham with Simon Greenway and Jean Venables

At the AGM, Simon Greenway was thanked for 12 years' service as Hon Treasurer and the badge of office was handed over from Andrew Graham to Jean Venables.

After commenting on the serendipitous change of venue to the Royal Academy from ICE which was concurrently experiencing a black-out, we were treated to Jean's Presidential Address. She chose to draw her many strands of activity together, in professional and public life, and then examine them to see where they would lead in 2018. She also highlighted the many anniversaries and milestones to come in 2018 for the ICE (200yrs), WFEO (50yrs) amongst others, plus the Government having declared 2018 as *The Year of Engineering*. IESF was also cited because of the preparations necessary in 2018 for us to celebrate our 100yr Anniversary in 2019.

Jean Venables was the first woman president of the ICE and now is our first woman president – she was only 12th female MICE when she became a Member. The 'women in engineering' situation is improving but there is still a way to go. Let's do all we can.

Floods have always been an ever present risk and Jean showed a map showing the 10% of England and 2% of Wales that is low-lying and under managed drainage, meaning that much of it has to be drained tidally and/or pumped continuously. Flood risk is considerably exacerbated by global warming and Jean addressed the actions needed to mitigate the risks both of flooding and warming, and to adopt our practices, especially by our moving to renewable energy sources and the elimination of carbon heavy fuels. She noted that there was one day last year when there was no coal generation at all – a real advance. On a plot of Likelihood vs Impact produced for the World Economic Forum, the effects of global warming she showed come higher than any other – even higher than cyber-attacks.

Map showing the 10% of England and 2% of Wales that is low-lying and subject to managed drainage. reproduced courtesy of The Association of Drainage Authorities – see www.ada.org.uk for more details

The other major theme of Jean's address related to what we as engineers could do to create a safer and a more-sustainable infrastructure fit for the future. The complexity of today's projects and the ever present thrust for faster, low cost build requires clarity of responsibility, and above all competent leadership by continuously trained professional personnel if we are to avoid failures such as the

Edinburgh schools and probably the Grenfell Tower fire.

A picture from the 2017 Report of the Independent Inquiry into the Construction (structural failures) of Edinburgh Schools

Tony Miller

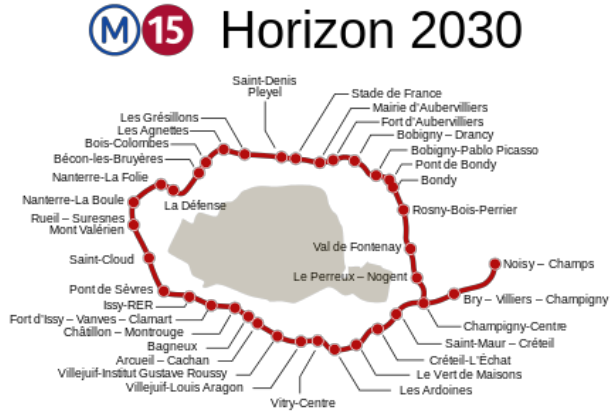
ICE & RICS Carol Service - 4th December 2017

The RICS/ICE annual Carol Service in St Margaret's Church, Westminster was attended by 36 IESF members and guests. All the favourite carols were sung concluding with a fine rendering of "The Twelve Days of Christmas".

Following the service members and guests retired to the RICS Building for mince pies and mulled wine before moving down Great George St to the Civils for a two-course supper, where a convivial evening was had by all.

Building Tomorrow's Metro. By Lucy Rew. March 19th ~ RAF Club, Piccadilly.

Lucy is a Civil Engineer, working for Egis, a consultant based in Paris. She gave us a fascinating insight into the problems of tunnelling in the densely populated area east of Paris. The project is known as the Grand Paris Express and will be an automatic Metro, 90% of which is underground. It will serve business and residential areas and airports. Lucy is director of design (tunnels) for Line 15 East, which will open in 2030, and comprises 21.3 kms of tunnel, 12 stations interfacing with rail, metro and tram lines, together with two large turnout structures.



There is a five year design period, and six years construction. 200 engineers, technicians and architects are on the team. A 3-D combined services model is being created, and over 2000 drawings and reports have been produced so far. Five separate tunnel boring machines (TBM's) are proposed for 10m diameter tunnels, with over 3.5 million cubic metres of spoil. All tunnelling is below water level, and the ground is mainly soft and very varied.

The stations are designed to be accessible to all, including the mobility impaired. Air conditioning is provided throughout. One very important station is "Stade de France" that has to be designed for several tens of thousands of people to get onto the trains fast at the end of a match. It is next to the emblematic RER station. Line 15 East also has an emblematic station at "Pont de Bondy"

Risk Management techniques are being used to analyse "natural" uncertainties, e.g. geology, and "man-made" uncertainties, such as quarries and structures. Quality, cost and schedule must be guaranteed. To do this the risk management starts at the beginning of the design process. A "risk register" is set up for the impacts during design and construction, in several categories and probabilities rated 1-4 for costs, public image, scheduling (potential delay) etc.

A major risk is settlement which will be monitored closely before, during and after construction. Some buildings, like hospitals are very vulnerable, and special mitigation measures are being devised. This includes the method of construction, any ground treatment, or structural reinforcement. Boreholes are being drilled, one on average every 120m, to check the ground for abrasiveness and gypsum inclusions. Abrasive ground causes the cutter heads to be replaced under water using divers. Dissolving gypsum causes subsidence and an unstable cutting face. This can be mitigated by grouting and extra detection.

The design will be complete in two years' time, and Lucy's team has carried out vulnerability analysis on 4000 buildings, of which 700 are prioritised, 64 either critical or very critical. Other hazards include tunnelling under 7 mainline railways, 5 RATP lines, 9 sewers, 4 water mains, 3 pylons and 2 motorway bridges. As the tunnelling is almost entirely below the water table, great care must be taken in optimising the tunnel boring machine pressure. Too low will cause settlement, too high will cause blow out. "Plaxis" 2D finite element modelling has been used to calculate the settlement under sensitive structures, and some 3D modelling will be carried out in the next design phase.

In conclusion, the team have been able to make significant cost savings, by raising three station platform levels by up to 5m, and mitigating the gypsum dissolution by proposing invert concrete reinforcement. 14 risks have been eliminated, with a saving of 8m euros, and 50m euros saved overall on tunnel risks. At the current stage of design, there are a number of risks at level 9-12. In two years' time, there will be no risks remaining above level 6.

Questions included:

The contractor – he will carry out his own detailed design and finite element analysis, and choose the type of TBM -either earth pressure balance (requiring conveyor belts), or TBM (involving bentonite slurry) will be selected, or the new "variable density" method, that combines the two.

Early contractor involvement – the contractor carries out the full detail design.

Crossrail lessons – Lucy has a copy of the reports for reference.

Sources of funding – 2bn euros is funded entirely by the City of Paris, the state, and real estate (no EC funding).

What to do if there are no details of the foundations? - Carry out gamma ray geophysical investigations, and if necessary avoid the building, thus adding 120m to the alignment in one instance.

David Brewerton

IESF Ski Group 4th~11th February 2018

This year the Ski Group returned to their favourite location in Courchevel in the French Three-Valleys Ski area. Chalet Monique is a luxury chalet in the centre of the village and only five minutes' walk to the main gondola lift. Of the twenty-two members and friends who took the trip, five went for the option of alpine walks where they experienced walking in crisp and sunny weather.

On most days the weather was clear and sunny once the Group got above 2000m when the cloud inversion showed mountain peaks sticking out of a white sea of cloud. The great snow conditions throughout the Alps this year produced fantastic skiing for all levels of skiers.

After the day's excursions in the mountains, the attraction of the hot tub was compelling prior to a top quality three-course dinner in the chalet.

IESF Ski Trip 2019

There are vacancies for one couple and a single lady for next year's ski trip to Les Deux Alpes in the French Alps in February. If you are interested or know of anyone who would be, please contact Paul Gerrard.

"Good Water Management" Lecture 17th April '18 ~ Army & Navy Club

Innes Thomson, Chief Executive of the Association of Drainage Authorities gave a lecture entitled "Good water management depends on liberté, egalité, and fraternité" on 17th April 2018 at the dinner at the Army and Navy Club.

Innes introduced the audience to his career to date with highlights of his ten years working in France on major projects. These included the ESRF synchrotron radiation facility at Grenoble which combined leading edge mechanical and electrical machinery with the accurate civil engineering of smooth concrete floors and building in which to safely house all the synchrotron equipment. Apart from his experience on the Synchrotron, the main theme of his career has been water. A particularly interesting time was spent with consultants SOGREAH in Grenoble overseeing the construction of marine breakwaters using the specialised concrete "Accropode ™ " units weighing in range from 2 to 50 tonnes.

His current position is Chief Executive of the Association of Drainage Authorities (ADA). This organisation acts as a national body representing public authorities engaged in the management of drainage, water level and flood risk management in England, Wales and Northern Ireland. A significant part of ADA's membership consists of Internal Drainage Boards who help in providing local water management services within the lowest lying areas of England and Wales and representing about 10% of the total land area of the two countries. ADA was also one of the founder members of the European Union of Water Management Associations (EUWMA).

The coordination of the management of fresh water, principally of rivers and their catchment areas, is steadily growing. This is essential as UK regions suffer from a wide range of natural problems caused by water in unwanted places. The national wake-up call for the creation of the ADA in 1937 resulted from very damaging local floods at that time. These emphasized the lack of a nationally coordinating body organised and associated

with natural fresh water management.

Innes Thomson – Chief Executive of ADA

In water management there is a question of the scale of any event, the possible level of the inundation and the real destructive force of flood water. There are very large changes in the flow of surface fresh water resulting from seasonal or more widespread climate changes or flash storms. These make it a requirement that emergency services are funded and equipped adequately and these resources are managed appropriately. An example was quoted of an inundation of two areas, one in France and one in England. In the French example the domestic housing was of bungalows, all, as is common there, with electrically operated window shutters. The English example was of two story housing. The flood water inundated both sites to the level of the upper part of the ground floor. In the English area the population moved to the upper story for safety while the French inhabitants had nowhere to retreat to. A number of the French were drowned as they were unable to escape from their single story homes by opening the window shutters because the electrical supply had failed.

In the UK, the local Inland Drainage Regions are mainly in the low lying areas of the east of England with a pocket in Somerset. We heard of the exchange of ideas and practices between Europe and the UK to ensure that best practices could be shared.

The Association of Drainage Authorities advises the local Inland Drainage Regions on the management of water courses and water levels. It seeks to coordinate the local efforts in complying with the requirements of the 1991 Land Drainage Act which covers 22,000 km of water course and 500 pumping stations.

Issues are being examined at national level with a view of maintaining a consistent level of compliance with the 1991 act. These focus on Health and Safety, Governance, survival of eels and Who Manages What?

In conclusion Innes made it clear that, as well as dealing with excesses of water, these resources can also become drastically limited during times of dry weather and drought. National planning is essential to ensure an equable supply for all the activities necessary for a complex human and natural environment.

The presentation was followed by a lively question and answer session followed by a vote of thanks by Eric Pearson

Andrew Graham

Voyage to Poole, Dorset 25th-28th May 2018

Friday 25th May

As members and their partners assembled in the RNLI's Harbour View restaurant for lunch they were treated to a lifting of the Twin Sails Bridge, an apt salute to a meticulously planned Voyage that took us

first to the National Trust's Kingston Lacy for a self-guided tour of house and surrounding park. The house is the most important surviving work of the architect Sir Roger Pratt, built in 1663-5 for Sir Ralph Bankes, with mid-19th C alterations by Sir Charles Barry, who added stone facings to Pratt's original brick façades and tall chimneystacks at the four corners. The interior boats a fine collection of art with examples by Rubens, Van Dyck, Tintoretto, Titian and Brueghel – and a fresco mounted on canvas on the dining room ceiling by Guido Reni, one of his earliest works (c1600). There was much to talk and reflect on over dinner later in the Storm Fish restaurant in Poole, run by local fisherman Peter Miles.

Saturday 26th May

The morning activity was a guided tour of the RNLI All-weather Lifeboat Centre where they build the new Shannon Class all weather lifeboat (AWL),

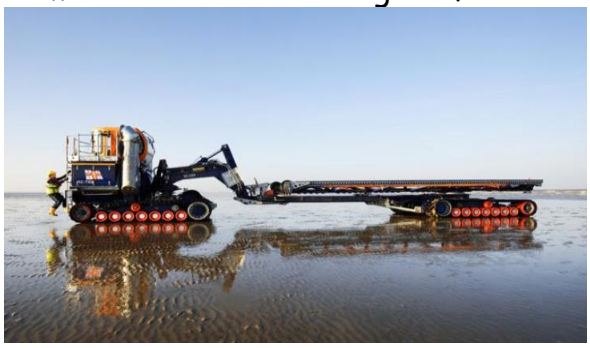
at the production rate of six per year with a currently scheduled fleet total of 50. The RNLI took a strategic decision to build their own AWLs for reasons of security of the supply chain and quality of build coupled with efficiencies to achieve a lower cost base and 50 year design life for the hull and superstructure. For many years the RNLI have been manufacturing the Class B and D inshore rib lifeboats at a facility on the Isle of Wight and in August 2015 opened the factory in Poole for the manufacture of the AWLs with ambitions to carry out major overhauls and major repairs to the older class AWLs: Trent Tamar and Severn. This work has commenced and now includes the complete refit of the Severn Class AWL where the specification is brought up to the same level as the latest Shannon Class.

The factory is made up of two separate halls, connected by a covered area. The first is where the bare hull and deck/wheelhouse are produced by laying up an epoxy resin film infusion glass sandwich in sheets taken from rolls. These are laid to various thicknesses using different strength reinforcement materials including carbon fibre in high load areas over a fibre glass mould, which is then carefully brought up to temperature in ovens to 85°C. This first hall also contains the paint shop. The second hall is divided into bays where the two basic units (hull and deck/wheelhouse) receive first stage fitting out before the two basic units are glued

together and transferred to the paint shop then returning for second stage fitting out including the systems and information management systems, communications, navigation and machinery monitoring. There are six production stages in total each of 8 weeks. The factory has a component manufacturing section and areas for recovery and storage of the lifeboats.

The factory employs 110 production staff and 40 supervisory, administration and management staff. It also runs a four year apprenticeship scheme currently taking on six apprentices per year.

The Shannon Class is the first RNLI AWL to be powered by waterjets which are capable of producing the 25knot speed and incredible manoeuvrability by the use of hydraulically controlled jet deflectors (buckets). The twin Hamilton waterjets are each capable of delivering 1.5tonnes of water per second at full power. The waterjet impellors are each driven by 650HP 13ltr. Scania engines each with a 1370litre fuel tank. The Shannon Class lifeboat can be launched down a slipway or by the newly developed launch and recovery system with an un-laden weight of 37tonnes.



The lifeboat is 13.6m long, beam 4.5m, draught 1m and a maximum displacement of 18tonnes. It is self-righting with a survivor capacity of 23 and a none self-righting capacity of 79. A crew of six are provided with special long-distance-vertical-travel seats for protection of their spines in heavy seas.

In the afternoon a guided walk of Poole Old Town and The Quay was conducted by volunteer guides from the Poole Museum who enlightened us on the history of this maritime town.

Our day ended with a private dinner in the RNLI Harbour View Restaurant, preceded by interesting talks from John McCallion, Head of Internal Construction and Refit, Iain Wallbridge, Senior Naval Architect and Ali O'Neil, Philanthropy Manager.

Photographs courtesy of the RNLI

Ron Walker

Sunday 27th May

The day began with Jim Wheeler, fellow Voyageur, giving a presentation to fellow travellers to flesh-out the eagerly anticipated experience of the Swanage Railway (SR) dining train on Sunday evening.

The railway between Furzebrook and Swanage closed in 1972 following 4 years of attempts to save it. Within 3 years a Town Referendum had been held and work started to rebuild the railway. It took until 1995 to reach its current normal operating limit at Norden where a Park-and-Ride facility was set up by Dorset County Council (DCC).

The stub of the branch, from Worgret Junction to Furzebrook, continued after 1972 initially carrying China Clay traffic and later the products from the Wytch Farm Oilfield but this reduced to a trickle after pipelines were laid to a loading facility on Southampton Water. Traffic finally ceased and DCC bought the trackbed to enable trains to once more connect to the mainline at Wareham. In 2014 this resulted in SR being granted a 99 year lease and given the task of restoring this long-neglected final section of railway.

Jim illustrated the works involved in this project, during which he spent over 200

days as a voluntary engineer/designer and labourer. Track work covered the clearance

of many trees, replacement of sleepers, the renewal of 950m of track with modern welded rail on concrete sleepers and the laying of a new siding where locomotives could be transferred between road trailers and the track. A major embankment strengthening was also carried out involving importing/moving over 5000 tonnes of spoil. The work was ceremoniously completed when a through train carried dignitaries from Wareham on 20th April 2016 – Jim's birthday!

Photograph courtesy of Andrew P M Wright – Swanage Railway Official Photographer

Jim Wheeler

The afternoon was spent at Corfe Castle where a Re-enactment Day was taking place. A great deal of cannon fire preceded the Roundheads attempt to storm the castle held by the Royalist, Lady Mary Bankes,

After the noise and excitement of the castle, afternoon tea was taken in the Mortons House Hotel in Corfe.

On the coach journey to Swanage, Jim Wheeler pointed out sections of the Swanage Railway that cross the highway.

In the evening, we boarded the coach again for a journey back to Swanage to pick up our private charter of a steam-hauled train for a four-course dinner as the train plied from Swanage to Norden and back …. twice!

Monday 28th May

After breakfast and a short walk to the Quay, we boarded the Dunkirk boat, Dorset Queen, for a cruise around Poole Harbour and a visit to Brownsea Island. This is where the first Boy Scout camp was held over 100years ago and the home of one of the few colonies of red squirrels in England. Back on the boat a light buffet lunch was served before returning to Poole Quay and our departure for home.

A very enjoyable Voyage was had by all especially the insight into the RNLI and the visit to the Swanage Railway. Well done Jean and Roger!

RIP 2018

We remember those members who have passed away in the first half of 2018:

Robert Lockhart Robert was a Fellow of IStructE and a Principal at Sir Herbert Humphries & McDonald. A member since July 1980.

David Smith David was a Member of ICE, retired and previously a Project Management Consultant. A member since January 2013.

New Members Dec 2017 – Jun 2018

We are delighted to welcome five new members since December 2017:

Ray Jefferson, is a retired member of the Royal Town Planning Institute

Chris Foster, is a Chartered Chemist, Fellow of the Institution of Fire Engineers

Matthew Symes is a Chartered Engineer, MICE. Currently employed as a Partner at consultants Concerto Partners LLP.

Peter Beard is a Chartered Engineer, Member of the Institution of Electrical Engineers and currently retired

Keith Cima CB is a Chartered Engineer, Member of the Institution of Mechanical Engineers and Fellow of the Institution of Royal Engineers.

Our thanks are due to those who have contributed to this newsletter The editor welcomes contributions on matters that relate to the objectives of the Société. Email: paulgerrard24@gmail.com