RCEA
(SUSSEX)

## An Association for Retired Professional Engineers

# NEWSLETTER March 2015

**President's Message**

By the time you read this message winter will have officially ended and so will the 2014/15 series of talks. It has been a good season with a wide range of engineering topics some historical, some current. They have been of a very high quality from speakers with an in depth knowledge of their subject acknowledged by the consistently high attendance at these events. We aim to keep up the standard for our 2015/16 season having already secured speakers for the period up until the New Year. We also had two visits one behind the scenes at Tangmere military aviation museum viewing their restoration work and another extremely interesting tour behind the scenes at the Glyndebourne Opera House. The cast for their performances are selected from world renown operatic talent and I'm pleased to say backed up by some innovative and world class engineering from the civil, acoustical, electrical, mechanical and lighting sectors.
Moving into summer we look forward to a number of more social events and visits. These are convivial occasions and I trust we will see many of you together with your partners at these visits. The full programme is as usual contained within the newsletter.
Next on the list is our spring lunch (April 15th) enjoyed by members for longer than I can remember. It's refreshing to see what these young aspiring caterers can do with guidance. We are never disappointed by the quality of the fare and service provided.
Moving on and before our next visit I feel that you would be well advised to firmly batten down the hatches and take off to some foreign part until after, say, May 12th. I say this in order to preserve your sanity and to prevent irreversible damage to radio, or television not to mention any adverse effect you may have on the poor paper boy's psychological well being should he witness any reaction to news of the illogical posturing of our politicians that he has so lovingly placed at the front door. Remember he's only the messenger!
After this madness the weather should improve for us to enjoy the company of other members during activities planned for our summer programme. I look forward to meeting with everyone on these occasions and wish you and your families well during the holiday season.
David Thomas

## PROGRAMME OF EVENTS 2015

**Please note that from April, we are going back to the Swallow's Return (BN12 6PB) for our coffee with partners meetings.**

| | | |
|---|---|---|
| **Wednesday** | **15th April** | **Lunch at Northbrook College, 12.00 for 12.30** |
| **Thursday** | **16th April** | **Coffee - at Spotted Cow, Angmering** |
| **Thursday** | **30th April** | **Coffee - with Partners at Swallow's Return** |
| **Thursday** | **14th May** | **Outing – Afternoon cruise on the Wey and Arun Canal** |
| **Thursday** | **21st May** | **Coffee - at Spotted Cow, Angmering** |

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|---|---|---|
| **Thursday** | **28th May** | **Coffee - with Partners at Swallow's Return** |
| **Tuesday** | **16th June** | **Outing – Chichester Theatre Tour** |
| **Thursday** | **18th June** | **Coffee - at Spotted Cow, Angmering** |
| **Thursday** | **25th June** | **Coffee - with Partners at Swallow's Return** |
| **Wednesday** | **15th July** | **Outing – afternoon of Croquet at Worthing Croquet Club, Field Place.** |
| **Thursday** | **16th July** | **Coffee - at Spotted Cow, Angmering** |
| **Thursday** | **30th July** | **Coffee - with Partners at Swallow's Return** |
| **Thursday** | **20th August** | **Coffee - at Spotted Cow, Angmering** |
| **Thursday** | **27th August** | **Coffee - with Partners at Swallow's Return** |
| **Tuesday** | **15th September** | **A.G.M and Talk - RAF Tangmere and the Special Operations Executive.** |

**All Talks and Meetings will commence at 2.30 pm and be held in the Chichester Room, Field Place, Worthing; unless another venue or time is indicated.**
**Timings for visits and outings will be as printed in the detailed description of the activity.**
**Coffee mornings commence at 10.30 a.m.**

## New Website for the RCEA

For latest information, log into **www.rceasussex.org.uk**

**This Newsletter is avilable in full colour on the Website**

## New Members and Speakers for Talks

The RCEA needs new Members to ensure that we can continue as a thriving organisation. Please think of appropriate people you know and encourage them to join the RCEA.

We need more volunteers to give talks to us on Tuesday afternoons from September to March. Speakers from outside organisations are harder to find and often seek payments for the services. We are aware that many Members have the knowledge from their working careers to provide interesting talks. If you are willing to give a talk please let us know.

## New Members

D. A James, BA, PhD, C.Eng, FIET

## RCEA Insurance.

Members need to be aware that the insurance policy that the Association holds is solely for the protection for the assets and liabilities for the Association as an entity. The policy does not provide cover for personal injury or loss to individual members. Members therefore attend any of the Association's events at their own risk; although under some circumstances there may be some cover from the insurance arrangements of the venue owner.

## Newsletter Entries

If you would like to provide an article for inclusion in a future newsletter it would be most welcome. We are always looking for new material. As a guide an article should be prepared as a Microsoft Word document, preferably in font size 10 and font style Times New Roman but this is not essential since all text will be 'standardised and formatted'

when composing the newsletter. Pictures can be incorporated into the newsletter and are best supplied as JPEG images as separate files and separately from the text. (Word documents incorporating pictures can sometimes be very large files and are often not easy to manipulate into a suitable format for the newsletter.) derek.webb2@ntlworld.com

## SOUTHERN RETIRED CHARTERED ENGINEERS

***Events are arranged by the SRCE to which our members have a standing invitation. We have no information for this newsletter.***

# Brief Detail – Talks, Outings and other activities April - August

## Spring Lunch:

Wednesday 15th April. Lunch at Northbrook College, Worthing, 12.00 for 12.30

There are a few places available for our lunch. Please contact Brenda Whitmell quickly if you would like to come.
There will be a bar for pre-lunch drinks, the cost to be settled individually by Members and guests. The cost is £14.00 per head including a tip, for a three course meal which in the past has proved to be very good value.
The occasion is not only an opportunity for new and existing members to meet socially but will also help to give 'work experience' to chefs and waiters. The committee look forward to seeing you there.

Booking form is at the end of this newsletter.

Contact Ms Brenda Whitmell, 01903 905922 e-mail bcwhitmell@uwclub.net

## Outing -Thursday 14th May. 2.00pm

**Wey and Arun canal cruise**

An afternoon cruise (2hr 30 min) on the Wey and Arun canal. Optional lunch at the Onslow Arms at Loxwood (not prearranged). Approx cost is £10 and will include a cup of tea if we get enough support.
Please make a note of the date; we need a good turnout as the boat seats 50 people, although 42 is more comfortable. The boat has a toilet and a mobility lift.

Reply Form 2 is available at the end of the newsletter

## Outing – Tuesday 16th June 10.30am

**Chichester Theatre. Behind the Scenes Tour**

A visit has been arranged to the Festival Theatre Chichester to look behind the scenes to see what has been done following the recent works.

The tour will last approximately an hour and a half and is at 10.30am at a cost of £5.00 per person**.**

To reserve your places, please return the completed reply form to me with your cheque, or reply by E Mail and pay me on the day. Reply Form 3 is available at the end of the newsletter

## Outing – Wednesday 15th July 2:45pm

**Worthing Croquet Club, Field Place.**

Chris Wood, along with some club members has kindly agreed to teach us the fine art of playing croquet.
Croquet can be a genteel game for garden parties and picnics or a fiercely competitive game of skill and strategy for teams or for individuals, we will be playing the former!! The basic rules of croquet are simple and will be explained on the day.

**Programme:** We are to meet at the Croquet Club at 02:45pm with a view to starting to play at 3:00pm. There will be a break for tea and biscuits and we should finish around 5:30 pm.
**Cost:** £5:00 per person.
**Location:** Worthing Croquet Club is situated on the lawn to the east of The Barn building at Field Place.
Contact: Randall Keir 01903 785952 or email randallkeir@btinternet.com

Reply Form 4 is available at the end of the newsletter.

# Reports

## Talk:

**Tuesday 11th November 2014**
**Cooch Memorial Lecture, Development of Flight Simulators**

**Mr David Parkinson, C.Eng, FRAeS.**

David joined what was then Link-Miles in Lancing in 1972, and rose to become Director of Research & Development. He is now an independent consultant. His illustrated talk covered early flight simulators (using wood and real manpower) up to the present day, and touched on other vehicles such as tanks and submarines."

**Early Simulators:** The first known flight simulation device was developed in 1909 to help pilots fly the Antoinette Monoplane. This consisted of a seat mounted in a half-barrel and two wheels which controlled pitch and yaw. The whole unit was pivoted so that assistants outside could move the device in accordance with the pilot's use of the wheels, using long wooden rods attached to the barrel structure.

A number of pilot training devices were developed during World War I for teaching pilots how to operate the flight controls. Some ground-based simulators were also developed to train pilots in air gunnery.

The best-known early flight simulation device was the Link Trainer, produced in 1929. The Link Trainer had a pneumatic motion platform driven by inflatable bellows which provided pitch and roll cues. An electric motor rotated the platform, providing yaw cues. A generic replica cockpit with working instruments was mounted on the motion platform. By covering the cockpit, pilots could practice flying by instruments. The motion platform gave the pilot cues as to real angular motion in pitch (nose up and down), roll (wing up or down) and yaw (nose left and right).

**World War 11 Simulators:** The Link Trainer was the principal pilot trainer used during World War II; however other ground-based flight training devices were produced. For instance, in 1943 a fixed-base aircraft-specific trainer for the British Halifax bomber was produced at the RAF Station at Silloth (the “Silloth Trainer”) in the north of England. This consisted of a mock-up of the front fuselage of the Halifax, the pilot's flight controls being simulated through an analogue system that gave artificial resistance ("feel") when the pilot moved the controls.

A trainer was also developed used for night navigation. The Celestial Navigation Trainer of 1941 was 13.7 m (45 ft) high and capable of accommodating the navigation team of a bomber crew. It enabled sextants to be used for taking "star shots" from a projected display of the night sky.

1945 to the 1960s: In 1948, Curtiss-Wright developed a trainer for the Boeing 377 Stratocruiser. This was the first complete aircraft-specific cockpit trainer owned by an airline. There was no motion or visual system, but the cockpit was closely replicated and the controls functioned and produced responses on the cockpit instruments. The device provided training to flight crews in checks, drills and basic flight procedure. With the advent of jet airliners such as the UK Comet and U.S. Boeing 707 and DC-8, simulators were produced to train for checks and drills, and to avoid using the actual aircraft for familiarization exercises that could be carried out in the simulator. An example was the simulator for the Comet 4 produced by the Redifon Company of Aylesbury, UK. This had a three-axis motion platform on which the forward section of a Comet fuselage was mounted.

The use of digital computers also began in the 1960s. Originally these were from specialist high-end computer manufacturers but with the increasing power of the PC, arrays of high-end PCs are now also used as the primary computing medium in flight simulators.

**Motion systems:** The motion system in the 1929 Link Trainer design gave movements in pitch, roll and yaw. Further development found that six jacks in the appropriate layout could produce all six degrees of freedom that are possible for a body that can freely move. These are the three angular rotations pitch, roll, and yaw, and the three linear movements heave (up and down), sway (side to side), and surge (fore and aft).

Visual Display Systems: Early visual systems used a small physical terrain model, normally called a "model board". A miniature camera was moved over the model terrain in accordance with the pilot's control movements. The resultant image was then displayed to the crew, generally used TV screens or projected displays in front of the replica cockpit to display the Out-The-Window (OTW) visual scene. Only limited geographical areas could be simulated in this manner, and for civil flight, simulators were usually limited to the immediate vicinity of an airport or airports. In military flight simulators, as well as at airfields, model boards were produced for larger areas that included terrain for practicing low flying and attacking targets.

Several developments improved the visual systems such that single-pilot trainers would typically have three display units (center, left and right), giving a field-of-view of about 100 degrees horizontally and between 25 and 30 degrees vertically.

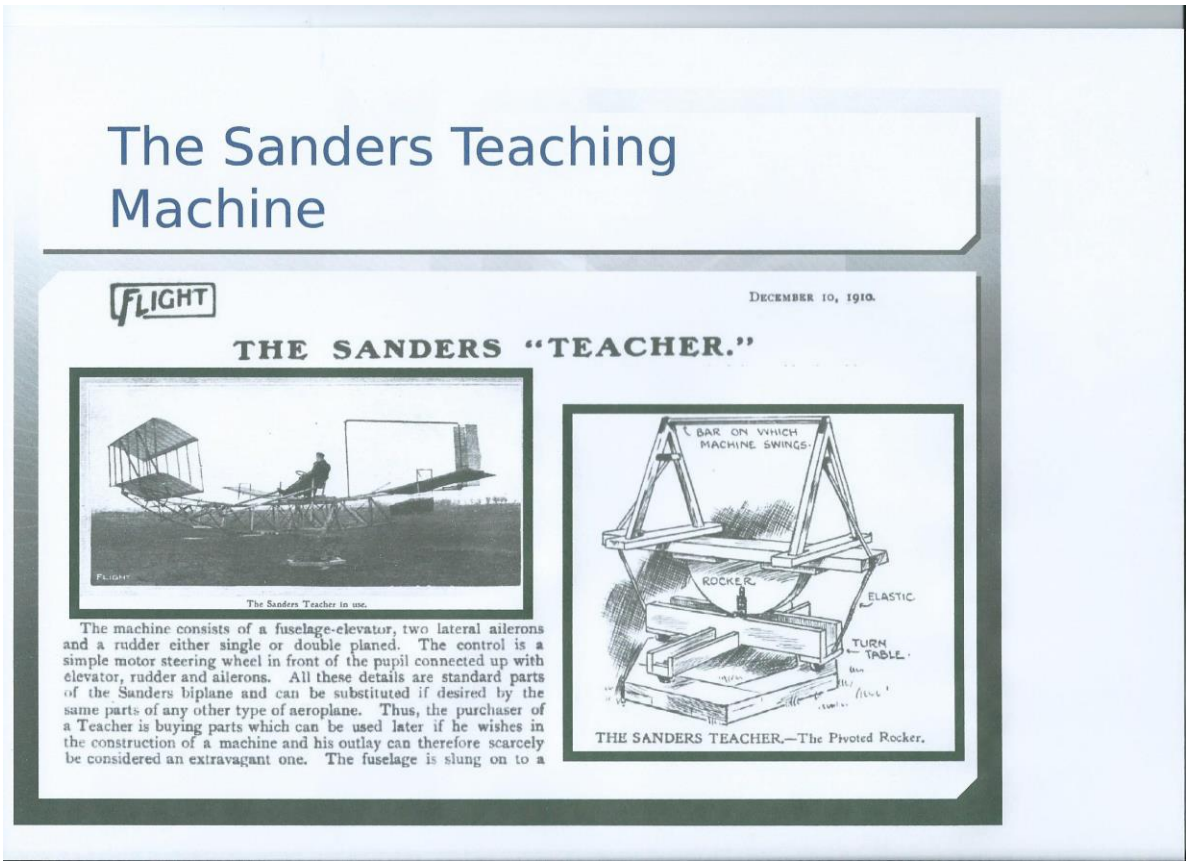
Modern simulators use digital image generation systems combined with mirror-based cross-cockpit (for pilot and co-pilot) displays. Using five projectors a field-of-view of 240 degrees horizontally and 30 degrees vertically can be obtained.

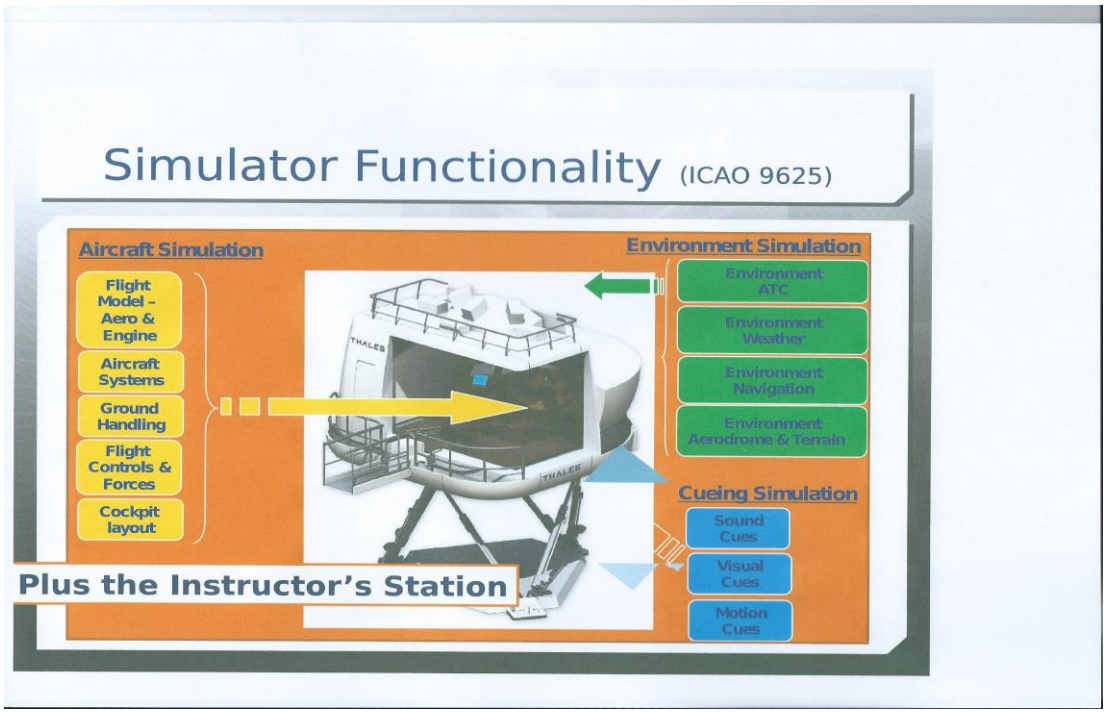
**Modern Simulators:** High-end commercial and military flight simulators have high-resolution image generation and large field-of-view (FoV) display systems. Most motion platforms use variants of the six-jack Stewart platform for cues of initial acceleration. These are also known as Hexapods (literally "six feet"). Modern hexapod platforms can provide about +/- 35 degrees of the three rotations pitch, roll and yaw, and about one metre of the three linear movements heave, sway and surge.

Flight simulation is used extensively in the aviation industry to train pilots and other flight crew for both civil and military aircraft, particularly in flight dynamics and man-machine interaction (MMI). It is also used to train maintenance engineers in aircraft systems, and has applications in aircraft design and development, in aviation, and in other fields of research. Simulators are also used extensively in accident investigations.

David showed two video clips to demonstrate how 'real' modern simulators are. He showed two flights of RAF fast jets flying overland. One was a cockpit display of a real flight, the other a view from a simulator. I found it difficult to tell which was which!!

R Keir




Simulator Functionality (ICAO 9625)
Aircraft Simulation
Flight Model – Aero & Engine
Aircraft Systems
Ground Handling
Flight Controls & Forces
Cockpit layout
Environment Simulation
Environment ATC
Environment Weather
Environment Navigation
Environment Aerodrome & Terrain
Cueing Simulation
Sound Cues
Visual Cues
Motion Cues
Plus the Instructor's Station


Now it is a game!
Flight Simulators
With Yoke, Joystick, Throttle,
Quadrant, & Rudder Pedals

## Talk:

**Tuesday 13th January 2015**

**Power from the sea – Creating a successful British Offshore Wind Industry**

Matthew Knight BEng, CEng, MIET, Director of Strategy and Government Affairs for Siemens Energy


This was a very illuminated talk given by Matthew who has been heavily involved with wind generation at sea in the UK from its inception. He covered the topic from the early planning stages through to commissioning of the final article which included the infrastructure necessary to integrate the power generated ashore and into the national grid. The picture shows one such farm under construction and gives an indication of the support services necessary.

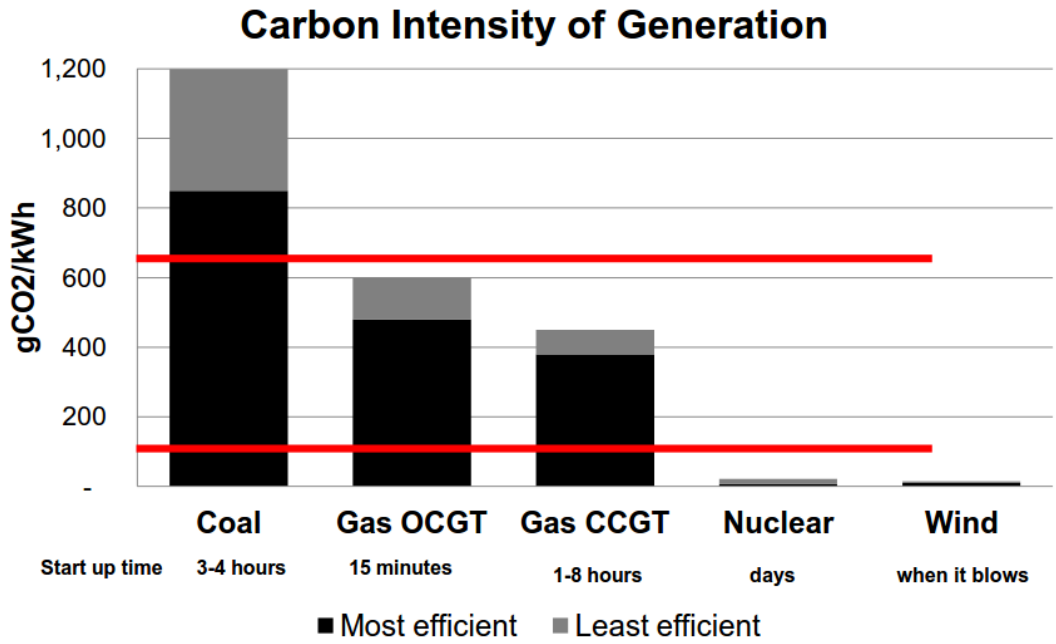
He started by drawing our attention to the political issues and the public's perception of coastal wind farms and their acceptance of their presence on the landscape. Surprisingly, around 70 percent generally accept them with only 11 percent actually opposing. Politicians generally manoeuvre around the subject acting only for political advantage causing delay. There are, apparently, only a very limited number of MP's that understand the subject and its implications for the country's future power requirements.

Wind power is, of course, part of what we term "renewable energy" aimed at reducing the country's carbon output to which we are legally committed. It is not the only way to reduce carbon output but it is the most efficient. The table below shows the different forms of generation against its carbon output together, importantly, with the time taken to bring it on line. From this it is quite obvious that a readily available backup is necessary for the most efficient forms of near carbon free generation with the build up of nuclear generation taking days and wind power only being available when the wind blows. Even with this restriction for wind a load factor of around 55 percent is obtained. So, although wind power is not the total answer, it makes a valuable contribution to our efforts for reducing the carbon output. In Europe the UK is planning to be the largest generator of power from offshore wind turbines. The different contributions by each state can be seen in the attached table below.

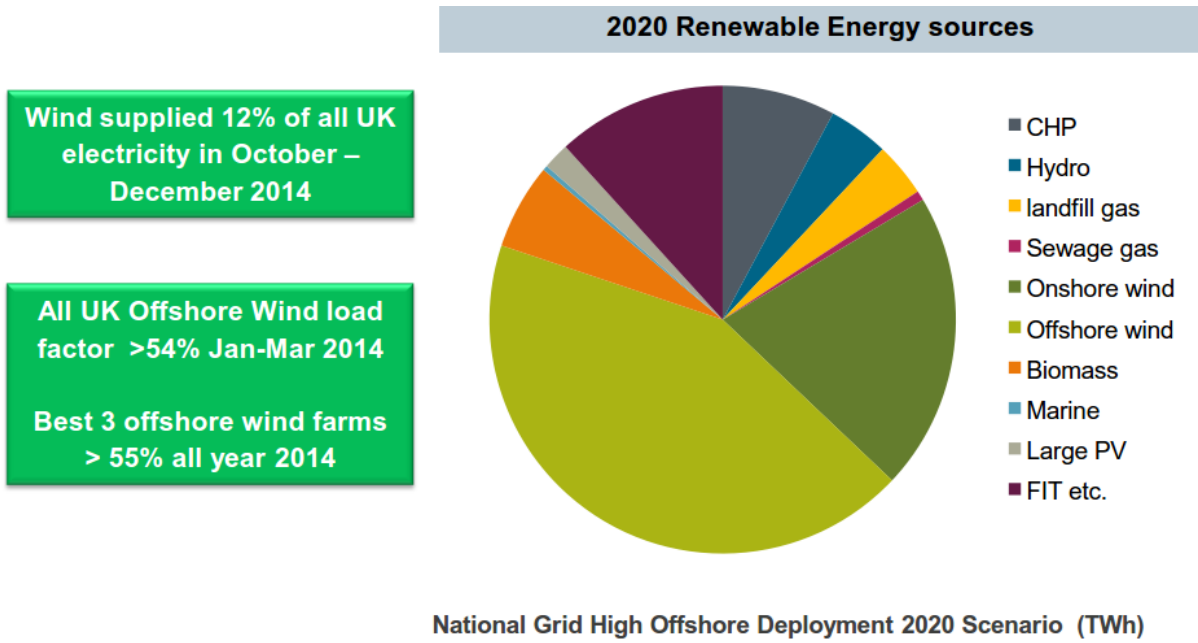
**Europe's offshore wind plans**

| | | | |
|---|---|---|---|
| **UK** | **51 GW** | ROI | 4.2 GW |
| **DE** | **37 GW** | FIN | 4.5 GW |
| F | 6 GW | BE | 2.3 GW |
| NL | 5.9 GW | IT | 2.8 GW |
| DK | 5.4 GW | POL | 8.3 GW |
| ES | 6.8 GW | GR | 4.4 GW |

EWEA figures from Feb 2013

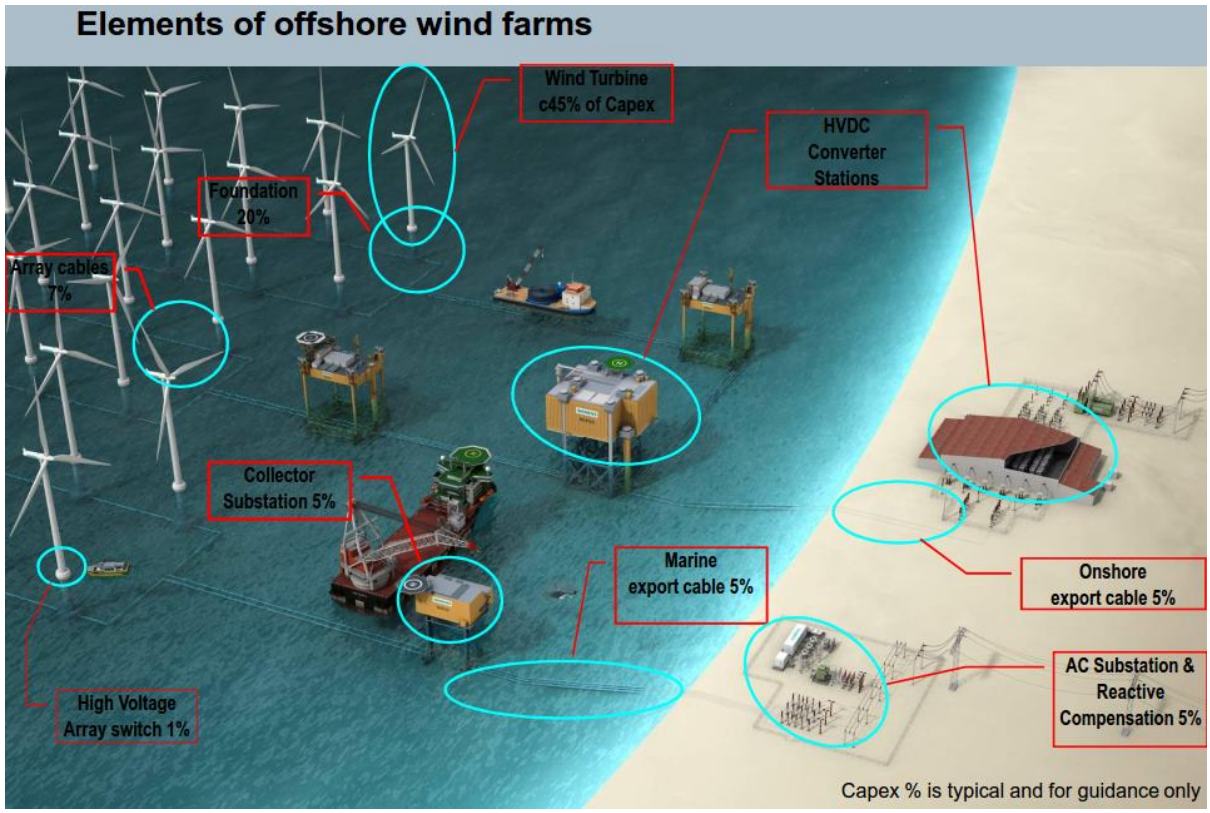



A complete picture of renewable energy sources planned for the UK by 2020 can be seen from the pie chart below although exactly what proportion of our total energy requirements it represents is not clear.
From the granting of a development licence for a typical offshore wind farm it takes around 6 years to obtain planning consent and get finance in place ready for the implementation phase of around 3 years. This implies that the engineering represents just one third of the workload!! Draw your own conclusions.
In terms of construction Siemens have a large plant in Demark and is in the course of constructing a plant in Hull in conjunction with Associated British Ports (ABP). The plant in Hull will be used mainly for turbine blade construction.




National Grid High Offshore Deployment 2020 Scenario (TWh)

The full implementation of a wind farm to the point of integration into the grid is a complex affair as can be seen from the slide below. Each aspect of the overall project is shown below with an indication of the proportion of cost for each of them. We can expect to see each of these elements nearby when the Rampion farm (off the coast east of Worthing) is constructed. It is interesting to note that the transmission from the farm is via high voltage DC cables.

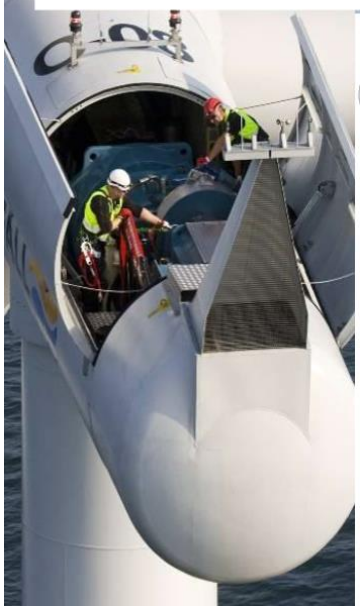


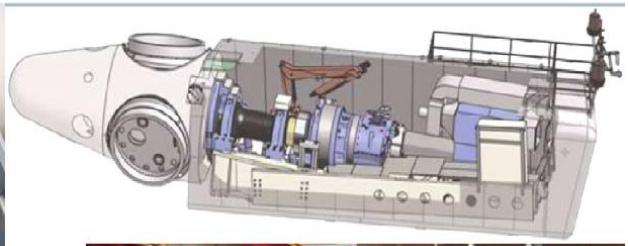

Matthew continued then to present the different parts of a typical coastal wind turbine starting with the blades saying how the aerodynamics have improved through continued development to some of the largest that are produced today forcasting that they are likely to be even bigger for some future designs, You can get some idea of the magnitude of these from the slide below where comparisons between the "Shard" and a Jumbo jet are shown. The blade under construction is shown at a fabrication plant in Denmark as is the transportation of one such blade along a motorway. Imagine one of these travelling down the A24 to Worthing - I think not!!


The speaker then went on to describe the different parts that make up a typical offshore turbine starting with the business end that generates the power, the nacelle. Here, the main components are the blade hub, gearbox and generator. The slide below shows a hub under construction. This is an enormous casting with 5 machined surfaces to take the blades, nosecone and gearbox interface. It also shows a diagram of an integrated nacelle showing the generator and associated electrical interfaces that take power and control cables to the power processing and control equipment in the tower.

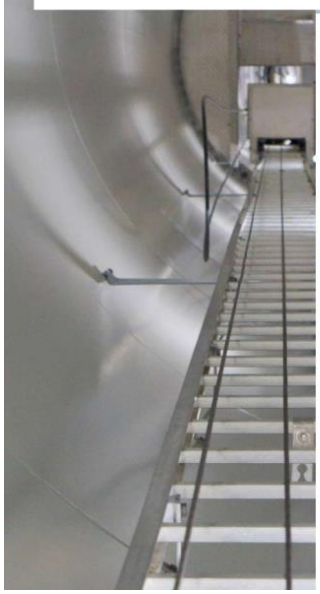
The following slide shows the inside of a tower and the equipment it typically contains. Here, information from the many sensors around the turbine and in the blades ensures that its operation is kept within safe limits taking account of variable wind speeds and gusts. One can imagine the importance of this task when considering the forces involved with such high rotating masses on top of a very high pole where excessive rotational speed would result in self destruction.

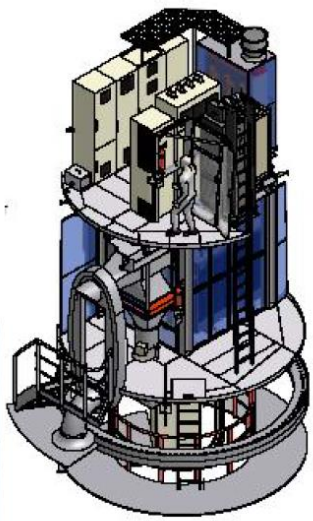
**Elements of a wind turbine - Nacelle**





**Elements of a wind turbine - Inside the tower**






Installation gives rise to a whole set of problems where one has both tides and wind to contend with in a very hostile environment. The slide above shows one solution whereby a reusable ship / platform is used bringing components from the shore to site. Upon arrival at the site it lowers support legs unto the sea bed to give a stable working platform. It must be quite a sight to see the blades erected. Looking at the hub many bolts have to be inserted by someone hanging below with the blade buffeted by the wind and dangling from a crane. There must be a huge sigh of relief after the first two have been inserted. In relative terms the rest of the installation must be a doddle! You can see the access for personnel from the platform to the bottom of the tower.
After finishing a review of the turbine Matthew continued to describe the rest of the equipment required for bringing power ashore from undersea cabling and substations necessary to process the power collected before it can be linked to the national grid for distribution.
This was a very illuminating talk covering every aspect of bringing power ashore from turbine fields and Matthew was thanked for the depth detail presented.
There are many more slides which accompanied the presentation and these will be available for viewing on our website at http://rceasussex.org.uk/category/report/talk/ in the near future. They are very detailed a very well worth a reading for those who were not able to attend the talk at Field Place.
Other sites on the subject which are well worth a visit include http://en.wikipedia.org/wiki/Wind_turbine_design and http://en.wikipedia.org/wiki/Wind_power

## Talk:

**Tuesday 10th February 2015**
**Saunders Roe Company & the Princess Flying Boat**
**Bob Wealthy - Solent Aeromarine.**

The speaker, Bob Wealthy, spent a career in space engineering at what finally became Astrium part of EADS now known as Airbus Industries. During this time he retained a strong interest in aeronautics and in particular the history of aircraft construction in the Solent area. On retirement he formed Solent Aeromarine which specialises in publications and artefacts regarding the history of aircraft construction in the area. His presentation focused on the Saunders Roe company and the Princess Flying boats that were constructed in the late forties and early fifties.
In 1901 Sam Saunders opened a branch of his boat building business in Cowes to take advantage of a location which was a centre for British yachting. He was part of a syndicate that had developed a new method for the construction of plywood hulls known as "Consuta". It involved the sewing together of plywood sections with copper wire. The process was a great success and gained international acclaim allowing him to form his own business which in 1908 become a private limited company known as S.E. Saunders Ltd and he started operations at his newly acquired Columbine yard on the river Medina.

As a sideline the company started to take interest in aviation building two gondolas for the first naval airships. This was followed by building Sopwith's Bat Boat in 1912 which was one of the earliest flying boats. At the outbreak of the first world war he opened a number of plants on the Isle of Wight which produced a variety of aircraft for the war effort including the Avro 504 trainer, Short 184 seaplanes, Felixstowe F2A flying boats and Norman Thompson NT2B flying boats. After the war Saunders became more ambitious and hired aircraft designers in order for the company to move forward and undertake complete packages. Out of this four aircraft evolved, the T1 biplane, the Kittiwake, A3 Valkyrie and the A4 Medina. All were wooden hulled in line with the company's expertise and many test and proving flights were flown but they failed to attract orders mainly because of their disappointing performance in comparison to their competitors. This was due in part to the fact that other designs used lighter weight metal hull and skin materials. Consequently their wooden type of construction was abandoned.

Sam Saunders realised that if the company was to survive a change to metal construction was essential but the cost of reinvestment in new equipment was beyond that which to company could manage to finance as a separate entity. After negotiations with other companies / investors failed to secure the capital needed S.E.Saunders was eventually taken over in 1928 by A.V.Roe and other investors to become what many of us will remember as Saunders-Roe Ltd which continued to trade until 1958 when it was taken over by Westland Aircraft.

During the 1930's the company expanded apace and operated in ever more areas of boating and aviation producing both military and civilian aircraft, flying boats, speed boats and other craft. Amongst the successes of the marine section were the "Miss England II" in which Sir Henry Seagrave captured the water speed record of 98.76 mph in 1930 killing himself and one other crew member in the process of trying to improve it during further runs. Only the third crew member escaped relatively unharmed. Although the record was raised further in the 1930's it was recaptured by Sir Malcolm Campbell in 1938 with a speed of 130.9 mph in "Bluebird" which was also built in Cowes by Saunders Roe.

The company was very active in the 30's producing many aircraft to its own designs and fulfilling subcontracts to build aircraft for other companies including the Blackburn Bluebird IV an all metal two seat biplane. Additionally in 1931 it acquired Spartan Airlines operating the three engined Spartan Cruiser airliner designed by Spartan and built by Saunders Roe. After 1935 the aircraft were flown only by a number of early commercial operators.

With war upon us again in 1939 the company prospered producing aircraft designed by other companies which came with the benefit of a sustained workload whereby 453 Walruses and 290 Sea Otter amphibians were built on behalf of the Supermarine company (of "Spitfire" fame) for the RAF. Large numbers of damaged aircraft were also repaired and 336 Catalina amphibians updated to carry radar. During this time the company also sustained heavy damage to its Solent works during an air raid in 1942.

By the end of WW2 the company had grown enormously and had a widely dispersed collection of factories engaged on a variety work suited to wartime production. In the interest of efficiency it was decided to concentrate aircraft work at Eastleigh and the Isle of Wight. It was at this time that the company was awarded a contract from the Ministry of Supply to design and build three large passenger carrying flying boats type SR45 and later named the "Princess". BOAC and other civil aircraft operators were involved to help define the operational requirements as it was those companies who were expected to purchase and commercially operate future production. Contract value was £2.8M a sum which would just about cover the cost of a design feasibility study in today's world.

At the end of WW2 there were many companies in the UK eager to secure peacetime orders for aircraft to sustain a large workforce of talented personal acquired for wartime production so winning the SR45 contract was a considerable success for the company and a vote of confidence in their expertise. The principal design requirements were that it should have a range of 5000 nautical miles, fly at 34500 feet at 360mph carrying 100 plus passengers on transatlantic routes.

Whilst Saunders Roe were at ease with the design and production of the airframe major subcontracts were necessary for such items as engines, propellers, fuel systems, flight controls and instrumentation. Of these, of greatest importance was the engines required to meet the design requirements at a time when the use of jet engine propulsion was in its infancy and deemed too much of a risk. Consequently it was decided to use Bristol Proteus turbines driving contra rotating propellers i.e. turbo-props. On reflection these also represented considerable risk as they were still under development together with a newly designed gear train. Ten of these engines were fitted of which four were mounted in pairs with the other two as singles. The propellers were manufactured by De Havilland and were of hollow steel and 16.5ft in diameter. The table below gives some idea of the size of this aircraft which I'm sure you will appreciate was a mammoth undertaking in the late 40's when designers never had the advantages of computers for simulation and design tasks to more readily obtain optimum performance of the aerodynamics and associated subsystems. All this in 6 years to flight testing from contract placement. Quite an achievement.

| | |
|---|---|
| All up weight | 330,000 lbs |
| Max wing loading | 65 lb/sq.ft. |
| Empty weight (less fuel) | 190,000 lbs |
| Wingspan | 219.5 ft |
| Wing area | 5019 sq.ft. |
| Length | 148 ft |
| Height | 55.75 ft |
| Fuel Capacity | 14,500 gall (117,450 lbs) |
| Max landing weight | 250,000 lbs |
| Floor area | 1400 sq.ft. |
| Cabin volume | 15,403 cu.ft. |
| Pressurisation | 8 lb p.s.i. |
| Engines (10) | 3,350 shp or 3780 ehp (incl. exhaust thrust) |
| Range | 5,000 nmls |
| Passengers | 105 (on two levels) |
| Cruising speed | 360 mph |
| Cruising height | 34,500 ft |

It was interesting to note that passenger accommodation was on two levels with a high level of comfort making the claims of modern aircraft manufacturers in this respect look dated but, of course, at that time a king's ransom was required to join the mile high club across the Atlantic.
The speaker continued with an outline description of the many test and simulation facilities required to verify the design. Generally they are earlier versions of what can be seen today and very much less complex but still a necessary part of the design process and much of it was situated on the IOW.
The Princess, as it then became known, took its first test flight on 22nd August 1952 taking off across the Solent in perfect weather conditions with a backdrop of the liner "Mauretania" making her way to Southampton docks after an Atlantic crossing. That must have presented all those who turned out for the occasion with a remarkable sight. The roar of 10 Proteus turbines at full power in the days before noise abatement completed the picture. It was airborne for around 35 minutes in a flight around the south coast which was considered to be a great success. No significant problems were reported and it was said to have handled well. In September 1952 and 1953 it made showings at the Farnborough air show.
On 27th May 1954 it made its final flight at the end of the Ministry of Aviation contract after completing a test programme of 47 flights totalling nearly 98hrs. Its performance fell short of the design aims mainly due to the Proteus engines poor reliability in relation to engine and propeller gearboxes together with the fact that the engines supplied delivered only 2500 shp as opposed to the planned 3500shp, a shortfall of around 30%. It is clear that these shortcomings could have been resolved as the proteus power plant survived to serve many varied applications well. However, it was also quite clear that enthusiasm for this type of air transportation was on the wane.

The "Princess" G-ALUN at Cowes

It had been hoped that BOAC would have been a lead purchaser / operator but had earlier closed its maritime flight operations having made a decision to concentrate on land based operations. This was clearly a great blow and sullied any international confidence the "Princess" might have gained.
Eventually due to the lack of any orders all three Princesses were cocooned to prevent corrosion in the hope that buyers could be found. Ideas abounded but only one from the US department of defence led to any meaningful negotiations. They were in their final stages when, upon removing the cocooning, significant corrosion was identified, jeopardising any further hope of a sale. Consequently they were scrapped.
This was, quite obviously, the end of the company's aspiration as a manufacturer for large maritime based civil aircraft. Having contributed so much to the evolving post war design of future turbine propelled and pressurised large civil aircraft the company had no alternative other than to reorganise to use these skills in other areas if it was to survive. So, in the late 50's and early 60's, it undertook a number of new projects including SR53 Rocket propelled Interceptor demonstrator and the Black Arrow satellite launch vehicle which successfully launched the "Prospero" satellite from a launch pad in Woomera, Australia.
Through takeovers and further reorganisations the Saunders Roe Company became a division of the Westland Aircraft Company in 1959 and later became the British Hovercraft Corporation in 1966 making the SRN series of hovercraft on the IOW. The original site in Cowes now houses GKN Aerospace Services, part of the GKN Group.

## Talk:

**Tuesday 10th March 2015**

**The challenges of operating preserved steam locomotives on the main line in the 21st century**

Cedric Spiller

For our last meeting of the season we were pleased to invite Cedric Spiller, former BRB Chief Officer and latterly very heavily involved in the running of UK mainline steam specials to talk about the future, if any, of operating in the new environment of electrified high speed lines.
He began by outlining the history of steam operation which officially ended on August 11th 1968. But by 1971, Peter Prior, the Chairman of Bulmer's Cider had negotiated a trial special with 4-6-0 King George V on an exhibition train. This opened the flood gates and since then there has been an ever-increasing number of steam specials operating over the entire network of Network Rail, thanks to the open access agreement in the privatisation Act.
There are currently three marketing companies all utilising the services of two 'safety case' approved operators. These operators provide rolling stock and crews. Locomotives are supplied by either societies, rich individuals or loaned by the National Railway Museum.

The nub of the talk was to examine what happens in the future. Areas covered included:-

- The age of locos, some over 75 years old.
- The high cost of loco maintenance
- The high cost of coal and water
- The age profile of the crews (over a mean of 60)
- The possibly diminishing market (predominantly over 55)
- The increasing attraction of diesels to those who chased trains in the 70s and 80s
- The demands on support crews with all the attendant Health and Safety requirements
- The state of Mark 1 carriages built in the 1950s which are vacuum braked and therefore cannot be used with modern air braked diesels
- The law that requires no loco to go over 75mph
- The demands of the modern electrified railway where line speeds are consistently at 125mph
- The lack of pathways to allow such charters to run
- Some attitudes in the hierarchies of Network Rail that are definitely anti-steam

So to the future; the view is that steam will survive but over specially selected routes such as the Settle –Carlisle, York-Scarborough, Birmingham-Worcester, Bristol-Weymouth, Whitby-Middlesbrough, Cumbrian Coast, and Carnforth-Hellifield. All these are in close proximity to stabling and servicing centres.
Costs will rise, the market will change, rolling stock will have to be dual-braked (which means no windows opened!) and locos will occasionally fail. More and more locos will not seek main-line approval due to the high costs of compliance to the modern railway's systems and procedures.
Answering questions Cedric was adamant that signalling was not a problem. It was like veteran cars that were akin to "old ladies" yet there are plenty of roads where they can go. Steam engines to some are an anachronism. But the British public still love them!

Derek Webb

# End of Newsletter

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**REPLY SLIP 1**

**To: Ms B C Whitmell, 12 Brook Way, Lancing, BN15 8DG 01903 905922**

e-mail bcwhitmell@uwclub.net

Please reserve me a place to attend the **Lunch at Northbrook College, Worthing, on Wednesday 15th April 12.00 for 12.30**

**Name:**……( Block capitals)

**Address…**……

……

……

Telephone Number…….Name of guest/s …….

E mail address……Seating Request …….

I enclose a cheque made payable to RCEA for £……..…(£14.00) per person

**PLEASE CHECK AVAILABILITY with Brenda**

**Intentionally Blank**

**REPLY SLIP 2**

**To:** Derek Webb, 6 Loxwood Avenue, West Sussex. BN14 7QZ
Telephone 01903 525969 or email derek.webb2@ntlworld.com

Please reserve me ……. places to attend **the afternoon cruise (2hr 30 min) on 14th May on the Wey and Arun canal**. Optional lunch at the Onslow Arms at Loxwood (not prearranged). Cruise departs at 2.00pm

Please indicate if you are thinking of having lunch at the Onslow Arms so we can give them an indication of the numbers. Yes/ No

The cost of the cruise is £10 and will include a cup of tea if we get enough support.

Full name:……(Block capitals)
Address……
……
……
……..
Phone No……. e-mail address ……..

Cheque enclosed for £……. at £10:00 per person **(non-refundable)**, made out to the RCEA.
**Applications by 30th April 2014**

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**REPLY SLIP 3**

**To:** George Woollard, 18 St Lawrence Ave, Worthing, West Sussex BN14 7JF

Telephone 01903 523640 / Mobile 07541 224769 or email Georgewoollard1@hotmail.co.uk

Reserve me ……. places to attend the **Visit to Festival Theatre Chichester on Tuesday 16th June at 10.30am**

Full name:……(Block capitals)

Address……

……

……

……..

Phone No……. e-mail address ……..

Cheque enclosed for £……. at £5:00 per person, made out to the RCEA.
**Applications by Wednesday 10th June 2015**

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**REPLY SLIP 4**

**To:** Randall Keir, 16, Shirley Close, Rustington, West Sussex. BN16 2EG

Telephone 01903 785952 or email randallkeir@btinternet.com

Please reserve me ……. places to attend the **Outing at Worthing Croquet Club**, Field Place.
on Wednesday 15th July at 2:45pm

Full name:……(Block capitals)

Address……

……

……

**……..**

**Phone No……. e-mail address ……..**

**Cheque enclosed for £……. at £5:00 per person, made out to the RCEA.**
**Applications 6th July 2015**