RCEA NEWSLETTER
RETIRED CHARTERED ENGINEERS ASSOCIATION
WORTHING

FORTHCOMING EVENTS

17th April	Wednesday	**Outing** to Arundel Castle see pages 4 for details
15th May	Wednesday	**Outing** to The Royal Armouries, Fort Nelson, Portsmouth see pages 5 & 11 for details and signing up
26th May	Sunday	**Outing** to the Worthing Wurlitzer, concert by Lyn Larsen. see pages 6 & 11 for details and signing up
19th June	Wednesday	**Lunch** at Boathouse Brasserie, Amberley followed by visit to the Industrial Museum see pages 8 & 11 for details and signing up
17th July	Wednesday	**Outing** to the South Downs Planetarium see pages 9 & 11 for details and signing up

Coffee Mornings

Denton Lounge, Worthing Pier.	Every Monday
Albion Inn, 110 Church Road, Hove.	First Wednesday of the month 3 Apr, 1 May, 5 Jun, 3 Jul, 7 Aug
The Spotted Cow, Angmering	Third Thursday of the month 18 Apr, 16 May, 20 Jun, 18 Jul, 15 Aug
Beach Hotel, Worthing (with Ladies)	Last Thursday of the month 28 Mar, 25 Apr, 30 May,
Highdown Towers (with Ladies)	27 Jun, 25 Jul, 29 Aug

Coffee mornings commence at 10.30 a.m., except at The Beach, which is from 10.45 a.m.

Copy date for next Newsletter 6 Aug

Membership

We welcome the following new member:

2001 **BIRCH, M.J.,** M.I.Mech.E. F.Inst.Pet., DMS *59 Brangwyn Drive, Patcham, Brighton, BN1 8XB (01273 557322)* ***Michael and Delicia*** 1964-68 Mobil Oil , petroleum storage and transportation 1968-72Ajax Magnetothermic, electric melting furnaces 1972-75 AMOCO(UK), petroleum storage and transportation 1975-2000 Ewbank Preece, design and construction in the oil and gas industry. Power stations, diesel and gas turbine, in the middle east and Sri Lanka *Interests:* DIY, Travel	

Will new members please check the above data and inform the Hon. Sec. of any errors or omissions so that the information can be incorporated correctly into next session's handbook.

To date we have 116 members which includes 7 life members and there are, in addition, 9 widows who are treated as members.

We are sad to report the deaths of John Brown and Desmond Lear.

Will members please inform the membership secretary Colin Pilling tel:01903 522356 if they hear of the death of a member or of a member's wife

Gas Turbines –Past, Present and Future. ***Presentation at Field Place by Professor Alan Turner, Sussex University, Director of Rolls Royce Aero Thermal Research Centre. 8th January, 2002.***

The presentation of slides and photographs began with a very short introduction to the theory of operation of the gas turbine by comparing its thermal cycle to that of an internal combustion engine

With the aid of cycle diagrams it was shown how modern GT engines can operate with compression ratios of up to 60:1 and temperatures up to 1900^0K, i.e. significantly higher than an internal combustion engine. These extremely high temperatures and pressures present the designer with a number of difficult problems to solve to ensure an engine can operate reliably over prolonged periods of time, many of which were referred to later in the presentation.

The presentation then centred on the history of the gas turbine, illustrated by a number of pictures of early machines. The work and patents of a number of early inventors was outlined, including references to the earliest patents of Ellen in 1904 and his first attempt to build a machine in 1907; the patents of Lorin for ram jets in 1913: the early works and patents of Frank Whittle in the UK and Hans von O' Hain in Germany; the problems they had to overcome to make their machines reliable enough to engineer into aircraft; the earliest jet

propelled aircraft in the UK and Germany; and Rover's involvement with gas turbine development work before the Government handed the work over to Rolls Royce.

The aero engine business worldwide will be worth in excess of $300 billion over the next 30 years or so. Consequently organisations involved in the manufacture and servicing of these engines, such as Rolls Royce, have had to develop into very complex businesses to cope with the demands they need to meet. Rolls Royce share of the market is currently about 30%. Out-sourcing of manufacturing for components and for research and development work is now common throughout the industry. Universities provide much of the research these days, Sussex University is just one of many in the UK competing for this segment of the business.

With the complex three shaft design of engine now being produced, which incorporate sophisticated materials to cope with the arduous conditions inside the engines, especially in the high temperature regions, the increasing demands for the development of low noise emissions, and increasing legislation relating to safety and pollution, the volume of work for these organisations to undertake is significant and the range of tasks is almost limitless.

Aero engines are now available with outputs as low as 700 shp for use in helicopters whilst at the other end of the range there are now engines such the Rolls Royce Trent 900 which can produce up to 110,000 lbs of thrust. Basically the product range has been developed as one high in technology whilst low in risk of failure. Some of the current designs were illustrated and described in more detail during the presentation.

To enable these machines to operate for prolonged periods without maintenance or the need to shut down extensive development has been necessary in the design of blades for compressors and turbines. The use of titanium, carbon fibre and ceramic materials has been essential with sophisticated and intricate designs needing to be adopted to ensure components are cooled to acceptable temperatures during operation, especially during the arduous operational experience when at full power. A number of examples of current blade designs were passed around for inspection, some of which bore signs of partial failure or in service damage.

To enable designers to evaluate the design of a blade or component in a gas turbine the University has developed a computerised Thermo-mechanical model for an engine in which the components are analysed during simulated operation using finite element analysis techniques. This computer model was demonstrated for an engine in an aircraft going through the cycle from take off to landing. The heating / temperature changes experienced by the various components in the engine were obvious as the cycle progressed.

The presentation continued with a review of some of the current day developments in industrial gas turbine technology, principally the small to medium output units (up to 50MW.) Many of these engines are being developed for use in stand-alone co-generation systems. They will involve the extensive use of ceramic materials in their construction and utilise high speeds of operation. Gas turbine units with their associated generators (but excluding the heat exchanger for the hot water / steam generation) suitable for use in these small single building co-generation plants are likely to be no larger than 1 m^3 to provide 300kW of electrical output.

This was followed by a pictorial review of the presenters views of the future for aircraft from the smallest remotely controlled drones currently being developed by a number of countries as combat and surveillance aircraft, through sub orbital planes and space launchers, to the double-decker 1000 passenger capacity planes for commercial use promised in the not too distant future. The presentation concluded with a commentary on the developments yet to come in gas turbine engine technology, the use of electro-magnetic bearings, the use of electrical auxiliaries where possible, and finally the development of hydrogen fuelled gas turbines for use should the world ever run out of oil.

A question and answer session followed, after which Ken Wheeler gave a vote of thanks on behalf of the members present for the excellent presentation.

Ray Wort

Visit to Worthing Town Hall - January 15, 2002

On Tuesday January 15, 2002 a party of 32 (members and wives) visited Worthing Town Hall at the invitation of the Mayor, Cllr Mrs Valerie Sutton.

We assembled in the Council Chamber where we were given a talk on the Mayoral robes and also a talk on the history of the Borough of Worthing by her Consort, the Hon Alderman Mr Stan Moore.

At the end of the presentations, the President, Mr David Matthews, presented a cheque for £100 to the Mayor on behalf of the Association. The cheque will go to one of the Mayor's charities - The Children's Centre.

After questions, we moved into the Mayor's parlour, where there was plenty of discussion over tea and biscuits. A very enjoyable afternoon was had by all present.

Dave Matthews

The Role of an Airworthiness Surveyor

Presentation at Field Place by Graham Rourke, Deputy Manager, Applications and Certification Section, Aircraft Maintenance Standards Department. 12th February, 2002.

This talk was given with the aid of a number of slides. A copy of these slides and literature can be obtained from the Hon. Sec.

Outing with partners to **Arundel Castle,** on Wednesday 17th April 2002.

Admission charge is £8.50 per adult and £7 for oap. The castle is open from 1200noon until 1700hr. It is suggested to meet for afternoon tea at 1530hr in the restaurant, position 9 on the map, entered from inside the castle.

Outing with partners to **The Royal Armouries, Fort Nelson** on Wednesday 15th May 2002 at 2.30 p.m.

Fort Nelson is situated on the hills overlooking Portsmouth and is reached via junction 11 off the M27 and following the brown tourist signs to the 'Royal Armouries'. Free car parking is available opposite Fort Nelson. There are no admission charges and it is proposed that we meet for lunch in the restaurant where a 'dish of the day' can be obtained for as low as £3.50. The guided tour will commence at 2.00 p.m

Closing date for applications (form on page 11) 8th May, 2002

In the centuries before the invention of aeroplanes and rockets, Britain's security depended upon command of the sea, and that hinged upon the possession of harbours such as Portsmouth. Before Fort Nelson was built, Portsmouth's defence relied upon smoothbore guns positioned close to the shore. They were loaded in the old - fashioned way of ramming powder and ball down the barrel from the muzzle. From the 1850s technology began advancing rapidly. Stronger, more accurate guns reached far greater ranges and fired with greater speed. To protect Portsmouth from these weapons it was necessary to redesign all its fortifications.

The old enemy, the French, operating from their key naval base at Cherbourg, were just 80 miles away across the Channel. In the 1850s the British Government did not trust the French, especially as their naval designers produced alarmingly powerful warships like 'La Gloire'. The British response to this threat was to upgrade the forts on the Isle of Wight and the mainland at the western end of the Solent. They also built four sea forts across the eastern approach itself. But the French had a larger army, and it was feared that a force might land elsewhere on the coast and attack Portsmouth from the rear. To prevent this, a line of forts was built along Portsdown Hill, and from shore to shore across the Gosport peninsula. The fire from all these forts overlapped and provided a protective ring around Portsmouth.

Fort Nelson was built between 1862 and 1871, during the reign of Queen Victoria, and, because of the nearby memorial, was named after Admiral Horatio Nelson, victor of Trafalgar. As they guard against landward attack, the guns of the Fort point inland rather than out to sea. They were manned by a garrison of almost 200 men, all volunteers, with regular army officers. However, the forts were never attacked, the French threat disappeared and we became allies. Indeed even before these forts were completed they were considered obsolete. They became known as 'Palmerston's Folly' after Lord Palmerston the Prime Minister responsible for havin'g them built.

After the end of World War 11 the Fort fell into disuse and was eventually abandoned in the 1960s. Hampshire County Council acquired the monument and careful restoration followed so that today most of the fort is open to the public.

Outing with partners to The Worthing Wurlitzer, Concert by Lyn Larsen on Sunday, 26th May, 2002 at 2.30 p.m.

The chairman of the Sussex Theatre Organ Trust, E.C. Buckland, member, has donated 50 tickets to members and their partners for the above concert. The RCEA have decided to make a charge of £2.50 per person, which will be donated, to the charity. Please complete the form on page 11 and return it to S. Oliver. Tickets will be posted to applicants.

Closing date for applications 12th May, 2002

The Wurlitzer Organ, in The Assembly Hall, Worthing, was previously in The Troxy Cinema in London and was opened by Bobby Pagen in September 1933. At that time The Troxy was one of London's largest super cinemas seating 3500 people and it was a most prestigious installation. The Organ cost £15,000 in 1933 its current replacement value if it were possible would be some £500,000. It was removed from The Troxy in 1960 when the theatre became the Covent Garden Opera House rehearsal centre. It was put into Buckingham Town Hall in a most unsuitable manner and by 1975 was unplayable and near derelict. It was rescued by the Sussex Theatre Organ Trust and after successful negotiations with Reg Caldicot the Leisure Services Officer at that time and Lewis Elliot the Town Clerk together with Jan Cervenka the Music Director an agreement was reached to install it in The Assembley Hall. This was approved by the Council on 3rd February 1977.

The restoration of the Organ took five years by a team of several volunteers and the final installation a further two years. The installation was designed such that the Organ would be suitable for classical as well as light music performances. The Organ was opened in May 1981 and has operated in a variety of musical activities since that time. The following are a few facts about the existing organ.

At the time that it was opened in 1981 35,000 man-hours had been put into the restoration and installation. The cost in materials and components was £135,000. Some 135 miles of electrical wire was used in the installalion. It has been played by some of the worlds greatest classical artistes at Symphony Concerts. It is now recognised as the finest Wurlitzer Organ in the U.K.

About 1989 it was decided that, consistent with the perception that Worthing was a centre of musical excellence and because of the superb acoustic conditions in The Assembly Hall, the organ was worthy of enlargement. At that time the BBC Theatre Organ became available because they were closing The Playhouse Theatre in Manchester in which it was housed. This organ, before acquisition by the BBC, was in The Empress Ballroom at Blackpool and because of its design was especially suitable for the proposed additions at Worthing. It was acquired and a great deal of its material together with other equipment from the USA was restored and installed in the new chamber on the left hand side of the stage. The installation is now complete and the inaugural concert opening the extended organ took place in February 1997. The new Organ is the largest Wurlitzer Organ in Europe and the only one operating in a concert hall in the UK. The design has been achieved from the consideration and advice of many of the world's greatest organists particularly in the USA where the preservation of theatre organs and theatres as arts centres is far more prevalent and serious than in this country.

To date the total expenditure on materials and components together with the purchase of the BBC Theatre Organ has reached £255,000 and at no time has any public authority money contributed towards this. The only major contribution was of £3,500 pounds from the Lottery Fund for components in the new Console construction generously arranged by Councilor Stanley Elliott when Chairman of the Lottery Committee.

The Organ provides the most regular and consistent musical entertainment in Worthing. Its use is quite varied, it performs for Ballroom Dancing similar to The Tower Ballroom at Blackpool, and it has been used for Classical Music with the Symphony Orchestra, the Philharmonic Choir and the Philharmonic Orchestra. The monthly Theatre Organ Concerts are attended by people from all over England. At many of these Concerts coach parties arrive and on many occasions the Concerts are filled to capacity and people are turned away. To date the Organ has provided over 5500 hours of musical entertainment and there has never been a breakdown which has affected its use. The Organ is regularly broadcast on BBC Radio 2 and many recordings have been made which have been sold throughout the world. In the current

installation and the extension many new technologies and the latest materials have been used although the original chests and pipework which are the heart of the Organ remain unaltered. The complete Organ contains about 25 tons of chests and pipework.. The electronic relay system controlling the Organ has about 125,000 components. The wind for the Organ is provided by two 10 11.P, Blowers each delivering 2,500 cubic feet of air per minute. The shortest pipes are 2 inches long and the longest equivalent to 32 feet long. The size of the airways delivering the wind to the chests varies from 12 inches diameter to 1 inch diameter. The Organ contains a large Symphonic Vibraphone, a full size Xylophone and a full size Glockenspiel plus many other tonal and percussion devices.

Lyn Larson

California born, Lyn Larsen began piano lessons at the age of three and by the time that he was seven years old he was tackling the organ. After hearing George Wright at the Rialto Theatre in South Pasadena, California, his interest turned to the theatre pipe organ and two years later he made his concert debut at the Wiltern Theatre in Los Angeles in 1964. Since then Lyn Larsen has performed virtually world wide including vision specials in Australia, and celebrated appearances at the Hollywood Bowl, Radio City Music llall, and the Royal Albert Hall. As the rebirth of the theatre organ continues Lyn has rededicated many restored behemoths such as the Chicago Theatre, and Shea's Buffalo Theatre. He has performed numerous times with the Jack Bethard's Orchestra at the Oakland Paramount, California and other resplendent performances in Detroit, Fort Wayne, Whichita, Chicago and other cities across the U.S.A.

Lyn's combination of dedication and artistry have resulted in numerous awards and some fifty recordings, one of which has the distinction of being the only theatre organ recording ever to make Billboard Magazine's top ten CD list. Lyn is proud to have been chosen by Jasper Sanfilippo to oversee the installation and completion of the extraordinary organ at his residence near Chicago as originally conceived by the late Dave Junchen. Some of Lyn's most gratifying times, both professionally and personally, have been spent in his capacity as music director of the Sanfilippo Salon.

In 1994 Lyn was named theatre organist of the year by the American Theatre Organ Society.

As well as being a busy performing artiste, Lyn is a consultant in the tonal design and layout of both new pipe organ installations and in the restoration of historic instruments all over the United States. In addition to his involvement at San Filippo he was in charge of the restoration and expansion of the 4 manual, 73 Rank Wurlitzer in the San Sylmar Museum in Sylmar, California.

Lunch at the Boathouse Brasserie, Amberley followed by visit to the Industrial Museum, on Wednesday 19th June 2002.

Meet for lunch at 1200hr at the Boathouse Brasserie (beside Houghton Bridge). There is ample car parking at the Brasserie.

The fixed price menu is: 2 courses & coffee £13.90, 3 courses & coffee £16.90 . There is a choice of starters, the main course is a choice of roast meats from the carvery or choice of fresh fish of the day and there is a good selection of home made sweets.

Please indicate on the reply slip on page 11 and return to S. Oliver if you intend to join the group for lunch at the Brasserie.

Closing date for applications 12th June, 2002

After lunch we can walk or drive to the Industrial Museum at around 1400hr.

Cost of admission £6.75, OAPs £6.00 or as group £5.75 & £5.00 meet at 1400hr.at museum entrance.

Please return the reply slip on page 11 to S. Oliver

Amberley Working Museum, covering 36 acres of former chalk pits nestling under the South Downs, has over thirty different buildings, hundreds of exhibits meticulously restored by our volunteers, a variety of working craftspeople, an enchanting nature and woodland trail, a railway station, bus depot and printing works, a dozen or so picnic areas, a children's playground, cafe and gift shop... and much more besides!

You won't even have to walk the whole site either... our I unique narrow gauge railway collection provides superb working locomotives and coaches to ferry you the length of the museum and back with a specially adapted coach for the convenience of our visitors in wheelchairs... or you can savoir the delights of a memorable trip on our tramcar or one of the other splendid vintage buses, all beautifully restored by our highly skilled volunteers.

Visit the Seeboard Electricity Hall to see an amazing variety of electrical wonders; you can explore the intricacies of electricity in our'hands on' introductory gallery and marvel at the electric cars and bicycles, then admire a host of domestic appliances from yesteryear. You won't want to miss our resident craftspeople, busily working at age-old trades and using traditional tools to produce beautiful pottery, elegant ironwork, an amazing variety of clay pipes, decorative walking sticks and besom brooms. The recently installed BT museum is scheduled to be open for our visit.

Outing with partners to the South Downs Planetarium, on Wednesday 17th July 2002 at 2.30 p.m.

The South Downs Planetarium project was born out of an awareness of the need to promote a greater public understanding of astronomy. It has been made possible by the many charitable donations the fund has received from individuals, groups and large organisations. Sir Patrick Moore, who has brought astronomy into our homes for over 40 years through the television programrne, 'The Sky at Night', has been instrumental in planning, promoting and making possible this exciting project which will be enjoyed by all ages for generations to come. A star theatre is an exceptional way for everyone to experience 'armchair' astronomy - as a fun and entertaining pastime, or as a stepping stone towards a new hobby or a new career. With the star projector, slides, videos, DVDs, music and a lively commentary, the planetarium allows us to enter a world beyond our own.

It is suggested to meet for lunch at the Selsey Tram PH which is about 1/4 mile south of the A27 on the A286 at the junction with the B2201. The entrance to the Planetarium is via the Chichester High School for Boys (drive through to car park at planetarium). The charge is £5 per person and Dr John Mason will be making a special presentation for the RCEA. Please return the reply slip to D. Matthews.

Closing date for applications 10th July, 2002

To: S. Oliver, Elphin, North Drive, Angmering, Littlehampton, BN16 4JJ Tel: 01903 787116
I wish to participate in the outing to **Worthing Wurlitzer Concert** on Sun, 26th May, 2002
Full Name .....(Block capitals)

Address .....

Phone No..... **Applications by 12th May, 2002**

My guests will be……

I enclose a cheque for …….payable to RCEA (£2.50 per person) tickets will be sent by post
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To: S. Oliver, Elphin, North Drive, Angmering, Littlehampton, BN16 4JJ Tel: 01903 787116
wish to participate in the visit to **Amberley Industrial Museum,** on Wed, 19th June, 2002

Full Name .....(Block capitals)

Address .....

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Phone No..... **Applications by 12th June, 2002**

I would like to join the group for lunch at the Riverside Brasserie, number.....
I would like to join the group for the visit to the Industrial Museum, number.....
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To: D. Matthews, 9 Larchfield close, Aldwick, Bognor Regis, PO21 4RB Tel: 01243 263898
I wish to participate in the visit to **The Royal Armouries, Fort Nelson,** on Wed, 15th May, 2002

Full Name .....(Block capitals)

Address .....

Phone No..... **Applications by 8th May,2002**

I would like to join the group for lunch, Number.....
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To: D. Matthews, 9 Larchfield close, Aldwick, Bognor Regis, PO21 4RB Tel: 01243 263898

I wish to participate in the visit to **Chichester Planetarium,** on Wed, 17th July, 2002 at 2.30 p.m.

Full Name .....(Block capitals)

Address .....

.....

Phone No..... **Applications by 10th July, 2002**

My guests will be……

I would like to join the group for lunch at the Selsey Tram PH Yes/No

I enclose a cheque for …….payable to RCEA (£5 per person)