RCEA
(SUSSEX)

An Association for Retired Professional Engineers

NEWSLETTER August 2005

PROGRAMME OF EVENTS 2005 / 2006

Every Monday 10.30 am. Coffee at the Denton Lounge, Worthing Pier.

13th Sept	Tuesday	**RCEA Annual General Meeting**, 2.30 pm. Field Place Worthing.
15th Sept	Thursday	Coffee - at Spotted Cow, Angmering.
20th Sept	Tuesday	**Visit:** Chichester Cathedral Guided Tour, 11.00 am. Chichester
28th Sept	Wednesday	**Visit:** Denbies Wine Estate Tour, 2.00 pm. Boxhill, Dorking, Surrey
29th Sept	Thursday	Coffee - with Partners at Beach Hotel, Worthing.
11th Oct	Tuesday	**Talk:** Army Presentation Team, 2.30 pm. The Barn, Field Place Worthing
13th Oct	Thursday	**RCEA 54th Annual Dinner,** 7.30 pm. Beach Hotel, Worthing
20th Oct	Thursday	Coffee - at Spotted Cow, Angmering.

26th Oct	Wednesday	**Visit:** The Argus Print Works, 1.30 pm. Brighton
27th Oct	Thursday	Coffee - with Partners at Beach Hotel, Worthing.
8th Nov	Tuesday	**Talk:** The Construction of Ardingly Reservoir, by Colin Hammond, 2.30 pm. Field Place, Worthing.
17th Nov	Thursday	Coffee - at Spotted Cow, Angmering.
24th Nov	Thursday	Coffee - with Partners at Beach Hotel, Worthing
13th Dec	Tuesday	**The Cooch Memorial Lecture,** Nuclear Power by Roy Budden, 2.30 pm. The Barn, Field Place, Worthing**.**
14th Dec	Wednesday	**Christmas Lunch,** 12.30 pm. Highdown Towers, Goring, Worthing.
15th Dec	Thursday	Coffee - at Spotted Cow, Angmering
29th Dec	Thursday	Coffee - with Partners at Beach Hotel, Worthing

2006

10th Jan	Tuesday	**Talk:** Safety in Process Engineering by John Pound, 2.30 pm. Field Place, Worthing.
19th Jan.	Thursday	Coffee - at Spotted Cow, Angmering
26th Jan.	Thursday	Coffee - with Partners at Beach Hotel, Worthing
8th Feb	Wednesday	**Visit:** 2.30 pm**.** Ceres Power, Crawley
14th Feb.	Tuesday	**Talk:** Microwaves Everywhere by Peter Gibson, 2.30 pm Field Place, Worthing
16th Feb.	Thursday	Coffee - at Spotted Cow, Angmering

22nd Feb.	Wednesday	**Visit:** Manhattan Kitchens, 2.30 pm. Lancing.
23rd Feb.	Thursday	Coffee - with Partners at Beach Hotel, Worthing
14th Mar	Tuesday	**Talk:** Sentinel Steam Lorry by Jim Hatfield, 2.30 pm. Field Place, Worthing
16th Mar	Thursday	Coffee - at Spotted Cow, Angmering
23rd Mar	Thursday	**Spring Lunch**, 12-30 pm. Northbrook College, Worthing.
30th Mar.	Thursday	Coffee - with Partners at Beach Hotel, Worthing
5th Apr	Wednesday	**Outing:** 2.30 pm. Newhaven Fort, Newhaven
20th Apr	Thursday	Coffee - at Spotted Cow, Angmering
27th Apr.	Thursday	Coffee - with Partners at Beach Hotel, Worthing
16th May	Tuesday	**Outing:** Michelham Priory and Gardens
18th May	Thursday	Coffee - at Spotted Cow, Angmering
25th May.	Thursday	Coffee - with Partners at Beach Hotel, Worthing
14th Jun	Wednesday	**Outing:** Harvey's Brewery, Lewes
15th Jun	Thursday	Coffee - at Spotted Cow, Angmering
29th Jun.	Thursday	Coffee - with Partners at Highdown Towers, Worthing
5th Jul	Wednesday	**Outing:** 2.30 pm**.** HMS Warrior and Portsmouth Harbour Tour, Portsmouth.
13th Jul	Thursday	Coffee - at Spotted Cow, Angmering

27th Jul.	Thursday	Coffee - with Partners at Highdown Towers, Worthing
17th Aug	Thursday	Coffee - at Spotted Cow, Angmering
31st Aug.	Thursday	Coffee - with Partners at Beach Hotel, Worthing

All Talks and Meetings will be 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 and on the appropriate reply slips.

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

Membership

Lewis Bannister:
For anyone interested, Colin Pilling our Secretary has a career history document prepared by Lewis which can be borrowed at any time to read.

Resignations: Frank Peatroy

Life Members:
The RCEA has 11 Life Members, - names are listed below for reference:-

H B Calverley
D R Fife
C S Gibson
B Haynes
S J Little
E Markwell
L Middlemass
C W Newberry
J Richards
A S Whitaker
J H Woodham

Website for the RCEA

Thanks to a major effort by Peter Gibson (Member), we now have a website which can be developed for the Association. Our website is available to view at www.rceasussex.org.uk and we would welcome any suggestions for its content or style and for any material that you feel should now be added to enhance its usefulness. It is anticipated that some RCEA news may now appear on the website ahead of anything which is published in the Newsletters.

Brief Detail – Talks, Outings and other activities

Visit:

Chichester Cathedral 11.00 am. Tuesday 20th September.

We have arranged a guided tour of the Cathedral, starting at 11.00am. Meeting by the West Door just before. The cost will be £3.00 per person.

In addition to the tour a visit up the tower is possible and will take about an hour. We need a minimum of EIGHT people for this visit and the cost will be £8.00 per person. This visit would take place immediately BEFORE the main visit and therefore those members who wish to add this extra tour to the main visit of the day, would need to meet at the earlier time of 10.00am at the West door. It should be noted that a 15 minute climb is involved if you wish to join this group.

At 1.00 pm after the main tour and a break for lunch, there is an organ recital by Ian Roberts from the Cathedral Organ School with a retiring collection. Unfortunately the Bell Room Restaurant in the Cloisters is closing for 6 months from the 1st September but there are many other places to eat in the vicinity.

Please return one of the reply slips indicating your requirements and enclosing a cheque for the appropriate amount made out to the RCEA before the 1st September 2005.

Visit:

Denbies Wine Estate Tour, 2.00 pm. Wednesday 28th September, London Road, Boxhill, Dorking, Surrey

The estate can be easily found on the west of the A24 just North of Dorking.

The estate is England's largest representing over 10% of the plantings in the whole of the UK. Around 400,000 bottles of wine will be produced every year at Denbies from

the fruits of over 300,000 vines spread over 265 acres of traditional vineyards.

We will be having 2 tours back to back. First there will be a tour of the winery consisting of a special effect 360-degree film, a ride in the people mover through the working winery and tastings of three still wines in the atmospheric cellars.

We will also take an external tour of the vineyard by trailer to the top of Ranmore Common where there are spectacular views across the valley towards Box Hill. Total time for the 2 tours will be less than 2 hours.

Visitors can also take lunch/refreshments in the Garden Conservatory

The cost will be £9.50 per person. Can you please complete the reply slip at the end of this newsletter if you wish to attend, enclosing a cheque made out to the RCEA for the appropriate amount.

Latest date for replies is 21st September.

Talk:
Army Presentation Team, 2.30 pm**.** Tuesday 11 October 2005
The third of the multi-media Presentations for the RCEA from the Armed Services. The role of the modern British Army will be explained, and there will be an opportunity to meet the Team.

RCEA 54th Annual Dinner, 7.00 for 7.30 pm. Thursday 13th October, The Beach Hotel, Worthing.

Dress - dinner jacket or lounge suit. The cost will be **£24.00** per person.

The menu will be:

Warm melon with crispy bacon and hollandaise sauce or tomato soup with basil.

Traditional roast chicken served with stuffing, chipolata and cranberry sauce and vegetables.

Christmas pudding with brandy sauce or fresh fruit salad or cheese and biscuits.

Coffee and mints.

Record your choices here for your own record:

Number of Soup.....

Number of Melon.....

Number of Christmas Pudding ……

Number of Fresh Fruit Salad …….

Number of Cheese and Biscuits …….

If anyone requires a vegetarian meal, please indicate this on the reply slip.

Can you please return the reply slip at the end of this newsletter before 1st October, if you wish to attend, enclosing a cheque made out to the RCEA for the appropriate amount.

Visit:

The Argus Newspaper Offices, Brighton, 1.30 pm. Wednesday 26th October.

We have arranged a visit for members and spouses to The Argus office and printing plant. We will have a guided tour of the office when journalists will be working, seeing Typesetting, Advertising, Editorial, Sales and a new Media Dept. After that we will go to the Print Works to see the reel store recycling and finally the main presses working, printing the final edition of the paper.

In order to see the presses working, the visit must commence at 1.30pm sharp.

The Office is situated in Hollingbury just off the A27 Brighton Bypass. A location map will be posted to each successful applicant for a place. We have been advised to park in the adjacent ASDA car park, where the time limit is two hours but our contact is sure that will be sufficient.

We are limited to 20 visitors and wheelchair access is possible subject to prior notice.

Can you please complete the reply slip at the end of this newsletter before the 19th October if you wish to attend. Any one needing wheelchair access must specify this on their application.

Talk:

The Construction of the Ardingly Reservoir: 2.30 pm Tuesday 8 November by Colin Hammond

An illustrated talk, by the Resident Engineer, on the building of the Ardingly Reservoir, Sussex. The talk will include the activities prior to construction, the enabling works and maintenance of good public relations throughout. The construction of the dam, embankment and pumping station will be described, together with the supplementary work of land clearance and landscaping.

Christmas Lunch:

Highdown Towers, Worthing, 12.00 for 12.30 pm. Wednesday 14th December.

Following the success of the 'trial' Christmas Lunch last year it has been decided to repeat the function for the current year.

The lunch will be in the recently refurbished Carvery Restaurant, i.e. main course will need to be collected from the Carvery Counter by each diner, starter, sweet and coffee will be served at the table.

The cost will be **£14.50** for the lunch, excluding drinks.

The lunch menu will comprise three courses with coffee and mince pies to follow.

Starter	Leek and Potatoe Soup or
	Pieces of Melon and Pineapple or
	Prawn Coctail
Main Course (Carvery)	Roast Turkey
	Roast Sirloin of Beef
	Roast Loin of Pork
	Roast Honey Glazed Gammon
	Poached Fillet of Salmon
	Roasted Mediterranean Vegetables
Sweet	Christmas Pudding or
	Chocolate Junk Yard

Can you please return the reply slip at the end of this newsletter, indicating your choice(s) for Starter and Sweet, before the 1st November, if you wish to attend, enclosing a cheque made out to the RCEA for the appropriate amount.

The Cooch Memorial Lecture.

Nuclear Power: 2.30 pm. Tuesday 13 December , by Roy Budden.

The lecture will be wide ranging on this method of power production, now returning to public attention. It will include the principles and history of nuclear power, and the developments in the UK. Environmental aspects and waste disposal will be dealt with and alternative energy sources will be discussed.

REPORTS

Talk

Tuesday 8th March 2005 2-30pm Field Place, Durrington, Worthing.

Steam Power by Ken Wheeler

This is a story about people. Of five engineers in the 18th century whose creativity, entrepreneurship, actions and prejudices changed Britain forever and these were Thomas Savery, Thomas Newcomen, James Watt, Matthew Bolton and Richard Trevithick.

Around the year 1700 Britain was an agrarian economy with a small population of less than 7 million people and where power came from waterwheels or horses. Waterwheels remained

an important source of power until around 1840 reaching 100-horse power with an efficiency gain from the beginnings of 21% to 67% in the latter years. Sources of capital for entrepreneurs was restricted being available from wealthy landowners and businessmen willing to risk some capital for a potentially handsome return. Job descriptions were loose. For instance, James Watts who we shall meet later was over his lifetime described and employed as a scientific instrument maker, a merchant dealing in Delf china, a land surveyor and an engineer.

The prime circumstance which made the activities of these five engineers unique was the strong patent protection for inventors at that time. Patent infringement in the 18th century brought dire consequences if proven in court; the journey from a position of relative wealth to the gutter could be swift and unrecoverable. Scientifically inadequate or false paradigms abounded. The strength of a beam in bending based on Galileo's formulae which was under strength by a factor of 3 was still widely used up to around 1800 a design factor of safety of 4 or more hiding the error. New paradigms correctly describing the theory of bending originated on the continent and were in French. Never the less textbooks in mathematics and natural philosophy, as physics was then called, were available and from 1720 church and grammar taught these subjects particularly Newtonian mechanics a situation peculiar to this country. Anglican churches even preached the virtues of the Newtonian paradigms from the pulpit; the church over the ages being the guardians of scientific and mathematical knowledge particularly among the Baptist and non-conformist movements. Up to1760 no true rudimentary explanation of how heat engines worked existed.

The driving force around 1700, which ultimately resulted in the steam engine in all its forms, the ultimate example of the law of unintended consequences, was the need to raise water by mechanical means to drain deep copper and zinc mines in Cornwall and in the coalfields of the Midlands of England.

In this talk it is best to start with Thomas Newcomen of whom no portrait exists .His ancestors were landed gentry forced to flee and ultimately settle in Dartmouth, Ireland and the USA. Thomas Newcomen in Dartmouth was taught by John Flavell a persecuted non-conformist preacher and eminent scholar who had been given succour by the family in Dartmouth. Newcomen's occupation is given as ironmonger but he was clearly a merchant of substance being able to employ Jim Calley a smith and plumber for the 10 years it took Newcomen to develop a successful engine. In earlier times Newcomen had done some ironwork for Thomas

Savery, a military engineer who in 1698 devised what he called a" fire engine" which he patented as" a device to raise water by the impellent of fire and the condensation of steam". This, which should have been disallowed, was a master patent, which would encompass Newcomen's engine and allowed Savery who played no part and his heirs to claim rights over Newcomen until the patent expired in 1733. Newcomen died in 1729.

The Savery Fire Engine which is essentially an egg shaped pressure vessel into which steam at a modest 3psi is introduced causing the water within the vessel to exhaust through a vertical forcing pipe, the height of the water column resulting being limited by the vessel's steam pressure. A water spray to the outside of the steam filled vessel induces a vacuum thereby replenishing the water level in the vessel from a head of no greater than 30 feet above the free surface of the mine water. Thus, the total lift is the sum of that in the force pipe and the suction head and the Savery engine is a restricted device.

A practical solution requires a minimum lift of some 150 feet and Newcomen's Atmospheric Engine of 1712 does just that and more. Being also limited to boiler pressures of around 3psi Newcomen utilises the near vacuum pressure of 10psi resulting from condensed steam under the piston in a large brass cylinder with a stroke of some 8 feet to pull up a submerged bucket pump, the attendant weight of the pump rods and the head of water generated by the bucket pump. Thus the bigger the engine the more head it will generate; a facility not shared by the Savery engine.

By placing the pump and the cylinder on opposed sides of a tilting beam both applied tension loads accommodated by the use of chains on each side of the beam.

No machine tools were available to prepare the cylinder bore so a cup seal was arranged around the piston diameter with a well of water above the piston forming the seal to prevent vertical escape of steam past the piston. The Newcomen engine required that the cylinder walls be cooled to help with the condensation of the steam and he tried a cold water jacket. A lucky incident due to a small hole breaking through into the cylinder during test caused cold water to enter from the jacket and cause rapid condensation within producing exactly the effect required. A post mortem decided that a means of regulated water injection into the cylinder should be used during the operating cycle of the engine. One problem remained; how to make the engine operate automatically. Newcomen would have been unaware that on history's subsequent internal combustion engines where power was transmitted by a rotating shaft, it is necessary to get the shaft rotating at some minimum speed for rotary inertia to ensure that the ignition cycle ensures continuous operation. The Newcomen engine

had a vertical rod (plug rod) attached to and hanging down from the beam for purposes of control and this triggered a tumbling bob to produce a rapid opening and shutting of the steam valve from the boiler at the extremes of plug rod travel where the bob was caused to over balance from top dead centre. The Newcomen engine had other triggers on the plug rod such as water injection valve operation to make it function in total. The concept of this engine and its enactment can never be underestimated in the annuals of technology, producing the world's first automatic machine, which remained practically unchanged for the next 53 years. Newcomen engines were very inefficient using large quantities of coal. This was no problem where engines were sited in coalfields but for mining in Cornwall the coal had to be imported by sea from Wales and successive generations of engineers were unable to effect much improvement on fuel consumption using the basic Newcomen design.

James Watt realised some 50 years after Newcomen that the high fuel consumption of the Newcomen engine was due to the need to reheat the piston cylinder with new steam before applying a water injection to induce a near vacuum below the piston and hence achieve a power stroke and thereafter heat the cylinder again to repeat the cycle. By venting the steam to a separate cylinder containing the water injection feature he thereby maintained the piston cylinder a high temperature with the steam exhausting to the lower colder cylinder, which he called a "separate condenser" in his patent. At the same time he patented the use of a gland around the top of the piston rod to enable steam pressure to be applied above the piston. Therefore in the power stroke the piston reacted to the pressure of steam on top of the piston concurrent with near vacuum conditions below the piston. The success of the Watt engine depended on the ability to produce a cylinder whose bore was both straight and truly circular with a good surface finish and in cheaper cast iron, rather than the brass previously used and this had depended on the unrelated development of a water wheel driven boring mill capable of the task. All early Watt engines used cylinders cast and machined by Wilkinson. Watt was prevented from proceeding with his prototype engine due to lack of money. His efforts came to the attention of Matthew Boulton who initially sought to buy a Savery engine but was so impressed by Watt's engine that he entered into partnership with Watt to develop the engine and initially sell it to the Cornish miners to resolve the problem of deep mine drainage. Boulton was a man of confidence and of substance and Watt remained in awe of him throughout his life. Watt, highly inventive, but reluctant to enter into negotiations with such as the mine owners left this to Boulton. Watt was also highly touchy about any of his inventions often taking criticism as a personal insult but never to or in the presence of Boulton who left primary design to Watt although Boulton was an engineer of considerable merit himself. In later times Boulton was commissioned by the government to design new machines and oversee the manufacture of new coinage, which meant his

contribution was in determining policy and policy for the partnership and pushing Watt along.

The B&W partnership in the early days when devoted to mining engines gained their profits not from making the engines but from a certain proportion of the savings in fuel compared with the Newcomen engine (about a quarter of that used by the Newcomen engine). They entered into agreements with the mine owners for one-third part of the savings made to be paid annually to B&W for a term of twenty-five years. Alternatively, the mine owners could purchase the indemnity at ten years price in ready cash. Utilisation of the engine was determined by examination of a pendulum mechanism attached to the beam and secured within a padlocked box (A Boulton invention). Determining comparative economy for pumping engines was by measuring the DUTY. This is the number of pounds of water raised one foot in height for the consumption of one bushel of coal (84 lbs). The average duty for Newcomen engines was 5,590,000lb and for original Watt engines was 21,600,000 lbs.

Prospective customers wanted to know how many horses a Watt engine could supplant. Watt determined this by an experiment with a mine horse tethered to walk around a 24 feet diameter 2 and BD times in one minute against an average pull of 172lbs (32425 foot lbs/minute). Watt rounded this up to 33000-foot lbs/min and called this one HORSE POWER. As the duty as expressed above was independent of speed the notion of horsepower only came into its own with the advent of the rotative engine.

Boulton was incensed to find that a James Pickard had adapted a Newcomen type engine with a crank which in conjunction with a Matthew Wasborough's fly (later called a flywheel) became a rotative engine suitable for driving rotating mill drive shafts and in 1781 pressed Watt to patent methods of producing rotary motion from the Watt engine. He pressed Watt repeatedly about the matter pointing out the mine pump market was all but satisfied and mills were the future. Indeed, they should set up a manufactory to make these rotative engines forthwith and Watt had better come up with this new engine design with appropriate patent protection as a matter of urgency. (It was to take some six years).

Watt was beset with three problems. No way was he going to use Pickard/Wasbrough patent in spite of a reciprocal offer for the use of the Watt separate condenser. Watt devised a complicated sun and planet drive to rotate the output shaft. He determined that a double acting piston/cylinder was necessary to ensure smooth transmission duty each cycle of the output shaft and that long term fluctuations of power could be overcome by monitoring steam input with a rotating ball assembly using centrifugal force to adjust the steam valve.

The use of a double acting cylinder presented the most serious problem. The beam in rotating about a fulcrum produced a radial locus at the end to be connected to the piston rod whose up and down stroke is in a straight line. The single acting cylinder going back to Newcomen always applied a tension load between beam end and piston rod and was accommodated by a chain drive Certain ideas such as a rack and gear design were tried but the friction load engendered by gear pressure angle and reacted by crude slides reduced life and efficiency dramatically. All subsequent beam engines made thereafter after used the straight line motion devised by Watt which comprised a series of rods with a bearing at each end such that each when connected into a five bar chain acted as either a strut or tie with no induced bending moment in any link Watt considered his parallel motion to have been his finest invention. Boulton and Watt went into series production (around 1789) of their rotative engine with developed about 10-horse power.

Richard Trevithick, a tall, well-built and extremely intelligent Cornishman has a place in history far beyond his presence in this story. The Cornish mine owners were seeking a pumping engine far superior to the Watt engine in terms of duty, for coal was expensive and had to be shipped by sea from Wales. A Joshua Hornblower had earlier tried to defeat the Watt patent by using two cylinders at the same end of the beam as a compound combination whereby steam from one cylinder was exhausted to the other in an effort to improve efficiency. Hornblower was sued for infringement by B&W and he lost the case. Trevithick formed a lasting friend ship with Davies Gilbert who eventually became President of the Royal Society and used him to check the feasibility of various ideas. Trevithick had determined that "strong steam" was necessary (50psi) to improve the efficiency of the steam engine. That the valve admitting steam to the cylinder during the power stroke should be cut off early allowing the steam to expand and complete the working stroke. Double acting cylinders could be used without a separate condenser and what was needed was a high-pressure boiler. Trevithick invented what became known a the Cornish boiler where the boiler shell containing the water feedstock was in the form of a large tube with the furnace and grate provided by another smaller tube running down the bore of the boiler shell. Robust end plates carrying the furnace door at one end resisted the pressure end loads. Watt was well aware of the efficacy of using strong steam, the early cut off of steam to the cylinder, that a separate condenser was not necessary with a double acting strong steam engine. He devoted considerable time to discrediting Trevithicks's strong steam as it would damage the powerful market position of B&W. Patent law had restricted development of the steam engine until 1800 to B&W's advantage. However, he had been advised that as the Watt patents could be disallowed and the patents were due to expire in a few years 1800 anyway he should devote his energises to maximising the production on the rotative engines and the

collection of the royalties due from the mine owners, much of which was overdue; it is certain that Boulton concurred in this.

Meanwhile Trevithick who cared little for Watts patents and was protected by his isolation in Cornwall and the connivance of mine owners seeking a better pumping engine went ahead with what became the ultimate in beam pumping engines. Early versions of the Cornish Beam Engine as it become known, as had an average duty of 43,350,000 lbs. After 1820 around 100,000,000 lbs duty was achieved on larger engines.

The Cornish beam engine as a pumping engine has a Watt linkage at each end of the beam. At one end is a counterweighted plunger (ram) pump, at the other is a steam jacketed single acting piston/cylinder working at around 50 psi fitted with a separate condenser and is valved for expansive working during the power stroke. The installation at the Kew Bridge Water Pumping Station built around 1846 is a typical example. The plunger pump has a counter weight of 36 tons, which is lifted via a cast iron beam weighing 35 tons by a 90inch diameter cylinder with a 132-inch stroke. The ram pump which has a 38-inch diameter shaft pumps 6.5 million gallons of water from the river Thames at 4 strokes a minute.
(Ken Wheeler 2005)

Visit

Wednesday 13 April 2005 2.30pm GSK East Worthing.
Seventeen members and two wives took part in the visit to the GSK plant in East Worthing. As with previous visits to GSK we received a very cordial welcome and GSK did not stint on the time senior staff took to explain the features of the plant and to guide us.

The visit opened with a talk by Shaun Swadling, an Engineering Manager , who described the automation of the newly refurbished Solvent Recovery Plant. What seemed to intrigue members with plant automation experience was that the automation systems spanned the period from the 1970's to the present day.

After the talk, we split into groups and visited various parts of the plant in turn. Perhaps the most significant feature was the Control Room with only one operator on duty watching over a complex and hazardous factory.

To those of us who took part in our previous visits to GSK, the most surprising fact was that the advanced Combined Heat and Power Plant which we visited on 17th March 1998

soon after it went operational has now been dismantled and sold on because of a change of product mix at the factory

Favourable comments on the visit and its interest were made by all who took part.

R. Norton.

Visit
Brighton Railway Station, Sunday 6th June 2005

(The following is an extract form the notes provided by Jackie Marsh-Hobbs our guide for the afternoon. The notes were used to supplement her excellent presentation on the history of the site and the tour that followed.)

On 15th July 1837 the London to Brighton Railway Act was passed, authorising branches to Shoreham, Bnghton and Newhaven. At 3pm on 11th May 1840 the Shoreham line was opened. The following year saw the opening of the London to Brighton Line and the station, on 21st September 1841, its Italianate style station building designed by David Mocatta.

At the back of the station there were three timber train sheds, designed by John Rastrick.

London Road Viaduct took only ten months to build, and was completed on 28th March 1846. It has 27 arches in a curve of length 400 yards to a height of 67 feet and uses approximately 10 million bricks. The Lewes line opened on 8th June 1846. The engineer of the viaduct and the Lewes Line was John Rastrick

The glass roof was designed by Henry Wallis and built in 1882/3. Its two curved and parallel spans are 34m (112ft) wide; they are 175m (575ft) and 185m (600ft) long respectively rising 22m (75ft) above the platforms. A smaller roof on the east side is 14m (46ft) and 12m (36ft) with a width of 4.5m (15ft). The roof has a surface area of 5 acres. About 80 quatrefoil section cast iron columns support roof frames at 8.5m (28ft). The columns were made by Patent Shaft & Axletree in the Midlands then transported to Brighton

.

The recent renovation of Brighton Station took three years and cost £28 million. All the glass was replaced with laminated glass, which cuts down on ultraviolet rays by 99%

Goods tunnel. The goods traffic ran from the Shoreham line through a tunnel running diagonally under the passenger lines to the goods yard. It was used for twelve years as a goods tunnel, until a goods line was built along the east side of the station. The tunnel is circular, brick lined and 7m (23ft) diameter

.

Cab Run. When the Station was built on the large man-made plateau stepped into the hillside, the only access was up Trafalgar Street. So a cab ramp was added to th

e east side of the station, which gradually climbed the 32ft from the goods yard up into the station.
On 2nd August 1869 The London, Brighton and South Coast Railway opened the line to Kemptown. On 1st January 1933 passenger service was withdrawn, and the goods service survived till 1971.

On 1st September 1887 a private company Brighton and Dyke Railway opened the Devils Dyke line, and on 31st December 1938 the line closed.

The Brighton Railway Works occupied a large area between the main line and Boston Street. Maintenance first started on the London and Brighton Railway stock in 1842. Additions were added, workshops and an iron foundry. Twelve locomotives were made annually and by 1891 there were 2,651 people working at the railway works. On 20th March 1957 the last locomotive was produced, the works were closed in 1958 and the buildings were demolished in 1969.

The site was made into a car park for 900 cars, which opened in January 1972.

Outing:

Wakehurst Place and Seed-bank, 15th June 2005.

This visit consisted of a guided tour of the 'top end' of the gardens and this was followed by free time to explore other parts of the garden, visit the house and /or visit the seed bank. On arrival at Wakehurst it seemed that the weather might conspire against us for a dry afternoon, but by the time we met our guide the weather was fine and we were all able to enjoy a very pleasant stroll around these magnificent gardens. Our Guide was very knowledgeable and interesting to listen to as he led us around the garden pointing out the many interesting species of plant and discussing soil conditions, plant origins, the work at Wakehurst, etc.

Outing

Duncton Croquet Club 13th July 2005

Duncton Croquet Club members did a superb job trying to educate us into the skills of the game. Those of us who had 'attempted' to play before were given instruction and led through 'proper' games of croquet, while those of us who had never even handled a mallet before, were given basic instruction and encouraged to play a simpler form of croquet, 'golf croquet'.

We all had a thoroughly good time; even our few spectators enjoyed getting a suntan on what must have been one of the hottest afternoons of the summer. After two hours or so of play, we adjourned to the adjacent Village Hall for a superb tea of sandwiches, fruit, and homemade cakes. Some members resumed play after tea for a short while.

REPLYSLIP:

To: B. Buckroyd,
6 Fosters Close, East Preston, BN16 2TL Tel: 01903 784926

VISIT ONLY REPLY SLIP

Please reserve.....……..places for me to visit **Chichester Cathedral 11.00 am. Tuesday 20th September .**

I enclose my cheque for £.....……..(£3 per person) payable to R.C.E.A.

NAME .....(Block capitals)
Address:
.....
.....
Phone No.....

Applications by 1st September 2005 **(Separate cheque please)**

To: B. Buckroyd,
6 Fosters Close, East Preston, BN16 2TL Tel: 01903 784926

VISIT INCLUDING CLIMB TO THE TOP OF TOWER, REPLY SLIP

Please reserve.....……..places for me to visit **Chichester Cathedral, 10.00 am. Tuesday 20th September .**

I enclose my cheque for £.....……..(£11 per person - £8 for Tower and £3 for Cathederal Tour at 11 am) payable to R.C.E.A.

NAME .....(Block capitals)
Address:
.....
.....
Phone No.....

Applications by 1st September 2005

(Separate cheque please)

To: Colin Pilling,

84, Marine Crescent, Goring by Sea, West Sussex BN12 4JH

I/we wish to join the outing to **Denbies Wine Estate, 2.00 pm. Wednesday 28th September.**

Full name:.....…….....(Block capitals)
Address:
.....
Phone Number:.....
Number of Persons:.....…..
Applications by 21st September 2005.

I enclose a cheque made payable to RCEA for £.....for the above-mentioned persons, (£9.50 per person).

(Separate cheque please)

To: B. Buckroyd, 6 Fosters Close, East Preston, BN16 2TL
Tel: 01903 784926

Please reserve**.....……..**places for me at **the 54th RCEA Dinner on Thursday the 13th October 2005 at the Beach Hotel, Worthing.**

NAME .....(Block capitals) Phone No.....
ADDRESS ……

My guests will be.....…….……
I/we would like to sit with…….

I enclose my cheque for £.....……..(£25 per person) payable to R.C.E.A.
MENU CHOICE:
Number of melon…… Number of soup…….
Number of Christmas Pudding …… Number of Fresh Fruit Salad ……
Number of Cheese and Biscuits ……
Vegetarian Request …….

Applications by 1st October 2005

Intentionally

Blank

To:- Richard Norton
106 Wallace Avenue, Worthing BN11 5QA

I/we wish to join the visit to **The Argus Newspaper Offices, Brighton**, 1.30 pm. Wednesday 26th October.

Full name:.....(Block capitals)
Address:
.....
.....
Phone Number:.....

Number of Persons:.....….. Name of Guest ……..

Wheelchair access required Yes / No: Applications by 19th October 2005.

Reply Slip: -

To: Ray Wort, Sylvan Glen, Longlands, Worthing, BN14 9NS
Tel: 01903 217747

Please reserve **.....……**places for me at the **RCEA Christmas Lunch**, 12.00pm for 12.30 pm, Wednesday the 14th December 2004, at Highdown Towers, Worthing.

I enclose my cheque for £.....…….…… .(£14.50 per person) payable to R.C.E.A.

NAME.....(Block capitals)
PhoneNo.....……

No. of Starters 1).Soup…….2) Pieces of Melon and pineapple……
3) Prawn Cocktail ……
No. of sweets 1).Christmas Pudding……..2) Chocolate Junk Yard……..

Applications at the very latest by 1st November 2005
