



Lichfield Science & Engineering Society

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Dear Member,

December 2019

Welcome to my Christmas Newsletter which comes with my very best wishes for a Happy Christmas and a successful and healthy 2020.

Thank you all for completing and returning your membership renewal forms to comply with GDPR legislation and for your subscriptions and donations to the Education Fund. These allow LSES to continue to offer good lectures, visits, discussion lunches, a dinner and a supper, regular newsletters, a good website, and email information about all our events. Organised by a busy committee who all deserve your thanks. Very good value for your £30 membership subscription.

LECTURES:

Wednesday 11th September 2019: The 2019 Paul Bettson Lecture “Life at 33,00ft: The Future of Engine Technology”

Dr Alan Partridge, Head of Materials Technology, Rolls Royce plc

Alan gave us a glimpse of the increasing challenges to be met in the engines which power civilian aircraft. More efficiency favours larger lower speed fan blades and smaller and hotter gas turbines with the aim to improve performance by 20 to 50%. Modern fan blades are based on hollow, lattice-braced titanium forms, but lighter blades are being developed using fibre reinforced composite blades with titanium leading edges.

Modern turbine blades are made of single crystal nickel alloy with internal cooling passages and have ceramic barrier coatings, these operate at about 200C above the melting point of the alloy. Even hotter temperatures could be achieved with ceramic turbine blades which are lighter in weight and developments are taking place to reduce their brittleness and prove their use.

Engine design changes are being developed to achieve lower fan speeds entailing the use of a large gearbox between the turbine shaft and fan shaft. Hybrid electric propulsion aircraft using motor driven fans to drive the aircraft are now at the demonstrator stage.

141 members, 4 students and 2 visitors attended this lecture.

Wednesday 8th October 2019: “Element Tales: Stories from the Periodic Table”

Professor Mark Lorch, Department of Chemistry, University of Hull.

2019 is the International year of Dmitri Mendeleev’s Periodic Table on its 150th anniversary, originally arranged in vertical groups. But earlier, in 1661, Boyle had recognised the importance of elements which can be grouped together with similar properties.

Dalton in 1808 recognised the indivisible nature of atoms and elements which join up to form compounds as many new elements were being discovered. Mendeleev in 1861, with a set of cards each with an element and its properties and atomic weight, recognised how elements could be grouped together in lines with similar properties, showing gaps where elements were missing and was able to predict the properties of those missing.

Henry Moseley was finally able to show how the elements could be correctly arranged in atomic number order which defines the atomic structure of the electrons.

Mark told us tales of Gallium, which melts at body temperature hence Yuri Gellers spoon, of how Uranium colours glass green which fluoresces and the work of Marie Curie to discover Polonium and Radium.

There are now 118 elements. All above Uranium (No 92) are created artificially by bombarding lighter ones and the naming of these new elements has been a cause of international tension between East and West, but all is agreed now.

144 members, 6 students and 10 visitors attended this lecture.



**Wednesday 13 November 2019: The 30th Erasmus Darwin Memorial Lecture
“Thinking the Unthinkable: Influenza Pandemic Preparedness and Response”**

Given by **Professor Jonathan Van-Tam, Deputy Chief Medical Officer for Health for England.**

Jonathan started by telling the audience that an influenza pandemic is the single highest risk to public health in England. It would be caused by a new, recently transformed virus not previously capable of spreading to mankind. No-one would have any immunity and about 30 to 40% of the population could be infected in a number of waves of respiratory infection.

The 1918 pandemic was the worst the world has seen with 20 -40 million people dying, but there have been smaller pandemics in 1957, 1968, 1989 and 2009 and it is by studying these that conclusions have been drawn as to how best to protect the public

Influenza is spread across the population especially through children but the health risks are most serious in people over 55, which is why both groups as well as health workers are vaccinated with the expected strain of vaccine each year

Good personal countermeasures to its spreading include copious hand washing, self isolation and wearing of face masks for the infected, and good manners such as not sneezing in anyone’s face, fine droplets from a sneeze carry widely and are very infectious.

The incubation period is 36 to 72 hours which means that that people carrying the virus can travel without detection and so the spread is quite rapid. Injections with anti-viral medicine such as Tamiflu do give some benefit as it reduces the severity but does not prevent influenza.

Jonathan answered questions from the audience and said the take up of Flu vaccinations in the UK was about 70% of those eligible, which is much better than most other EU countries.

This public lecture held in the main theatre was attended by 175 LSES members, 86 members of the public and 67 students from local schools

Wednesday 4th December 2019: “Can we Repair the Brain”

Professor Roger Barker. Department of Clinical Neurosciences, University of Cambridge.

Roger started by explaining that degenerative disease of the brain involves inflammation of particular areas, either of the brain cells themselves or the cells which support them. To grow more cells where they are being lost could be achieved by either using fertilisers (growth factors) which help cells grow or by planting new cells in the area.

His research has focussed on Parkinson’s Disease which is normally not hereditary and Huntington’s Disease which is. He explained that loss of dopamine cells in the area of the brain concerned with movement is the cause of Parkinson’s Disease, and diagnosis is by analysis of the symptoms rather than with any clear clinical analysis except brain scans.

Patients can be divided into two groups, those who are diagnosed early and were probably younger and those whose disease had progressed more and who were older. Those in the first group respond to current treatment because they have more dopamine cells to support

Treatments using growth factors to increase the number of dopamine cells did not work reliably, though there was some random improvement

The most promising treatment relies on infusing stem cells into the correct area of the brain. Several types of stem cells have been tried and clinical trials on a few patients are being carried out, and the prospect is that a reliable procedure will be established.

Roger answered 45 minutes of questions and Carol proposed the Vote of Thanks.

Held in the main theatre and attended by an audience of 152 members, 12 students and 15 visitors.

ANNUAL DINNER:

Wednesday 16 October 2019, held at Aston Wood Golf Club. With an After Dinner talk
“Bringing a Slice of the Ocean to the Midlands”, given by **Mr Jonny Rudd, Curator Birmingham Sea Life Centre.**

88 members and their guests enjoyed a splendid three course meal.



Lichfield Science & Engineering Society

This was followed by a presentation to our retiring President Professor Peter Lambert and his wife in grateful thanks for his two years in office. He then passed the LSES jewel to our new President Professor Carolyn Roberts whom we welcomed into office.

Jonny Rudd trained as an aerospace engineer so he is well capable of dealing with the labyrinth of pipes, pumps and 60 tanks which make up this giant display of marine life containing more than a million litres of sea water. A tanker of 40,000 litres of fresh sea water is delivered each week to support the purification system which enables the creatures to prosper in their marine habitat.

But Jonny delights in the marine life that he supports and is excited by new sea creatures he is able to bring to Birmingham. He is especially proud of a new display facility for the two Alaskan sea otters, which are part of a world wide effort to support the species and which are the only sea otters in the UK.

Birmingham Sea life is the most visited aquarium in the UK, funded by Merlin Entertainments and supports the Sea Life Trust charity to which LSES made a donation in support of their work.

VISITS:

Tuesday 10 September 2019: Visit to Biffa PLC, Aldridge

The group of 9 members was given a detailed tour of this large recycling facility by the Engineering Manager and Health and Safety Manager. The plant is an intermediary, taking already sorted plastic, glass, steel and aluminium, from an initial sorting facility which handles our “blue bin” materials.

The raw material arrives in bales, which are then broken down and the material fragmented and sorted – plastic by the use of a Near Infra Red Unit (which has the ability to segregate a wide range of different plastics), aluminium by eddy current and steel by magnets.

The material arrives from all over the UK, but 75-80% of the material handled in this particular facility is plastic. Once the plastic has been sorted, it is re-baled and sent for reprocessing into pellets, which are then used to manufacture new plastic packaging. It was interesting to learn that most recycled plastic milk bottles are used to manufacture new bottles.

Saturday 2 November 2019: Visit to Total Sim, Catesby Tunnel Project

30 members were warmly received with hot drinks, having travelled through bad weather, to reach deep rural Northampton. We were initially given an informative slide presentation by Rob Lewis, Managing Director and the entrepreneurial brains behind the Project. The former rail tunnel is set to become the world’s premier full scale, real time vehicle testing facility. It is 2740 m long, with a 40 m² working section and is perfectly straight, with a gentle 1:176 constant incline. The tunnel was opened in 1897 and closed in 1966, having taken 3 years to build, with 30 million bricks.

The facility will provide complete confidentiality for automotive companies to test new vehicles and is planned to become operational in late 2020. So much international interest has been generated that an unnamed Japanese automotive manufacturer has taken a 25% stake in the project.

We were given a guided tour inside the tunnel by Alex Cundy, Operations Manager of Stepnell, the construction partner. We were taken several hundred metres inside the tunnel, past two of the original construction shafts. The Society has been offered a return visit once the project is completed.

Thursday 7 November: Visit to Ideal Standard (Armitage Shanks), Armitage

20 members attended the visit to this mass producer of ceramic basins (35% of production), bowls (22%), pedestals (15%) and tanks (28%). Before going on the shop-floor, we were given a detailed presentation by Sue Izon, Health, Safety and Environment Manager. The plant manufactures over 1.1 million units per annum, employs 300 personnel and covers 35 acres.

The site has a rich history with production of earthenware sinks and bowls commencing over 200 years ago. The production process follows a standard routing – 1) mixing of raw materials 2) casting 3) drying 4) glazing 5) firing.

After the presentation, we were split into 2 groups and given a thorough tour of the plant. A large part of the casting process is semi-automatic, with 10 in-line moulds and robot removal of product. It was particularly interesting to see robots handling clay products without damaging the surface. The total processing time is approximately 3 days from raw material to product out of the door, with the longest



Lichfield Science & Engineering Society

times at drying (9 hours) and firing (28 hours). A very professionally organised visit was rounded off with some tasty nibbles and drinks

Wednesday 27 November 2019: Visit to the National Transport Design Centre (NTDC), Coventry University:

20 members were warmly received by David Wright, Director of the Centre. The visit started with a presentation by David, explaining the Centre's vision of providing "safe and sustainable transport solutions fit for the cities of the future". This is a unique facility in the UK and is the largest design based studio in Europe. The NTDC explores new areas of transport design research and finds new ways to use existing equipment, as well as creating new technologies. David explained some interesting points about increased motion sickness associated with autonomous vehicle development, and that facing backwards increased the risk of motion sickness by 75%.

Following the presentation, we were divided into small groups and shown three development areas by a team of young enthusiastic engineers – 1) the development of Air Taxis 2) use of virtual reality in the development of transport solutions 3) modelling of a powered light vehicle.

DISCUSSION LUNCH:

19 September 2019: Erasmus Darwin House. Palm Oil – The Debate

26 members enjoyed an excellent lunch. This was followed by an introduction on Palm Oil by Mark Hambly who had visited Palm Oil plantations in Malaysia. This oil is the most widely used vegetable oil in foodstuffs, cosmetics and many other products. Palm Oil trees are very productive and their growth provides employment in many low income nations. Palm tree cultivation has been the cause of the destruction of enormous areas of tropical forest and loss of habitat of endangered wild animals.

WWF, producers and users have set up an organisation called Roundtable of Sustainable of Palm Oil (RSPO), which now represents 20% of world production, to minimise the environmental damage and provide good employment. But more international regulation is required as Palm Oil production is still increasing and spreading to rain forests in more countries.

This newsletter is accompanied by a list of members who have agreed to have their membership published, also the Programme of Visits for the period until May 2020 and details of a Discussion Lunch in February.

May I wish you all Season's Greetings and I look forward to welcoming you back to our lectures and activities in 2020.

Very Best Wishes

Bob Giles
Chairman & Membership Secretary