

Reorganisations at The Institute of Materials.

As some of you may be aware there have been a number of changes within The Institute of Materials. The staff hierarchy has been streamlined to make it easier for both members and staff, and full details are laid out in Materials World on pages 44 and 45 of issue 8 (August 2000). In particular the Education Manager, Martin Stammers, retired at the end of May. His duties have been passed to Peter Davies, the Regional Consultant for what was formally the North East Region.

Peter is going to be very busy because he has also taken over responsibility for some areas on the other side of the Pennines! The North West, North East and Scotland regions have also been reorganised. Peter now covers Yorkshire, Lancashire, Manchester and Liverpool, whilst John Wilcox takes control of Cumbria, Cleveland and Tyneside as well as his original duties in Scotland and Ireland. The South West and Midlands remain in the hands of Jennifer Keeble and Sarah Boad respectively. All four regional consultants are there to help you get the most from the Institute, so make use of them. Their contact details are shown in the box down the right hand side.

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Leeds Materials Go Back to School!

It was the day Dr. Bromley got sent back to school! Not because the grey matter was in need of some refreshing (although it probably is!), but for a careers exhibition, with a textiles emphasis, at Rhodesway School in Allerton, Bradford. Now it can be competitive at these exhibitions, with various people bringing in attractive exhibits to bring attention to their stand, however, when the Bradford



Bulls arrive with the Rugby League Challenge Trophy, your samples of artificial hips and knees face tough competition! None the less, a good afternoon was had by all, students and exhibitors, with plenty of opportunity to discuss applications of Materials and possible Careers.

Perhaps such an event would be useful for your school?

(Left: Bradford Bulls with the Cup!)

The Department also opened its doors again for the University of Leeds Open Days (May 10th and June 22nd), with over 200 visitors to the Department over the two days. Visitors were treated to demonstrations and exhibits around the School of Process, Environmental and Materials Engineering, of which Materials is a constituent department. Exhibits covering, for example, the entire bible printed on a single sheet of paper, smashing steel, injection moulding, the environment, renewable energy etc, etc. It was also time for another 'whodunit?' with those rogue characters, Rhoda (Harley) Davidson, Des Haster, Johnny 'Fish Face' McGraw, Tex Nolagee, Eddy Slime, Sid Slugger, Miss Trust and Claire Voiante lurking around the Department. If you would like to try and solve the murder contact Dr. Bromley at a.p.bromley@leeds.ac.uk for the details or phone 0113 233 2362.



Left: Dr. Bromley tries not to put off the 'customers' with too much descriptive detail about the use of artificial artery materials.

Right: Firstly, there was nobody. Then all of a sudden.....



.... everybody turned up (Left: Dr. Bromley arrowed!)

4th year Projects in Oxford; applying the theory in practice

One of the most important components of the Oxford Metallurgy and Science of Materials course is the 9 month research project undertaken in the 4th year as a full member of one of the research groups in the Department. This is a very popular part of the course, allowing students to select projects from a wide range of topics. Recent students have chosen to work on a variety of industrially related projects, making a very practical use of understanding gained in their lectures and tutorials. Many of the projects result in publications in scientific journals, and a significant number of patent applications have been filed as a result of discoveries made by 4th year students.

A few recent projects (all carried out in collaboration with major industrial partners) show the diversity of subjects a Materials student can study:

- ❖ How can the performance of food packaging be improved?
- ❖ The growth of metal particles in alumina for optical storage materials.
- ❖ Displays from diamond - can they work?
- ❖ Controlling surface quality in aluminium extrusions.
- ❖ Quality control in high temperature super-conducting tapes.

New Facilities for Oxford Materials Department.

On the 186th of June 2000, the Minister of State for Science and Innovation, Lord Sainsbury, opened a major new facility for the Oxford Materials Department. The Begbroke Science Park is on a 5 hectare site just outside Oxford City, and contains 3,500 square metres of new laboratory space for the Materials Department as well as several smaller units for start-up companies - many of them commercialising Materials-based technologies developed in the University. The new laboratory space allows the Materials Department to expand both its basic scientific research and to hugely increase our existing commitment to collaborative research with industry.

Research into novel materials and new processing techniques requires a very wide range of industrial-scale equipment and the facilities to analyse the structure, chemistry and properties of the novel materials fabricated by these new processes. The Materials Department has located in the new Begbroke facility some of its state-of-the-art electron microscopes, atom probe microscopes for sub-nanometer chemical studies of materials as well as the archeometallurgy unit that specialises in the analysis of the structure and technology of ancient artefacts. In addition, major new processing facilities are soon to be installed in collaboration with multinational companies like Luxfer and Ford. The rapid forming of tools and dies for the automotive industry directly from a stream of liquid steel is one particularly exciting project with huge industrial potential, but asking some tough scientific questions as well!

New equipment for the deposition of multilayer coatings onto polymer films will also be installed to develop transparent moisture barriers. These are a vital component in reliable polymer displays - one of the most attractive new ways of achieving cheap, large area screens for televisions and computers. Another unique piece of equipment in the UK will be a special spectrometer designed for the analysis of trace elements in semiconductor materials, but intended in Oxford for the analysis of how critical trace species like Mg^+ and Ca^{2+} are exchanged across biological cell membranes.

In the future, 4th year students in Oxford will be able to choose research projects that make use of all these new facilities in the Begbroke Laboratories - and thus to work on problems of industrial relevance and importance using the very latest equipment. We are looking forward to some exciting discoveries over the next few years!



Materials in Action at The University Of Birmingham

July was a very busy time for schools liaison in the School of Metallurgy and Materials at the University of Birmingham.

The Centenary Science Fun Fair kicked events off to a flying start with over 20,000 people visiting the University over the two days. Hundreds of school children visited the School of Metallurgy and Materials where they could take part in interactive demonstrations of materials in action, from the very cold levitating train (based on superconductivity) to the very hot space shuttle tile.

The following week, 29 Year-12 students descended on the School for

the annual Sixth Form Course – “What is Materials Science?” The course, which gave students the chance to experience the world of materials science first hand and live in student Halls of residence for four days, was a great success with many of the delegates expressing a serious interest in pursuing a career in the field.

Figure 1, (above) “Even the safety equipment could not spoil the fun.”



Figure 2, (right) “Materials testing with a difference: making a stretcher out of wallpaper!”

Three younger groups of budding engineers enjoyed one day workshops in the School, run in conjunction with the COMO project (Challenge of Materials on-line) at the Science Museum. The pupils had the chance to carry out tensile and impact tests and then write up their experiments in the form of a web page. For more about the COMO project go to www.nmsi.ac.uk.

Figure 3, (below left) The COMO workshop proved a great success for everyone involved. Figure 4, (below right) The results of this experiment are now on line thanks to the COMO workshop.



If you would like more information about activities and events in the School of Metallurgy and Materials at the University of Birmingham, please contact Diane Talbot, Schools Liaison & Recruitment Officer, School of Metallurgy and Materials, University of Birmingham, Edgbaston, Birmingham, B15 2TT. D.Talbot.1@bham.ac.uk

New Programme at Leeds: Automotive Materials Engineering

The Department of Materials and the School of Mechanical Engineering, at the University of Leeds, have combined their expertise to produce a new and exciting MEng degree programme 'Automotive Materials Engineering', which will have its first intake of students in October 2001.

Materials Engineering has an important role in the automotive industry, from the high technology racing car through to the more familiar road car, from performance through to economy. We have major manufacturers producing concepts for the future such as the 'Ecobasic' from Fiat, which concentrates on fuel economy (through light weight) and ease of production, including an aluminium space frame, plastic panels and even plastic windows. At the other end of the scale there is Formula One, looking for an extra edge, for example, taking carbon-carbon composite brakes from aircraft. These examples represent extremes in the automotive industry but both present high technology challenges, exciting and rewarding for the motivated engineer. By combining important aspects of Materials Engineering and Mechanical Engineering in a single degree programme the aim is to produce graduates in an excellent position to pursue careers in the automotive field.



The programme provides a broad-based education in both automotive and materials engineering designed to meet the needs of industrial employers. With options at all levels of the programme students may choose to specialise in combustion and engine technology, in materials engineering or in sensors, actuators and mechatronics. In addition to the core academic content in the specific subject area, students will receive an introduction to management, industry and professional development, comprehensive development of transferable skills and the opportunity to study a contemporary European language.

The programme includes both individual and group project work. The design and research projects, together with the Advances in Engineering Materials module, will bring the two disciplines together as they are focussed on the application of materials science and engineering in the automotive industry.

For further information contact the programme manager Dr. R. Gee, Department of Materials, University of Leeds, Leeds LS2 9JT. e-mail r.gee@leeds.ac.uk.

The careers website.

Thank you to those of you that contacted us about problems with the careers website. This month it is being relaunched and the web address has changed to:

www.materials-careers.org.uk

Try it out and let us know if there are any improvements that would help your careers department in their job. This service is only as good as the information on it and you know best what your pupils need and where their questions most often focus. Please help us to help them.

Pass it on.

Is your school making the most of its membership of the SAS? One science teacher involved in the scheme made the following comments:

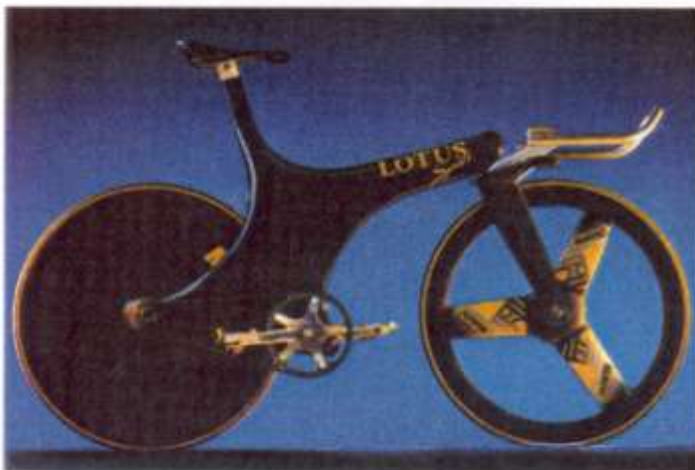
"I have found it very interesting and have made the most of it by passing it onto the CDT dept. They have also made full use of some of the free posters and the CD-ROM and teaching material we have been sent."

The scheme is designed to be of use in teaching science, technology and careers, so make sure you get full value for money and use it as widely as possible.

New Degrees in Sports Engineering and Sports Technology at the University of Bath

Sports engineers and technologists make major contributions to almost every aspect of sporting achievement. This year at the Sydney 2000 Olympics there were a number of examples of sports design and technology to look out for:

- Bodysuits are now commonly worn in swimming. This new swimsuit design includes the use of a fabric designed by marine biologists known as 'Fastskin' which is claimed to decrease drag by 3%. The swimsuit material is said to mimic the effect of shark skin by being covered with small indentations resembling tiny hydrofoils to reduce water turbulence.
- In sports equipment advanced materials are playing an increasing role in reducing weight and improving properties over existing materials. Materials developed for aerospace applications with high specific strength and stiffness are being utilised, such as Al-alloys, Ti-alloys and carbon fibre composites. Examples include high stiffness lightweight bicycles, tennis rackets and composite pole vaults with high strength, stiffness and resistance to twisting.
- Javelin design has changed to make throwing technique more important than power. Due to the limited distance within 400m running tracks, javelins were landing dangerously close to the tracks. A new design is now used; requiring a more sophisticated throwing technique and a changed weight distribution prevents the javelin from 'floating'; shortening flight distance.
- Sprinters are starting to wear body-hugging outfits made of Lycra and silk to reduce wind resistance. Even sprinting shoes with several internal chambers inflated with a hand-held canister of carbon dioxide have been used.
- In the last winter Olympics speedskating took on entirely different look and sound due to the development of the 'clap skate'. A spring-loaded hinge on the skate allowed the blade to stay on the ice longer, allowing greater speeds to be attained. Five world records were broken.



- A high level of importance is placed on technology in cycling. Aerodynamics and equipment design is being utilised for the development of wheels, handlebars, silk tyres filled with helium and aerodynamic shaped helmets. *Figure 1 left, shows Chris Boardman's Olympic Gold Carbon Fibre Bicycle. (Photo courtesy of Lotus Engineering).*

Further information on the impact of advanced materials and design in sport can be found in an excellent article at <http://www.tms.org/pubs/journals/JOM/9702/Froes-9702.html>. In view of increasing

developments in design and technology in sport, the University of Bath now offers degrees in Sports Engineering and Sports Technology to provide an education with common themes of sport, engineering science, design, manufacture and materials.

For further information on degrees in Sports Engineering (MEng and BEng) and Sports Technology (BSc) contact:

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Email: c.r.bowen@bath.ac.uk or visit <http://www.bath.ac.uk/Departments/EngAppSci>.

Materials Science and Engineering, Swansea

Materials Science and Engineering at Swansea offers a wealth of opportunities for sixth form A-level students. In Swansea, a centre of excellence in Materials has developed innovative undergraduate degree programmes which train high-calibre materials graduates for future career success in industry, academia and the public sector. Moreover, world-leading research centres are generating the knowledge needed to evolve the industrially applicable materials technologies essential to UK wealth creation.

Many national indicators and awards demonstrate the excellence of the research and training achievements. These include:

- i) The Quality Assurance Agency awarded an "excellent" rating for Teaching.
- ii) The Research Assessment exercise awarded the highest possible 5*A rating, and
- iii) The outstanding quality of the postgraduate training and research was recognised with the award of the 1998 Queen's Anniversary Prize. See Issue 2 of the SAS newsletter.



Schools Liaison and Prizes

Increasingly, students from schools and colleges are taking the opportunity to obtain a taste of university life through formal and informal study programmes. In addition to supporting national schemes such as the 'Engineering Education Scheme, Wales' and the Royal Academy of Engineering sponsored 'Headstart', one day visits and residential courses are organised regularly.

The recent "Materials in the Millennium" competition attracted entrants from schools across the UK. The winner of the competition, Gillian Warwick won £500 for herself and £500 for Amman Valley School. Gillian's entry outlined how materials developments were vital to future transportation. Runner-up in

the competition was Jim Mason of Bishop of Llandaff High School who won £200 for himself and £200 for his school. Professor Jonathan Parker, Head of the Department of Materials Engineering, Swansea, is seen (*above*) presenting cheques to Gillian Warwick and Roger Thomas of Amman Valley School, and (*below*) Jim Mason of Bishop of Llandaff High School. For those who are interested in entering this year's competition, details will be published in September.

Scholarships

Recognising that Swansea materials graduates have the attitude and expertise vital to industry and commerce, numerous student scholarships are available. For undergraduates, these include entrance level, valued from £500 to £1,500 supported by organisations such as 'The Worshipful Company of Armourers and Brasiers'. Sponsorship in Year 2 is available to gain industrial experience, for example £1,000 scholarships and vacation placements are supported by a broad range of companies including Rolls-Royce, Corus, Powergen, Alcan, 3M and Timet.

Overseas Links

Students benefit enormously as a consequence of the international profile of the Department. Not only are formal training opportunities available with key universities in North America and Australia but many students take advantage of financial support for overseas vacation placements. In addition to formal schemes such as IAESTE, awards are available which allow students to take advantage of individual initiatives.



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Spotlight on Work Placements.

In today's competitive job market, students that can show experience of working in a technical capacity have a distinct advantage. Accordingly, University courses that include an element of working within industry are extremely beneficial to the student, and so are becoming increasingly common. Here are some comments from one department that arranges work placements for all its undergraduate students.

Students at the School of Metallurgy and Materials at the University of Birmingham are required to carry out vacation work for a minimum of 10 weeks during their second-year vacation. The objective of the work placement is to allow the student to gain some industrial experience to complement his or her academic studies. Although this is a mandatory requirement for the awarding of a degree, students invariably welcome the opportunity and challenge of experiencing a working environment.

On return to University the student has to submit a report that:

1. Outlines the company's technical activities.
2. Describes the way in which the company is organised.
3. Gives an account of the work that the student carried out.

This ensures that the student considers the overall working of a company and examines how their contribution fits into the running of the company.

The company is requested to provide feedback on how the student has performed, and this is followed up by asking his/her supervisor to complete an assessment form asking them to grade the student's performance in terms of

- (i) effort and commitment
- (ii) competence
- (iii) integration with the organisation

Although the marks awarded make only a small contribution to the total mark for the final degree, evidence of a good report from these employers can be of considerable benefit when applying for a job after graduation.

Historically students have benefited greatly from their vacation work experience and return to University more mature and motivated for the final year.

Additionally, supervisors comment that the students have made a useful contribution to the company. The students are usually enthusiastic and keen to get a good report, and the supervisors invariably take an interest in the student, thereby gaining satisfaction from contributing to his/her development.

The projects undertaken vary considerably and recent examples include:

- a small research project in an Aerospace Company such as Rolls-Royce
- potential developments in the automobile industry with Jaguar
- investigating production problems that a company is experiencing in casting car engine blocks
- laboratory testing of the properties of various metallic alloys, ceramics, plastics/composites and examining the structures of these with a microscope
- compiling computer programmes and data that improves the company's control of its functions,
- shop floor activities during the summer holiday period.

We try to ensure that the abilities of the student match the type of company and work that he/she is required to do, so that the vacation work is enjoyable and successful for both the company and the student.

Students apply to the companies involved and are interviewed for the vacation jobs, which are paid at a commercial rate. Debriefing forms completed by students on return to University show that they find the experience rewarding and each year some students are offered a job on graduation, sometimes with sponsorship for the final year.

Thank you Corus!

As most of you will know Corus have been very supportive of the Schools Affiliate Scheme, and have sent out extra resources to member schools. These resources are in addition to those provided by The Institute of Materials as part of the membership subscription. Corus have now generously decided to increase the value of these resources to over £25. All new members will receive copies of The Steel Story, posters, and books covering environmental issues, iron and steel, and the motor industry. Existing members will not lose out, as Corus will be sending top up packs to all these schools as well.