

The Schools Affiliate Scheme is intended to be of benefit to several departments within your school and so with effect from this issue we shall be sending you three copies each term.

Please share these additional copies with your colleagues. Materials related topics are found in Chemistry, Physics and Design / Technology, so it is important that all departments are aware that your school is a member of this scheme so that the benefits to you, your pupils and your colleagues can be maximised.

You may find you have more in common that you realised!

Likewise materials can lead to many interesting and challenging careers, so your careers department should be encouraged to take a look at some of the articles in the newsletter.

Often students wish to pursue a career that may be more academically challenging than they are capable of, and it is important that they are given viable alternatives which maintain their original career interest but are more suited to their own abilities. One good example of this is the Biomaterials course offered by many Universities and suitable for pupils whose original career choice was dentistry or medicine.

The Institute of Materials

1 Carlton House
Terrace, London
SW1Y 5DB

Tel 0171 451 7300
Fax 0171 839 1702

Website:
**[http://www.
instmat.co.uk](http://www.instmat.co.uk)**

Ruth Withey
Scheme
Co-ordinator
01454 882577
**[ruth.withey@
virgin.net](mailto:ruth.withey@virgin.net)**

Corrections

In our list of university contact details on page 8 of the last issue of the newsletter there were two errors. Our apologies to all concerned.

Leeds University:

Rik Brydson's phone number is 0113 233 2369

Surrey University:

The internet address should be **www.surrey.ac.uk/MME** the last three capital letters are essential as WWW addresses are case sensitive.

What's inside

| | |
|-----------------------------------|-------------------|
| <i>Careers.</i> | <i>page 2</i> |
| <i>Design in your Life.</i> | <i>page 3</i> |
| <i>Experiment.</i> | <i>page 4</i> |
| <i>Techniquiest.</i> | <i>page 5</i> |
| <i>Course Texts.</i> | <i>page 6/7</i> |
| <i>Murder Mystery.</i> | <i>Page 8/9</i> |
| <i>UCAS Conventions.</i> | <i>page 10/11</i> |
| <i>Armourers and Brasiers Co.</i> | <i>page 12</i> |
| <i>Materials World.</i> | <i>page 12</i> |

ON A ROCKY ROAD!

John graduated with a degree in Materials Science, from the University of Leeds, Department of Materials, in 1988 and then obtained a PhD in Polymer Physics, also at the University of Leeds. During his PhD John took the opportunity to travel to several conferences both in Europe and in the USA. After his PhD he obtained a Masters of Business Administration from the University of Illinois, USA. He then secured a position with Andersen Consulting at their world headquarters in Chicago. Four years on, he is now a manager in their Electronics and High Tech Business Unit.

| | |
|------------------------|---|
| Name: | John Clarke |
| Qualifications: | BEng 2(i) (Hons). PhD: Polymer Physics |
| Employer: | <i>Manager</i> <i>(Electronics and High Tech Business Unit),</i> <i>Andersen Consulting, Chicago, USA</i> |

John has held a variety of roles since joining Andersen Consulting. At his first client John worked with a team of product developers on a new jet aircraft development programme. They succeeded in reducing product development time by 50 percent and costs by 30 percent. 'It was very rewarding to see the first plane roll off the production line this year.'

John has travelled and worked extensively in the USA and will be working in Paris in the next twelve months. He finds that consulting offers the challenge of constantly changing job requirements and a high level of job satisfaction.

John is married to a native Chicagoan; they live with their two children in a leafy suburb just outside Chicago.

Design in your Life

Teachers Guide

Five full colour posters, a 32 page (black and white) photocopiable booklet of student activities, teachers notes and information on links to the National Curriculum.

Our opinion.

Well laid out and easy to follow. The student booklet is packed with ideas for interesting activities and encourages reference to, and use of, the posters to help pupils discover for themselves. There are plenty of pictures and diagrams to illustrate the many different ways something as simple as, say, a gear can be used, and the variety of activities and information allows you / your pupils to pick areas of specific interest.

Divided into 5 sections covering:

- 1) Transport - introducing design ideas and research finding
- 2) Frameworks - follow work from the transport section, showing how and why different frameworks are used in different situations
- 3) Mechanisms - levers, gears, pulleys, linkages
- 4) Systems – especially electronic and control systems
- 5) Product Packaging – the materials, size and shape used and the reasoning behind these decisions. Marketing also covered.

Cost : £7.50 including postage and packing.

Contact: The UK Steel Industry Education Service,
PO Box 361,
Stockton on Tees,
TS23 4YE

Tel 01642 566 888 Fax: 01642 561 888

E-mail : uksteel.ed@aes.co.uk

KS 4 (Design and Technology) but similar packs are available for ages 4-7 and 7-11, and GNVQ Business Advanced.

Good Points.

- Very good value for money.
- Use of cartoons and drawing helps explain and demonstrate underlying principles clearly.
- Posters designed to stimulate ideas.

Warning comments.

- Allow plenty of time to prepare / organise activities as many require additional materials.
- Pupils will need to be able to refer to a wide range of other sources for information.

These booklets would not be available but for the commitment and generosity of the following:

Allied Steel and Wire Ltd

Avesta Sheffield Ltd

British Steel plc

Glynwed Metals Processing Ltd

Sheffeld Forgemasters Ltd

Unscos Steels Ltd

Steel Industry National Training Organisation

ASW Sheerness Steel

Bridon plc

Caparo Group Ltd

ROM Ltd

Tinsley Wire Ltd

National Association of Steel Stockholders

UK Steel Association

Course Texts

Whilst many publishers include a section on materials in their text books on chemistry or physics there are some publications available which look specifically at the materials element of the syllabus and are worth considering. Below are a selection produced by Longman.

For a catalogue, price details or free inspection copies contact www.longman.co.uk, telephone free on 0800 579579 or email them at schools.enq@awl.co.uk

SCIENCE AT WORK 11-14

Ideal for Teachers requiring a successful modular science course for middle to lower ability students through a real world context.

Colourful and appealing presentation which should attract the attention of pupils. Cartoons, photographs and line drawings are used throughout to explain clearly what is required of the student and to illustrate the message within the text. Plain text is kept to a minimum and clear and easily understood.

Experimental work is fun having been based on the everyday world in which pupils live. Safety warnings are obvious on the page and pictures of children undertaking the tasks suggested reinforce that safety message with goggles and other safety precautions undertaken.

Year 7 – Classifying Materials.

Split into 5 chapters, covering what materials are and are used for, and how to categorise them as metals and non metals , or as solids, liquids and gases.

Final summary section refreshes the memory as to the has been covered as well as reinforcing the developmental skills, (such as working as a team, following instructions and making observations) developed

24pp £3.99

Year 8 – Elements, Mixtures and Compounds.

Split into 7 sections, the style and content of this book builds on that of *Classifying Materials*. This book looks at the elements, compounds and mixtures naturally occurring in the earth and investigates the properties and reactions of them, leading up to the formation of equations to describe the processes taking place.

Findings and skills developed are summarised at the end of the book.

24pp £3.99

Year 9 - metals and Non-metals.

In the 4 sections of this book pupils see how the elements are arranged in the periodic table. There is a significant section on metals and non-metals, revising work on particles in solids, liquids and gases. The other sections cover the reactivity series, extraction of metals, and thermal decomposition.

Summary section at the end of the book

32pp £4.50

SCIENCE AT WORK 14-16

A motivating course, which can be used in conjunction with the *Further Science* chemistry and physics core text books to cover all abilities.

Similar to the texts of ages 11-14, these books use colour photographs, cartoons and drawings to present materials in a lively and exciting format. The text is clear and the layout helps ensure that work is undertaken correctly and safely. Questions and examples of how observation should be taken ensure that pupils complete their work accurately. Throughout the underlying scientific principles involved are related back to everyday events that pupils can relate to. The main points of the book are summarised at the end.

Materials and their Uses.

40pp £4.99

Making New Materials

32pp £4.50

NUFFIELD ADVANCED SCIENCE 16-19 Special Studies

Extensively revised and updated in the light of comments from teachers, examiners and professional experts.

Materials Science

This special study, which was produced by the Department of Materials Science and Engineering at the University of Liverpool, examines the structure and performance of materials. There is an introduction to how engineers choose appropriate materials for a particular function, together with chapters on environmental effects on materials and on recycling of materials.

Experimental work is included and there are examination questions taken from Nuffield A-level Chemistry.

48pp £8.50

Materials Science Teachers Guide

This guide includes an introduction to the Special study and a more detailed account of each chapter. For each chapter there is an introduction stating the objectives and giving a recommended timing for each section of that chapter. Then there are teaching notes giving detailed information on the experiments and background information.

Each chapter concludes with a summary of the ideas covered.

Final sections provide answers to the examination questions and a listing of additional sources of information such as books, pamphlets and videos.

24pp £8.50

POST 16 SCIENCE DAY

On Tuesday the 29th of June lower sixth form students from around the West Yorkshire area descended on 6 departments at the University to take part in a number of Science and Engineering Workshops.

Workshops were held in :-

A. Colour Chemistry - 'Catching Rainbows with Chemistry'

B. Environment Centre - 'Meteorology and Weather Forecasting'

C. Fuel and Energy - 'The Dynamic Behaviour of Flames'

D. materials - "Whodunit?" Solve the forensic clues online!

E. Mining and Mineral Engineering - 'Lead Ore to Car Battery'

F. Textiles - 'Hanging by a Thread and Dyeing for a Living'

And the following schools took part :-

Abbey Grange High School, Leeds Benton Park High School, Rawdon

Brigshaw High School, Castleford

Intake High School, Bramley

Morley Bruntcliffe, High School, Morley

Roundhay High School, Leeds

The day was part of an ongoing project with Leeds TEC.



Carlton Bolling College, Bradford

Leeds College of Technology, Leeds

Pudsey Grangefield School, Pudsey

Department of Materials - 'Whodunit ?'

The scene was set, poor Dr. Matthew Ayreals (Matt to his friends) had been knifed to death in a laboratory within the Department of Materials, and it was up to the students to find out 'Whodunit ?'. Was it Rhoda Davidson, Des Haster, Johnny 'Fish Face' McGraw, Tex Nolagee, Eddy Slime. Sid Slugger, Miss Trust or Claire Voiante? Through materials testing of samples taken from suspects, by using information gained from the

crime scene and with a little help from in terms of some technical information provided, students had to make their choice.



If you want to have a go at cracking the murder, visit the Post 16 website at www.materials.leeds.ac.uk/post116, it contains all the details, including the answers you would have got had you been able to carry out the experimental work. If you need to ask for a bit of help or a few clues then you can e-mail Dr. Tony Bromley (a.p.bromley@leeds.ac.uk). For example, where did the chlorine come from? What about the Uranium? etc.....



The Post 16 Science



Open Day was just one of several Open Day events held within the Department throughout May and June. If you would like to visit the Department as a schools group or an individual, contact Dr. Tony Bromley (a.p.bromley@leeds.ac.uk) and he will make arrangements.

This website is one of several interesting pages that you can get to from the Materials Department webpage at: www.materials.leeds.ac.uk.

Materials Course for Physics and Science Teachers

Open days and courses at universities are not just for your pupils, this three day course, jointly sponsored by Rolls-Royce plc and The Worshipful Company of Armourers and Brasiers, is designed especially for teachers. It is packed with useful practical sessions to help you with the materials content of the Science and Physics A-level syllabuses.

- ❖ Keynote speech from Prof. Colin Humphreys,
 - ❖ Practical demonstrations of experiments,
 - ❖ Lectures on relevant topics,
 - ❖ Visit to Rolls Royce,
- The fee of £75 covers food, accommodation and 12 meals.

For more details contact: Erica Tyson, Rolls-Royce, Derby. 01332 249394.

UCAS Conventions

Do you remember that in the very first newsletter, we gave you details of the UCAS conventions held during the summer term? Well here are a few comments from those involved, to give you an idea about how worthwhile they are and to encourage to go to those to be held in six months time.

“How do you promote Materials Science as a career choice?”

Due to the decline in student numbers studying the Material Engineering discipline, this is the question we at the IOM posed. After all, if you stop and look around, you will see that this is one particular branch of Engineering which impacts on all aspects of everyday life.

We considered the solution to be actively promoting the discipline and demonstrating that it has, and will continue to have, a significant bearing on technological developments, and as such is far from extinct. Therefore, the IOM attended UCAS Career Conventions at Manchester, Sheffield and London. Although all were the same event, each venue was individual in their layout, timings and attending exhibitors. Since I was involved with the Sheffield Career Convention it is this event I will provide an account of.

The event was held at Sheffield Arena on 10 and 11 May 1999, and in excess of 8,000 students attended, from the South Yorkshire and Humberside region. The IOM were present for both days and had a stand, manned by volunteers to whom I am most grateful. These volunteers were either academic



Dr James Marrow, Manchester Materials Science Centre, Trying to force two opposed magnets together, with Diane Talbot, University of Birmingham, and Paul Chalker, University of Liverpool, looking on.

or industrial, male or female, but all were young, enthusiastic and clean. I feel I have to emphasise the latter point because people tend to have pre-conceptions of engineers. That is, we are all old, boring and mechanics! As an engineer myself, I do not consider myself to be any of these and that this myth should be broken. Furthermore, from their varied disciplines, all the volunteers were clearly able to demonstrate the diverse nature of Materials Science and the exciting and rewarding career choices it affords.

In addition to the volunteers, various artefacts were displayed which demonstrated the selection and use of materials in applications the

student could relate to, such as aerospace, automotive, sport, packaging and leisure to name but a few. A good example of this was an artificial artery. When asked to name the product, various answers were given. However, the most memorable was a sleeping bag for a worm! Once told, and having got over the initial shock of what they were holding, the students were fascinated to know more, i.e. it was manufactured from polyester which made it strong, non-degradable (relative to the patient's lifetime) and “non-invasive” so it would not be rejected. Furthermore, it was woven to enable passage of oxygen from the blood to tissue and corrugated to allow maximum flexibility without blockage.

Approximately 300 students visited the IOM stand and it appeared they had no real concept of Materials or Materials Engineering. Mechanical and Civil Engineering – yes, Materials Engineering – no. We were therefore able to take 300 students on a steep learning curve to enlightenment. Another revelation were the choices of A levels made. Physiology and sociology were favourites with languages and sports coming close second. Maths and sciences seemed be harder to find. When asked what they thought of Engineering, the replies given were “It's dull”, “It's boring”, “Don't want to be an engineer” (which is fair enough!), “It's physics” and “It's maths”. Some of this is undeniably true (physics, maths) but it is not all dull and boring as our demonstrations illustrated.

The IOM was one of a very small number of professional bodies to attend the event. We met our objective of promoting and increasing the awareness of the Materials Science discipline and its many facets, which can be measured by the fact that an accredited university had two enquiries as a result of our presence. Therefore, I would consider it to have been a complete success and an event to be repeated.

So, getting back to the question of “How do you promote Materials Science as a career choice?” It’s simple really: in an interactive, informative and inspiring manner. Even if students are made aware of its existence and choose an alternative subject, at least they have been more informed to make that choice. We understand the time constraints and pressures teachers have. Therefore, remember the IOM can assist by coming to you, the schools affiliate member, to give an interactive, informative and inspiring presentation.

Peter Davis is the Regional Executive for the IoM in the North East.

Tony Bromley (Admissions Tutor at The University of Leeds), was one of the academics present and this is what he thought of the whole event from a University point of view.

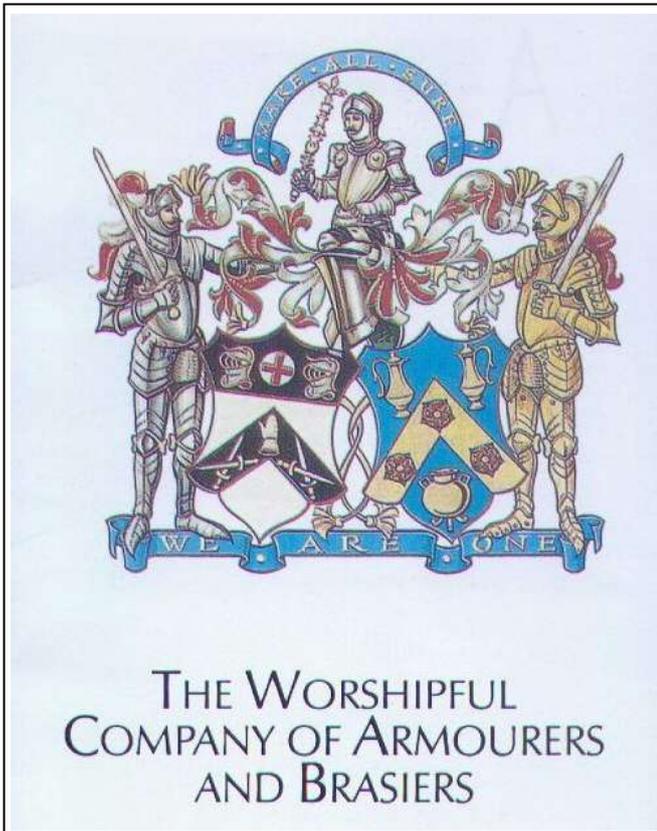
I am not bragging, but currently it is a fact that the University of Leeds is the most popular University in the Country in terms of UCAS applications. It means we can get extremely busy at Higher Education Conventions, for example at the recent Manchester Event we cleared around 400 prospectuses an hour. However, what strikes me most, as a relative newcomer to the HE convention scene, is the relative interest in courses. Top of the list, (compiled from my impression rather than any fact!) are English, History, anything to do with the media and Sports Science. Next come Law and Medicine, then the biological sciences and towards the bottom of the list are other sciences and right firmly at the bottom is Engineering. Now, this is



Diane Talbot, from the shows a student a piece of aircraft floor panel.

paradoxical as, in my opinion, your chances of good Employment with the Sciences and Engineering are high, I know employers in this who can't find the people, yet in English? The problem is that the University market is led by what the student wants rather than what the employer wants. How do we reverse that!? Tony Bromley

The Armourers and Braziers Company



In a gold leafed and chandeliered drawing room deep in the City three elderly gentlemen are in earnest conversation. Overlooking them, from a glass case, is the ceremonial suit of armour worn by Elizabeth I's Champion, Henry Lee. What are they doing in this newsletter, you may well ask?

Well, the drawing room is a part of Armourers' Hall, home to the Worshipful Company of Armourers and Brasiers. The armour is one of their principle treasures. And the three gentlemen? They are the Metals Committee, which connects the Company with Materials Science.

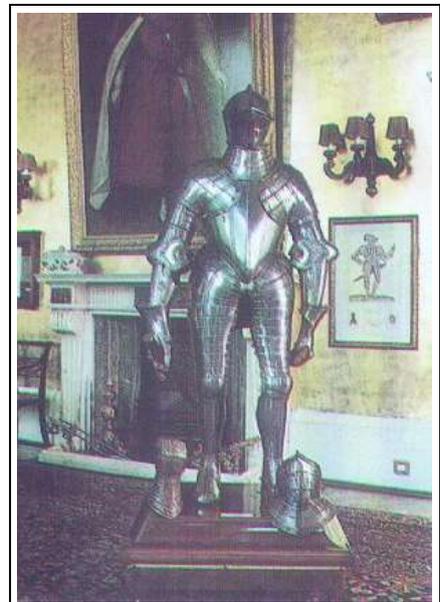
How so? The Company's roots go back to 1322 when it started providing quality assurance that its armour was of good quality, and succour and comfort for its members, who were the only people licensed to make and sell armour within the City walls of London.

The Livery Companies have always been charitable, principally in the provision of schools and almshouses, but in the 1980s the Armourers and Brasiers

took a fresh look at their charitable activities, created the Gauntlet Trust as their own charitable arm, and decided that the support of Materials Science was the natural successor to the ancient crafts of making armour and working in brass. The trust derives income from donations made by the Worshipful Company and from interest on its investments. Two thirds of its charitable expenditure goes to materials science.

This element of the Company's giving is administered by the Metals Committee – the three elderly gentlemen! They aim to cover the whole spectrum of education from Primary Schools to post-doctoral research. All manner of prizes, bursaries, awards and sponsorships are made, and partnerships with industry increase funds available. The Committee works closely with the Institute of Materials and sponsors Physics Teachers Update courses run by Institute of Physics (tel.: Leila Solomon 0171 451 7300).

The Company's aims are very similar to those of teachers in materials science. So if you see an Armourer passing by, give a cheery smile and a shake of the Gauntlet!



Right: The Lee Armour.

the
the
him

Watch out for the following in Materials World:

July

- p 195 : Faster trip with lighter seats.
- p 201 : Motoring into the future with MIM.
- p 205 : Thermal spraying in the new Millennium.
- p 213 : A Materials for melding humans and machines.

August

- p 487 : Living for the future.
- p 489 : Leaps in design in plastics.
- p 495 : Scientific conferences with a difference