

Fulmer

UPDATE

Fulmer Newsletter No. 58, December 1987

NEW LOOK TO THE FULMER GROUP

Fulmer Research Institute has abbreviated its name to Fulmer Limited, and renamed the operating companies within the Fulmer Group, to emphasise the changes in its business which have occurred over recent years.

All subsidiary companies will have Fulmer in their name to emphasise the cohesion and integration of the group's breadth of expertise covering all engineering materials and their applications. The group consists of Fulmer Research, Fulmer Yarsley—formerly Yarsley Technical Centre, Fulmer CVD—formerly Fulmer Components, and a new company Fulmer Systems, plus its existing overseas companies.

Fulmer is no longer concerned solely with R & D, but is increasingly involved in the whole evolution of manufactured goods and industrial processes, from initial research through design and development, prototype manufacture, testing, quality assurance and certification.

Fulmer continues to serve its traditional industry sectors of aerospace, defence, energy, land transport and consumer products, but recent expansion of its business has been in healthcare, information technology, building services and chemicals.

Fulmer Group

Fulmer Research

Fulmer Yarsley

Fulmer Systems

Fulmer CVD

CONTRACT R & D SPEND UP

Latest figures from the Department of Trade and Industry show that U.K. manufacturing industry's spend on R & D rose by 10%, in real terms, between 1983 and 1985. The largest increase of 40% was in the motor vehicles industry, but in the mechanical engineering sector R & D spend fell by 6%. Industry's expenditure on contract R & D, with organisations like Fulmer and the higher education institutes, has risen substantially from 3.5% of the total in 1978 to 4.9% in 1985.

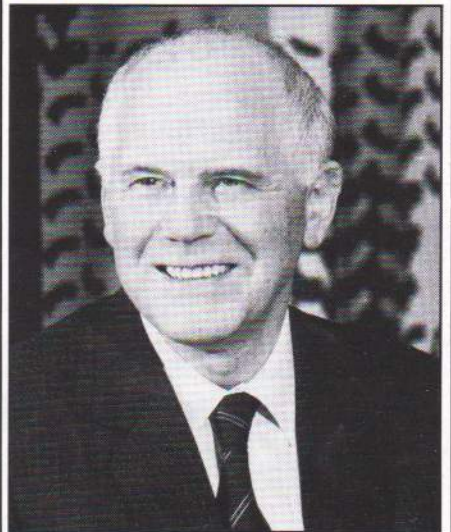
Whilst these are encouraging signs of the revival of the U.K.'s manufacturing base, we have been slow to develop concerted national R & D policies, compared with our competitor nations. The House of Lords Select Committee on Science and Technology, the Advisory Council for Applied Research and Development (ACARD), the Advisory Board for the Research Councils, the Confederation of British Industry, the Association of Independent Research and Technology Organisations, and the Trades Union Congress have been unanimous in calling on the Government to implement a

long-term national innovation strategy.

Government has responded by establishing the Technology Requirements Board, and, most recently, by proposing creation of a new advisory body, the Advisory Council on Science and Technology (ACOST), and of a new national Centre for Exploitation of Science and Technology.

The Technology Requirements Board, established in November 1985 under the chairmanship of Sir John Collyear, advises the DTI on development and implementation of industrial R & D policy. ACOST, when established, will absorb ACARD and advise Government in areas such as priorities for science and technology for the U.K. The proposed Centre for Exploitation of Science and Technology will be substantially different from these two advisory bodies. It is intended that the Centre should be created, led and primarily funded by industry and the City, although Government will contribute £1 million to the set-up costs.

SIR JOHN COLLYEAR NEW FULMER CHAIRMAN



Sir John Collyear, F. Eng., succeeded Sir Ieuan Maddock as Chairman of Fulmer Limited in June.

Sir John, who is 60, graduated in mechanical engineering from Leeds University, served in the Royal Engineers, and has been Managing Director of Glacier Metal Company, and, more recently, Chairman of its parent group, AE plc.

Sir John has had a strong interest in and commitment to advanced application of materials technology throughout his career. While he was MD of Glacier Metal Co., he supported work at Fulmer to develop bearing materials in aluminium-lead alloys. In 1983 he was appointed Chairman of the Department of Trade and Industry's Materials Advisory Group, which produced, in 1985, the widely read Collyear Report—recommending a national coordinated programme for the wider application of new and improved materials and processes. He is currently Chairman of the DTI's Technology Requirements Board, established in 1985, which has made recommendations to increase industrial R & D and its exploitation, and Government support for R & D in information technology, advanced manufacturing technology, materials technology and biotechnology.

SPECIAL FEATURE: MAGNETS AND MAGNETIC MATERIALS

NEW UK FACILITY FOR MAGNETIC MEDIA RESEARCH

Magnetic Media Research Company has united with Fulmer Limited and changed its name to Magnetic Media (Fulmer) Limited in a move to Fulmer's Stoke Poges site. The synergy between the two companies' activities in magnetic media R & D provides a unique facility in the U.K.

There is a strong growth in the magnetic recording media industry, both in market size and advances in technology—as evidenced by the interest in products such as digital audio tape (DAT), the new forms of

video recording tapes, and the rapid advances in floppy disks, Winchester and computer tapes. Over the first two years Magnetic Media have benefited from this growth and have been very successful in research into magnetic media materials, processing and product behaviour, including lubrication and wear of tapes and disks. This latter area matches well with Fulmer studies on the abrasivity of these media, and the manufacture and marketing of tape and floppy disk abrasivity test equipment.

The complementary areas of specialisation, with support provided by Fulmer's extensive facilities, are enabling the organisations to propose comprehensive joint research programmes to clients in the U.S.A., Japan, Asia and Europe.

For further information please contact Ted Naef, M.D., Magnetic Media (Fulmer).

MAGNETIC MEDIA TESTING AND MEASUREMENT

The test and measurement section of Magnetic Media (Fulmer)—MMF—is directed by Roy Taylor. Roy has an international reputation through his work for the British Tape Industry Association and the International Electrochemical Commission (IEC), which defines world standards for audio and video tapes and cassettes.

MMF's Laboratories are fully equipped to provide industry with an independent test facility to these international standards, and are being extended to provide similar services for Digital Audio Tape and Extra Definition TV products. Typical of MMF's test and measurement services is the specialised instrument calibration



MAGNETIC MEDIA FORMULATION AND PROCESSING

The majority of magnetic recording media are made by coating magnetic powders in resin binder onto flexible substrates. The performance and durability of the product depend on the materials used—the magnetic and secondary pigments, and additives such as surfactants and lubricants.

Magnetic Media (Fulmer)—MMF—has considerable expertise in magnetic media formulation and processing. Current work includes studies on coatings incorporating hexagonal barium ferrites, in which the axis of magnetisation may be perpendicular to the plane of the platelet particles. Such coatings may have a major impact in recordings with isotropic or perpendicular fields.

Montefluos, a company of the international chemicals group Montedison, recently sought MMF's support in

development of new molecule forms of perfluoropolyether topical lubricants for advanced Winchester disks. The requirement was to incorporate end groupings in the polymer to provide high energy of absorption on sputtered Carbon and Cobalt alloy surfaces. These lubricants are now commercially available in Montefluos's Fomblin range. MMF have extended this activity to provide applications assistance to U.S. clients in the manufacture of advanced Winchester disks and in stiction studies under extreme ambient conditions.

MMF are currently active in a number of programmes on advanced recording techniques, with clients from Japan, U.S.A. and Europe.

For further information contact Bill Jeans Magnetic Media (Fulmer).

illustrated. Here, Peter Woolhouse is using a MMF reference tape to characterise a B/H meter destined for a U.K. magnetic materials production plant.

For digital data products, MMF has extensive experience in physical rather than electromagnetic performance testing—specialising in product durability under a wide range of climatic and mechanical conditions. With Fulmer Research's facilities to measure the abrasivity of magnetic tapes and floppy disks, and drop-outs for instrumentation tapes, the two companies provide a comprehensive service to manufacturers and users of digital data recording media.

For further information contact Roy Taylor, Magnetic Media (Fulmer).

PERMANENT MAGNET MATERIALS

Permanent magnets are an important part of our everyday life—with the average household in the U.K. employing about 70, and the family automobile having around 20 magnets in electromechanical and electronic devices. The volume use of permanent magnets has grown throughout the 1900's, with growth averaging 13% per annum for the past 20 years. Applications in motors and generators account for 35% of world demand, but new markets such as "in" information technology are largely responsible for recent growth.

Advances in materials technology (see inset graph) have enabled permanent magnets to be produced inexpensively as ferrites and magnetic rubbers and with energy products (the maximum value of the product of induction and magnetic field) 100 times greater than at the beginning of the century.

Fulmer has been closely associated with the Commission of the European Communities (CEC) initiatives to develop advanced European technologies in

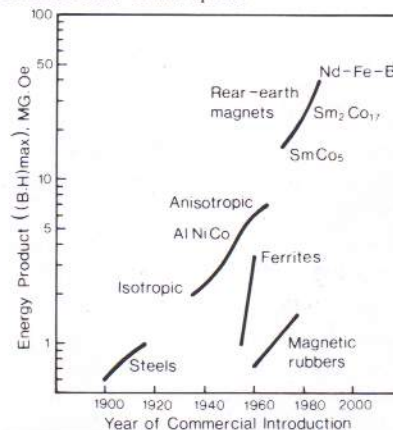
permanent magnet materials and processing. The incentives are to reduce European imports of cobalt metal, which is a "strategic" material widely used in permanent magnets, and to establish commercial products which can compete with those from the U.S.A. and Japan.

The very high strength and potentially low cost RE-TM-X magnets (RE-rare earth metal, TM = transition metal, X = metal or metalloid) have been the subject of intensive R & D worldwide. General Motors in the U.S.A and Sumitomo Special Metals in Japan have a monopoly on the first commercial magnets of this type, Nd-Fe-B materials. In response the CEC launched a Concerted European Action on Magnets to pump-prime the European research effort in this field, and commissioned Fulmer to seek alternative systems to Nd-Fe-B. Fulmer's physical metallurgy group in conjunction with the University of Surrey, reviewed RE-TM-X phase diagram data and identified RE-Fe-C alloys, in particular Gd-Fe-C, as promising candidates. A number of European laboratories are now evaluating these materials.

Although RE-TM-X permanent magnets such as Nd-Fe-B are commercially available, development work is continuing to improve their corrosion resistance and temperature capability and to overcome severe processing problems. High strength anisotropic Nd-Fe-B magnets are

processed from very fine powders which oxidise rapidly and are pyrophoric. The powders are extremely difficult to handle and cannot be transported in bulk. Fulmer is collaborating with several European partners to develop improved and safer processing technologies.

The project, which is being supported by the CEC over a three year period, will address several of the major processing problems in commercial production of both isotropic and anisotropic RE-TM-X magnets, including the very thin coating of domain-sized particles and novel consolidation techniques.



For further information please contact Dr. Ian Sanderson, Physical Metallurgy Division, Fulmer Research.

SUPER-CONDUCTING MAGNETS

The discovery of oxide ceramics which display superconductivity (zero resistance to electrical current flow) at temperatures above that of liquid nitrogen has renewed interest in commercial applications of superconductive materials.

Superconductive materials enable very efficient and high flux density electromagnets to be employed in applications such as NMR (nuclear magnetic resonance) body scanners. About 80% of current NMR body scanners have electromagnets constructed from metallic wires which become superconducting at temperatures below -250°C., requiring liquid helium cooling. Materials that are superconducting at higher temperatures, above -190°C., could be used with much cheaper liquid nitrogen cooling, thus reducing the cost of operating NMR body scanners and making magnetically levitated transport systems an economic proposition.

Fulmer staff have been monitoring developments in superconductive oxide ceramics, and are in contact with offices of the U.K. Department of Trade and Industry and the Commission of the European Communities, who will shortly be announcing initiatives to encourage industrial R & D and exploitation of high temperature superconductors. We are undertaking preliminary experimental programmes to establish the feasibility of manufacturing routes for superconductive ceramics in thin and thick films and 100% dense bulk material of various shapes, and developing ideas for improving the characteristics of these materials—in particular, ways of increasing their critical current densities.

Fulmer welcomes discussion with potential users of superconductive materials to identify ways in which we might co-operate in technical programmes and in securing support from funding organisations.

For further information please contact Greville Brook, Fulmer Group.

MAGNETIC MEDIA ABRASIVITY

In high quality magnetic recording systems minimising the wear of the magnetic head is an essential requirement to extend the life and reliable operation of the system. Even in stand-off systems, head wear can occur during "take-off" and "landing", and particulates trapped between head and media cause head damage and loss of data.

Fulmer Research have pioneered an on-line method for measurement of the abrasiveness of magnetic tapes and floppy disks. The test equipment incorporates a sensor consisting of a thin film resistor deposited onto a ceramic carrier. For tapes, the sensor is a cylinder over which the tape is passed. The tape wears the ceramic and thin film, thereby increasing the electrical resistance of the film. The rate of change of resistance, or change per unit length of tape, is a measure of the tape's abrasion potential which is monitored and displayed by a dedicated microprocessor. A similar system is employed for floppy disks, but the equipment is a stand-alone instrument with disk drive unit, sensor and microprocessor circuitry incorporated in a single housing.

The major advantages of these instruments are their simplicity in operation, on-line measurements and rapid assessment of the test media. The

abrasiveness of different tapes measured with the Fulmer system has been found to vary by factors greater than 40, and floppy disks sourced from different manufacturers have abrasivities varying by factors of up to 700. Independent experience with tape abrasivity measurement has confirmed that the Fulmer instruments provide rankings which correlate excellently with actual head-wear— μ metal, Alfesil or ferrite—and that they are sufficiently sensitive to detect differences in abrasivity caused by environmental changes such as humidity, thus measurements are normally made under controlled atmospheres.

Fulmer's tape abrasivity equipment is suitable for assessment of audio, video, computer and instrumentation tapes of widths from 3.8 mm to 25 mm. The method employed will be included in a new British Standard for unrecorded instrumentation tapes and is under consideration by the International Standards Organisation. Fulmer manufactures and supplies abrasivity test equipment and undertakes testing of magnetic media for manufacturers and users.

For further information contact Rex Waghorne, Physics Division, Fulmer Research.

FULMER YARSLEY'S DEREK BERRY ADDRESSES THE ASSOCIATION OF BUILDING COMPONENT MANUFACTURERS

Derek Berry, a Divisional Manager at Fulmer Yarsley, addressed the annual lunch of the ABCM in June. His address is reproduced below:

One of the things which we believe will most severely affect our members is the moves to remove non-tariff barriers to trade within the EEC. This will mean that many of the problems with importing and exporting within the EEC will be removed. While this could be of great benefit to our members it could be to their disadvantage with increasing imports to the U.K. A more disturbing aspect to this problem is that although there is feverish activity behind the scenes not only in this country but throughout Europe, little publicity is evident. Many manufacturers—who could be severely affected—are unaware of the impending situation—and are in any case convinced that nothing will be achieved.

To them I say—wake up to reality. The aims of the EEC certainly will be achieved—if not by 1992—only 5 years away—then soon after—and these achievements will affect you!

What is it all about then? The aim is to harmonise regulations and test methods by 1992.

This means that in outline all the Building Regulations will be the same.

This means that test and approval methods will be standardised.

Building Regulations

Luckily the new British Building Regulations are likely to be the model for

the "Directive on construction" which will be submitted for ratification soon. A draft has now been issued. It contains at least one clause which could have disastrous consequences for a product manufacturer.

Harmonisation

The other activity is the harmonisation of testing standards. Especially in the fire field this is proceeding rapidly. It seems likely that many of our present fire tests will be radically altered, manufacturers will have to abandon many of their present test certificates and pay to obtain new ones. But in addition to this the test certificates on their own will not be enough, it appears that these certificates will have to be submitted to an Approvals body for ratification—the German method. This will entail more expense. Superimposed on this is the danger that there will be a proliferation of specifications—British Standards, CEN, Eurocodes, ISO and so on—how ever many different tests will be needed?

Britain has been at a disadvantage in these negotiations because our standards organisation has not been centralised and government controlled as in other countries. This has meant that it has taken time to involve government in these dialogues and even now our means of communication are far from perfect.

At least one country has suspended work on their own national standards to concentrate their efforts in the European arena. BSI committees are still spending

valuable time dotting the i's and crossing the t's of our British Standards. Couldn't the resources be better directed?

ABCM is so concerned about this issue that it aims to co-operate with organisations with common interests to increase awareness of the issues involved. We are devoting the whole of our Autumn conference at the Wembley Conference Centre to this subject. We are going to do our bit to wake up Britain!



NEW FACES

Hilary Campbell

The new Librarian at Fulmer Research is Hilary Campbell. Hilary graduated in Physics at the University of Manchester Institute of Science and Technology. In 1980 she moved South to work at the Science Museum Library in South Kensington to pursue a career in information science. After a years traineeship at the Science Museum Library Hilary was appointed as an information officer in the library of the Institution of Electrical Engineers, in London. Whilst at the IEE she worked for a postgraduate diploma in Information Science, following at part-time course at the City University, and is a Member of the Institute of Information Scientists.



John Hosmer

John Hosmer has recently joined Fulmer's accounting team as Financial Controller.

After qualifying in 1971 as a member of the Chartered Association of Certified Accountants, he was appointed a Senior Manager with a City firm of Chartered Accountants and specialised in audit and corporate taxation for a wide ranging portfolio of clients in the UK and overseas.

For the past five years he has been Group Accountant with The Oxford Instruments Group plc, during which time he was involved in the group's successful flotation on the U.K. Stock Exchange. He had particular responsibility for accounting disciplines and procedures, including statutory and management reporting, treasury administration and tax planning.



TRAFFORD BUILDING OPENED

Mr John Butcher, Under Secretary of State for Industry opened a new 12,500 sq ft building at Fulmer Yarsley's Redhill site on June 29th. It was dedicated as the Trafford Building in recognition of the contribution to the company from Mr D J Trafford, former Divisional Manager at Yarsley Technical Centre. 'Traff', as he was always known, worked for Yarsley for 28 years before his retirement and premature death in 1985.

The new building now houses the technical information centre, the polymer development and chemical synthesis activities, all of which were previously located at the Ashted site. This brought all of Fulmer Yarsley's technical activities onto the same site for the first time in twenty-one years.

After the opening Mr Butcher together with other distinguished guests who included the firms founder Dr Yarsley OBE and Sir John Collyear, Chairman of Fulmer Ltd., made a tour of the new building to observe a range of testing and development activities.

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