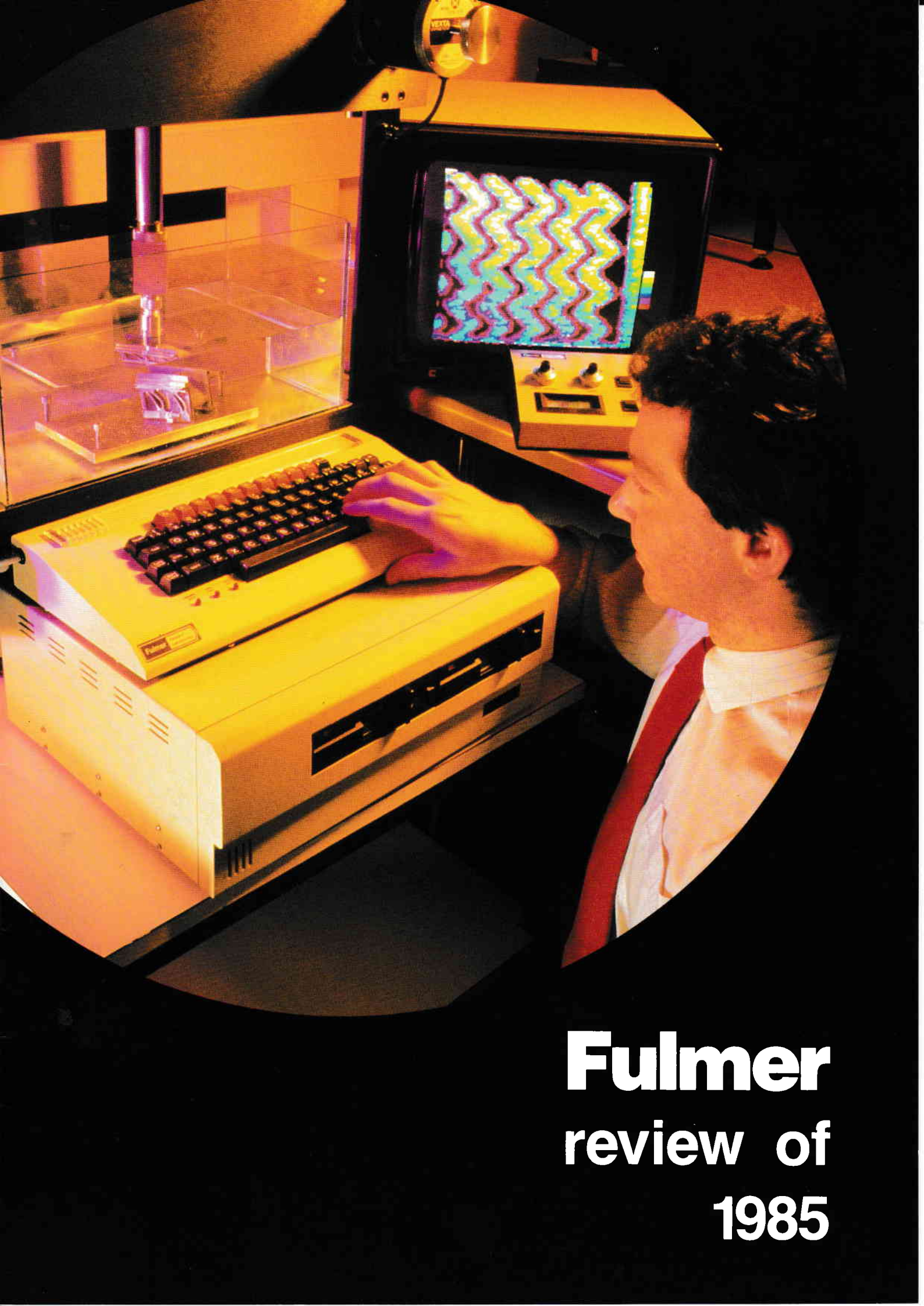
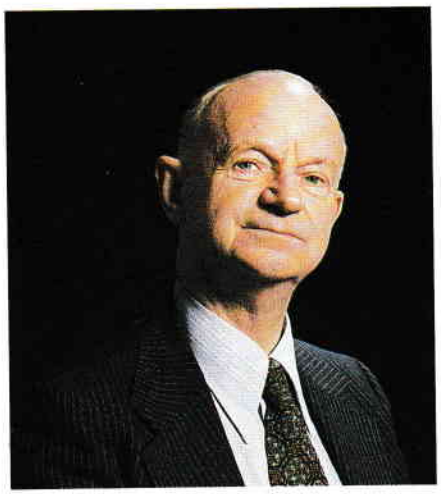


Fulmer
review of 1985



Sir Ieuan Maddock, C.B., O.B.E., D.Sc., F.Inst.P., F.Eng., F.R.S., Chairman

The front cover illustrates a Scanning Acoustic Microscope—designed and built at Fulmer—employed in the inspection of an aero-engine component.

Chairman's Foreword

1985 proved to be a difficult trading year, but despite this turnover was maintained at £4.7M. Fulmer's main business is in the traditional materials shaping and assembling industries, which still provide the bulk of the U.K.'s exports and are a major source of employment. As the U.K. government survey of R & D expenditure has shown, these industries are reluctant to invest in technological innovation to the extent that they must if they are to survive in an increasingly competitive world.

They are sometimes derided as the "sunset industries". In our view there is no such thing as a sunset industry, only sunset technologies. While we play our part in serving the high tech "sunrise industries", we recognise that the bulk of employment in manufacturing industry must always be in those traditional sectors of materials shaping and assembly. These are the ones on whose behalf we are continuing to invest in the new technology they need to develop the processes and products on which their future survival depends.

In 1985 this investment was heavier than we could provide out of increased income and, as the table on the facing page shows, this investment drained us of our profit for the year.

Hitherto, the Department of Trade and Industry has contributed to supporting Fulmer developments aimed at advancing the technology of our traditional industries. The continual squeeze on the Department's finances and a change of emphasis away from project and market related support, has reduced this source of seed corn income to less than 1% of our 1985 turnover. Fortunately, the City of London is not so short-sighted in its support for British industry. We have been able to benefit from contracts by Cogent Limited, the technology transfer company owned by Legal and General Assurance plc. Overseas clients still regard the U.K. as a rich source of technology, and our exports have increased by 52%, to an all time record of £920,000, 20% of our income.

We regard ourselves as a main source of needed technological innovation in the U.K., and to this end we joined with our colleagues in A.I.C.R.O. and C.D.R.A. during the year to promote the Innovation for Industry campaign. Without technological innovation U.K. manufacturing industry is doomed to continue its decline. The need for changing attitudes towards and within industry is one of the main thrusts of this Industry Year 1986, during which Fulmer will increase its efforts to make industry and Government aware of the vital resource the nation possesses in contract research organisations such as Fulmer.

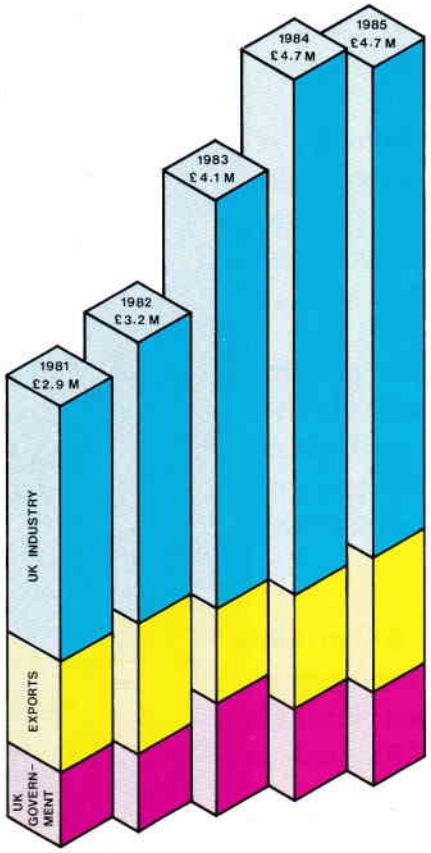
We have been part of one of the few growth sectors of the U.K. economy. While pure science in the U.K. is now under pressure because we cannot afford as much as we used to, applied R & D and forward engineering in organisations like our own have thrived because they are so relevant to the needs of our clients and of the nation.

In this review we describe some of our achievements for our clients during the year. Particular emphasis is put on our developments vital to improvement in quality and performance, which are rightly increasingly demanded by all customers worldwide. As part of the movement to improve quality assurance we have launched YQAF, Yarsley Quality Assured Firms, Limited, initially in the building and polymer industries which our main subsidiary company, Yarsley Technical Centre, serves.

A substantial investment during the year was in improved manufacturing facilities for high added value components required in the electronics industry and for monitoring performance on-line. Advances were made in our ability to serve the expanding healthcare market and output of our fluorochemical compounds used as pharmaceutical intermediates rose by 150%.

While we continued to be concerned at the low profitability of many of our current operations, we did not slacken in our purpose of building up a range of technological strengths vital to the future of all our client companies.

Fulmer Income Distribution 1981-1985



Group Trading Report

	Turnover, £K		*Profit (Loss), £K*	
	1984	*1985*	*1984*	*1985*
Fulmer Research Laboratories	*2,620*	*2,440*	*299*	*103*
Yarsley Technical Centre	*1,883*	*2,094*	*100*	*(30)*
Fulmer Components	*372*	*374*	*(3)*	*(72)*
Fulmer Singapore	*72*	*88*	*(30)*	*(25)*
Fulmer Southern Africa	*—*	*22*	*—*	*(24)*
Group Total	*4,743*	*4,730*	*366*	*(48)*

(Less inter-company trading and minority interests)

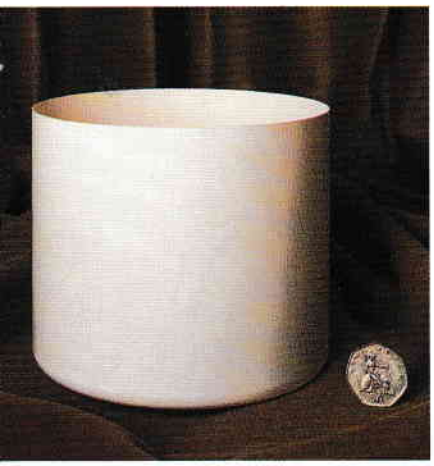
Acknowledgements

We are grateful to the following organisations and clients of Fulmer, who have kindly given permission for the reproduction of photographs in this review:

Admiralty Research Establishment
British Airways
British Aerospace
British Telecom
Central Office of Information
Rutherford Appleton Laboratory
Tyfoam Limited
Vosper Thornycroft (UK)

British Aerospace plc is producing Zinc Sulphide preforms by vapour deposition, under licence from Fulmer. The preforms are being used in the development of infra-red transparent domes, such as the one shown above, being diamond finish machined at British Aerospace.

NEW MATERIALS BY VAPOUR DEPOSITION PROCESSING



During 1985 Fulmer has continued to develop its strength in vapour deposition processing—a technology in which we became involved over 25 years ago. The developments have led to the licensing of technology to both overseas and U.K. companies.

Vapour deposition is established as one of the major technologies for producing metal, inorganic and, more recently, diffusion coatings, but it is attractive as a route to forming free-standing items.

Fulmer recognised some years ago the potential demand for high purity Pyrolytic Boron Nitride (PBN) products. In a joint venture with the British Technology Group (BTG), we developed the technology and a production unit for vapour deposition processing PBN.

To maintain our technological lead in PBN processing we are making further investment, again with BTG. Fulmer's production unit has extended the range and size of standard PBN hardware. This includes six inch diameter crucibles which are used for growing large single crystal electronic materials.

Zinc Sulphide produced by vapour deposition processing also has a promising future. Throughout 1985 Fulmer has worked closely with British Aerospace plc to develop Zinc Sulphide preform manufacture, following our demonstration of the processing technology in 1982. We have concluded a licence agreement with British Aerospace, whose Reinforced and Microwave Plastics Group is operating pilot production at its Stevenage site.

A six inch diameter Pyrolytic Boron Nitride crucible manufactured in Fulmer's production unit.

The Prime Minister with Sir Robin Nicholson (far left), recent Chief Scientific Advisor to the Cabinet, and Dr. Geoff Manning, Director of the Rutherford Appleton Laboratory, inaugurating the SERC's spallation neutron source, ISIS. Fulmer used specialised processing techniques to manufacture the uranium alloy target module essential to this £60 million project.

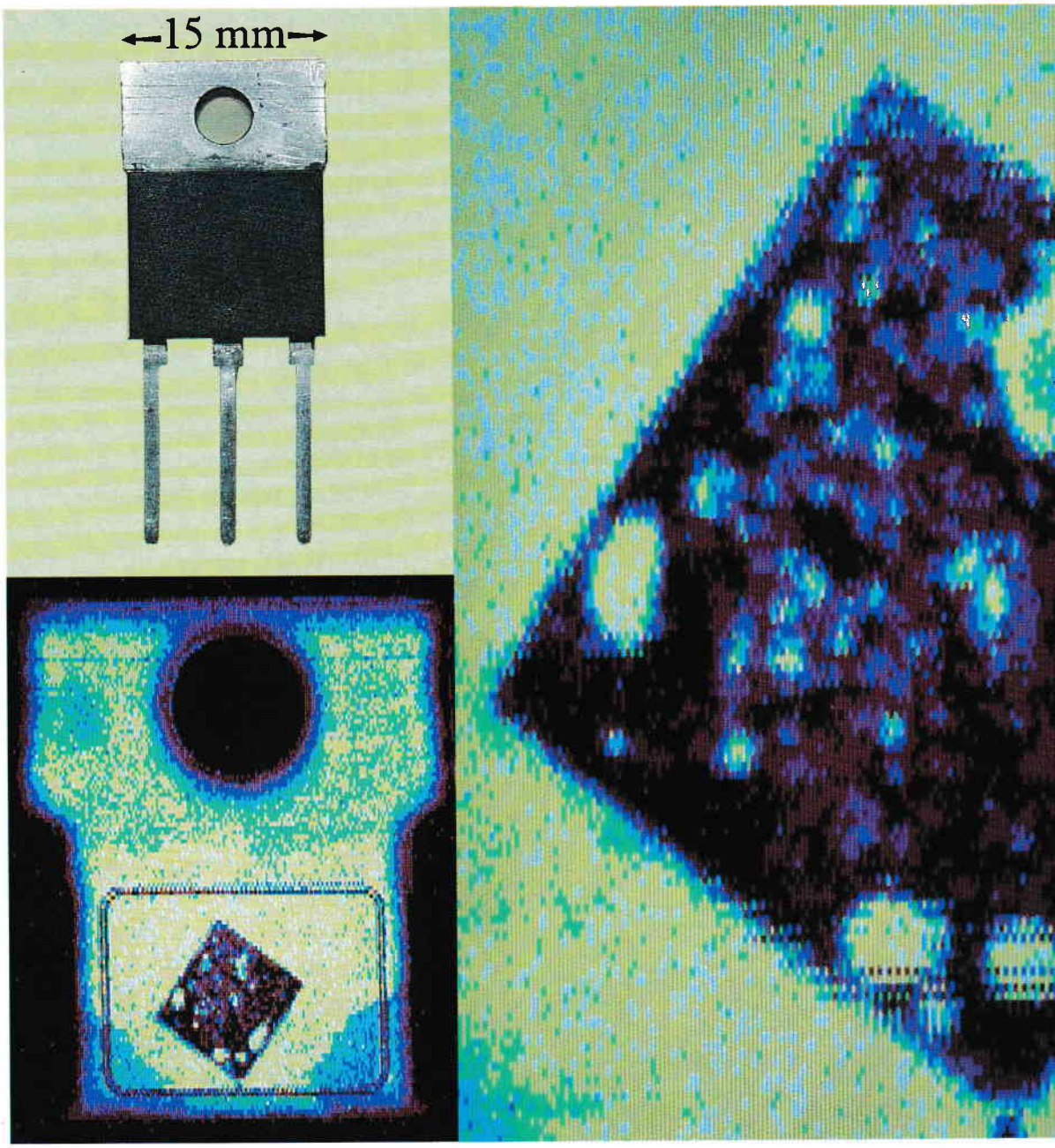
SOLID AND LIQUID STATE PROCESSING

One of Fulmer's strengths, during 40 years of operation, has been in the development and commercialisation of novel processing techniques—for both new and the more traditional materials. This area of technology is still vital to the efficiency and competitiveness of manufacturing industry.

Throughout 1985 the Science and Engineering Research Council's spallation neutron source, ISIS, has provided the world's only source of pulsed neutrons for the study of condensed matter. The high integrity target module for this project—which Fulmer produced in 1984 using high quality casting, electron beam welding, hot isostatic pressing and diffusion bonding processes—has been a complete success. As a result the SERC ordered further target modules, the first of which Fulmer delivered in mid-1985.

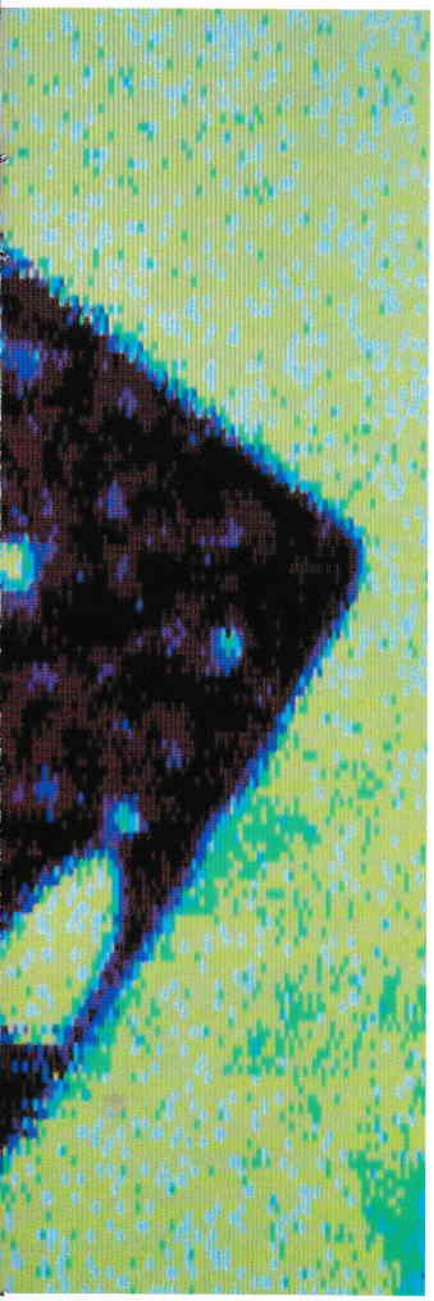
Thin polymeric film and membrane materials are enabling new products and devices to be developed, notably in the healthcare, medical and microelectronics industries. Recognising the demand for a materials development and small scale production capability, Fulmer's subsidiary Yarsley Technical Centre commissioned a membrane casting machine during 1985. Yarsley staff designed the machine to produce sub-micron to 100 microns thickness films and membranes from soluble polymers. The unit is capable of semi-continuous processing, and multi-pass or tandem coating operation enables production of multi-layer materials.

Fulmer capabilities in materials processing range from hot isostatic pressing of metals and ceramics, far left, to polymer membrane casting.



High performance and quality electronics components are essential in modern telecommunications equipment. British Telecom's Materials and Components Centre is employing a Fulmer Scanning Acoustic Microscope to inspect newly developed components. Shown above is a micro component under development at British Telecom, scanned to provide images of the critical bond between the silicon chip and its heatsink.

ADVANCED INSPECTION SYSTEMS: SCANNING ACOUSTIC MICROSCOPY



1985 has been a most successful year for sales of Fulmer products in advanced ultrasonic inspection—Fulmer's Scanning Acoustic Microscope and range of piezoelectric polymer, PVdF, ultrasonic transducers.

Fulmer has strengthened its technological lead in the field of high resolution ultrasonic inspection systems by developing and applying these products. They illustrate the advances that are possible through an integrated, multi-disciplinary approach. Product development—undertaken as a joint venture between Fulmer and the technology transfer company Cogent Limited—has involved Fulmer's thin film polymer, metallic coating, electronics, and signal processing technologies.

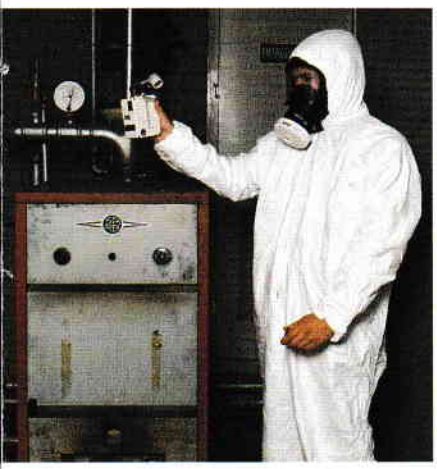
Customers for Fulmer's Scanning Acoustic Microscope have included manufacturers and users of critical aerospace and electronics components. High resolution scanning ultrasonic inspection finds application in metrology as well as in flaw detection. During 1985 Fulmer demonstrated the ability of scanning ultrasonics to accurately size the cooling channels of gas turbine blades.

Developments in near-surface resolution are opening new fields of application for ultrasonic scanning in health care. The single-cycle pulse capability of Fulmer's PVdF transducers has attracted the attention of medical scientists for use in topical and subcutaneous dermatology. Wells-Krautkramer, the U.K.'s leading supplier of non-destructive testing equipment, reached an agreement with Fulmer in 1985, to market and sell a standard range of Fulmer's PVdF transducers.

A bubbler probe—one of a range of piezoelectric polymer ultrasonic transducers available from Fulmer.

Removal of asbestos-based building products presents a potentially serious environmental hazard. Fulmer's subsidiary Yarsley Technical Centre, with Southwark Borough Council, managed the asbestos removal and air monitoring at the Greater London Council's Gloucester Grove Estate. Yarsley staff were on site every day for seven months, taking over 6000 samples for analysis.

IMPROVING SAFETY STANDARDS: FROM FIRE TESTING TO ENVIRONMENTAL MONITORING



Throughout 1985, Fulmer has been active in the development and implementation of improved safety standards—incorporating better design and materials utilisation, more stringent specifications and the management systems to adhere to them.

Concern over public safety standards has increased, leading to a growing demand for investigation of a wide range of environmental problems. To supplement the services from Yarsley Technical Centre Redhill site, we have opened a regional laboratory at Wantage, Oxfordshire, to undertake monitoring tests for toxic materials.

The 1984 legislation on reduction in industrial control limits for "brown" and "white" asbestos has helped make the U.K. one of the world's most advanced nations in its attitude towards asbestos exposure. Yarsley has been closely involved in this development, as an associate member of the Asbestos Removal Contractors Association and through its monitoring work. As a result, Yarsley was one of the first laboratories to achieve accreditation for asbestos monitoring and identification under the National Testing Laboratory Accreditation Scheme.

Aircraft safety was very much in the public eye in 1985. Appropriately, fire safety on aircraft is improving with the implementation of tougher specifications. Yarsley participated in the evaluation of the test method for the Civil Aviation Authority's new specification for fire resistant seating, and provides the major independent testing and evaluation service to this specification.

Yarsley capabilities in safety testing range from fire property assessment of aircraft seat cushions supplied to airlines—including British Airways—to air sampling.

The building and construction industry is especially aware of the need for consistent quality. Tyfoam Limited, installers of cavity wall stabilisation and insulation foam, is typical of the companies that have applied to YQAF Limited for assessment and registration to the National Quality Standard BS5750. Tyfoam were successful, confirmation that their quality systems ensure consistent installation to the required specification.

NATIONAL QUALITY CAMPAIGN

ASSURING AND CERTIFYING QUALITY: YARSLEY QUALITY ASSURED FIRMS

Fulmer has been offering quality assurance consultancy services for many years. In 1985 the firm establishment of a new subsidiary, Yarsley Quality Assured Firms (YQAF) Limited, strengthened this activity.

YQAF Limited is an independent certification body, financially supported by the UK Department of Trade and Industry. It assesses a company's quality management system to conformance with the requirements of the National Quality Standard BS5750, and provides Testguard Product Conformity Certification against published criteria. Accreditation under YQAF confirms a manufacturer's or supplier's commitment to quality and gives confidence to the purchaser regarding the quality of products or services procurred.

YQAF Limited is operating initially in the building and construction industry and in the polymer industry. To complement single firm registration, we are discussing with relevant trade associations the potential for developing schemes relating to specific sectors of industry.

The UK Government's National Quality Campaign has concentrated attention on the potential cost savings and increased product and service competitiveness derived through improved quality standards and systems. YQAF clients, assessed in 1985, have confirmed these benefits. Through clear use of the YQAF logo, they will be able to communicate their commitment to quality to potential clients and specifiers and extend trading contacts.

Mr. Roger Young (right), Managing Director of Borden (UK) Limited, Industrial Products Division, received the first YQAF assessment of registration to BS5750: Part 1, from Mr. Anthony Williams, Chairman of the YQAF Board.

Fulmer Research Institute

CONTRACT RESEARCH, DESIGN, DEVELOPMENT, CONSULTANCY AND TESTING IN MATERIALS TECHNOLOGY AND ENGINEERING

The Fulmer group constitutes three wholly-owned companies operating in the United Kingdom and two part-owned companies operating in Singapore and Southern Africa. Fulmer is a non-profit distributing body owned by the Institute of Physics. This guarantees its complete industrial and commercial independence.

The group employs more than 260 people, including 100 professionally qualified scientists, technologists and engineers.

Fulmer's operations in the U.K. are located in South Buckinghamshire, Berkshire and Surrey.

Fulmer has 40 years experience of providing comprehensive services to industry, government agencies and commerce. The group is dedicated to assisting its clients to manufacture products and operate processes more profitably. We achieve this through our rapid response, technical excellence, integrated multi-disciplinary approach and efficient transfer of technology.

Fulmer Research Laboratories

Provides research, design, development, consultancy and technical services in metallic and advanced engineering materials, the structures and components manufactured from them, and the processes used. Special facilities and expertise include chemical vapour deposition for special ceramics coatings and components; comprehensive analytical, X-ray and electron microscope investigation; ion and electron emitting devices; novel non-destructive testing methods and systems; ballistic testing; radiation testing; and advanced metal processing and production engineering. The laboratory is NATLAS listed under registration number 0050.

Yarsley Technical Centre

Provides research, design, development and evaluation services in non-metallic materials, and products and components which use plastics, rubbers, composites, paints, adhesives, timber, thermal insulating materials, floor coverings and building materials. Particular expertise exists in 'tailored' polymer technology, including polymer design and synthesis, coatings, film technology and composite materials. Special facilities include those for polymer research and processing; fire testing; fitness-for-purpose testing of building components; and thermal conductivity testing. Yarsley is a NATLAS laboratory listed under registration number 0036.

Fulmer Components Limited

Manufactures high technology products including abrasivity monitors for recording tapes and lubricating fluids; special sensor systems and devices; pyrolitic boron nitride coatings and products in the form of crucibles, tubes and plates; delay units for computers; cable tension meters; and small batch, high precision engineering items.

Fulmer Research & Development (Singapore)

Provides testing and technical services in engineering metallurgy, including troubleshooting; materials evaluation and consultation; materials selection; technical data search; and corrosion protection advice.

Fulmer Research (Southern Africa)

Provides research, development and technical services involving engineering materials and their application. Located in Johannesburg, the company has access to specialised equipment and expertise, both in South Africa and through Fulmer in the U.K.

FULMER IS A MEMBER OF THE ASSOCIATION OF INDEPENDENT RESEARCH AND TECHNOLOGY ORGANISATIONS (AIRTO)

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