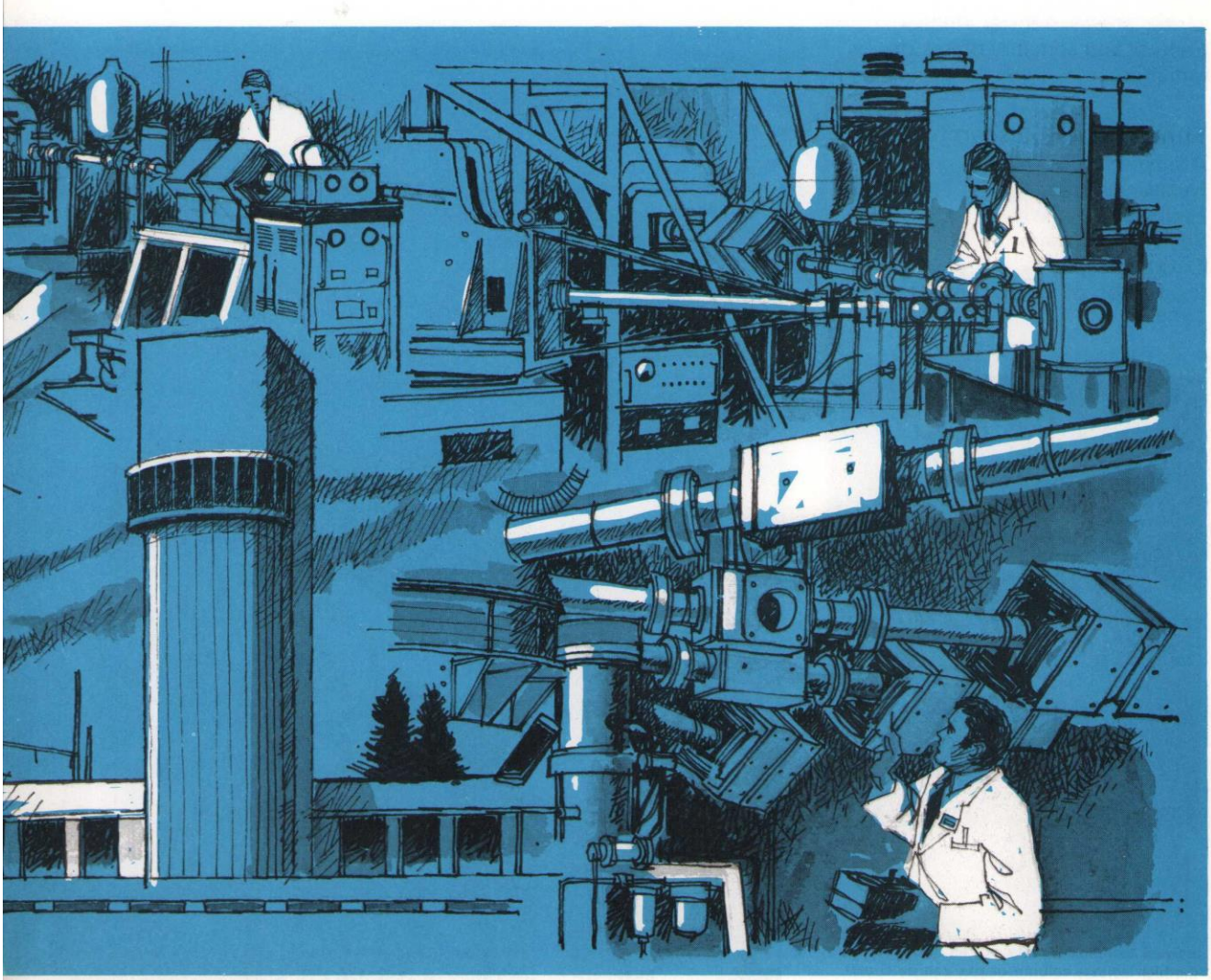
HARWELL Accelerator Services

Accelerator beams for industry and research

Beams of charged particles – electrons, protons, heavier ions – and associated secondary radiations, have many uses outside the traditional fields of atomic energy and nuclear research.

Harwell offers a comprehensive range of particle beams and accelerator services, which are described briefly overleaf, and in more detail on separate sheets which form part of this series.



Industrial Applications

Micro-structural studies (e.g. of welds, transistors, surface layers)
Trace-element analysis down to parts per 10^9
Micro-radiography
Specimen activation (e.g. for lubrication and wear investigations)
Radiation damage studies (e.g. for aerospace materials)
Structural modification of surfaces
Radiation processing (e.g. paint curing)
Biological sterilisation (e.g. of surgical materials)
Ion implantation

Bio-medical R&D

Activation analysis in vivo
Studies of tissue micro-structure
Linear energy transfer studies
Cellular and somatic effects of radiation

Fundamental Research

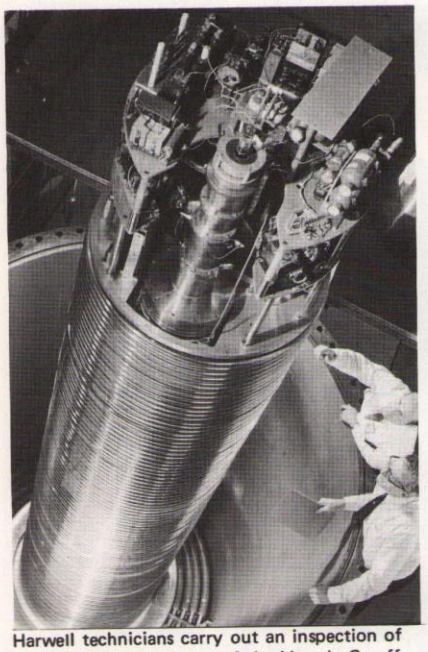
Atomic physics
Nuclear physics
Radiation chemistry
Solid-state physics
Crystallography
Production of special isotopes and targets
Provision of advanced analytical facilities

Atomic Energy

Radiation-damage studies on reactor materials and components
Shielding studies
Cross-section measurements for neutrons and charged particles
Fission chemistry
Isotope production
Neutron flux standardization

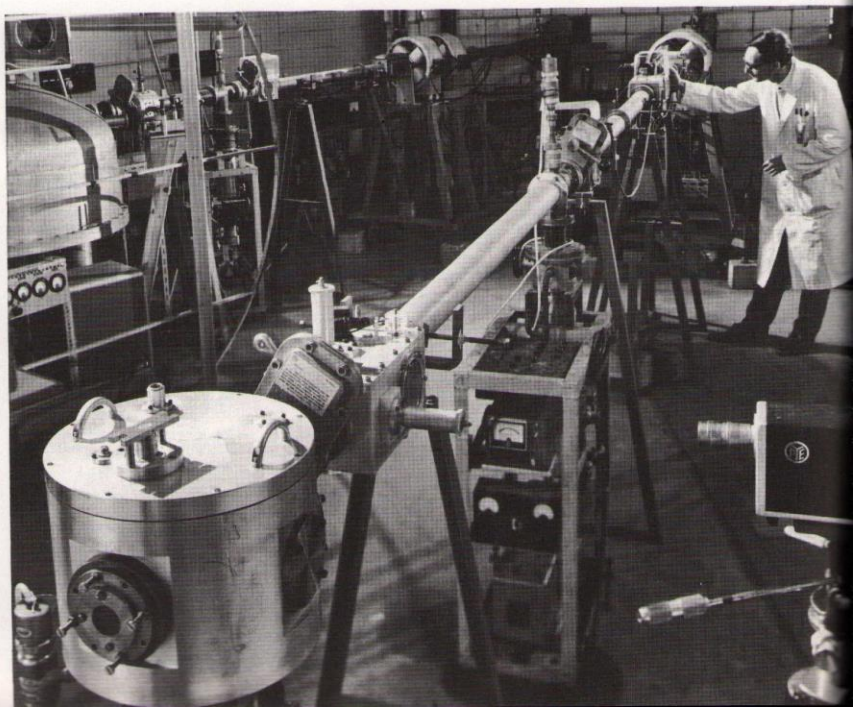
Harwell's accelerator service

is available to help your organization to undertake research programmes or to develop new industrial processes. The service is based on an exceptionally large and varied range of accelerators, backed up by advanced laboratory and workshop facilities. Our scientific and technical staff have 25 years of practical experience, much of it on problems outside atomic energy. We provide a fully comprehensive service, which we believe to be unequalled anywhere in the world.



Harwell technicians carry out an inspection of the high voltage column of the Van de Graaff Accelerator.

A Harwell technician collaborates with the experimental scientist in checking the beam alignment on the Tandem Generator Accelerator.



We offer

Experience

Harwell scientists and engineers are available to collaborate in working out the best experimental procedures and in designing and supplying the appropriate hardware for each individual job. They are accustomed to working to strict cost limits.

Particle beams

Beams of electrons and protons are available at energies up to 55 MeV and 175 MeV respectively. High-energy beams of deuterons and other positive ions up to mass number 130 (Xenon) are routinely produced, including beams of heavy metals e.g. Nickel 58. At lower energies, beams of essentially any element in the Periodic Table can be produced, typically with a current on target of about 1 μA. Secondary beams of fast neutrons, X-rays and gamma-rays, including mono-energetic beams, are also available. Very close control can be exercised over beam purity, energy, intensity and focus. Beams may be continuous or pulsed, down to pico-seconds in some cases.

Target-room facilities

A special techniques laboratory is available for "on the spot" production of natural targets and backing materials, e.g. 5 μ grams/ cm^2 carbon.

Help can be given in the selection and preparation of clients' target-materials, and in choice of exposure conditions. Targets can be mounted singly or in groups, and exposed at rest or in predetermined movement. Temperature can be controlled at any point between cryogenic and furnace levels, and targets can be irradiated in ultra-high vacuum or in selected atmospheres, including free air. Provision is available for orientation of targets to a precision of second of arc. In suitable circumstances targets from a few microns to a metre in diameter can be accommodated. Exposures may be monitored by time and beam-current or by energy-deposition measurement, or in some cases by studying target conditions as irradiation proceeds. Other target-room facilities available to users include particle and radiation spectrometers, on-line computers, and means of handling highly-radioactive specimens.

Post-irradiation services

Chemical and physical laboratories and engineering test facilities are available for carrying out detailed and comprehensive post-irradiation examinations of target materials. These include dark rooms and laboratories for the processing and examination of nuclear emulsion films and plates. Even highly-radioactive specimens such as nuclear fuel, etc. may be studied. Assistance can be provided in interpreting the results of examinations and in planning follow-up work. See also the companion brochure describing Harwell's Nuclear Services.

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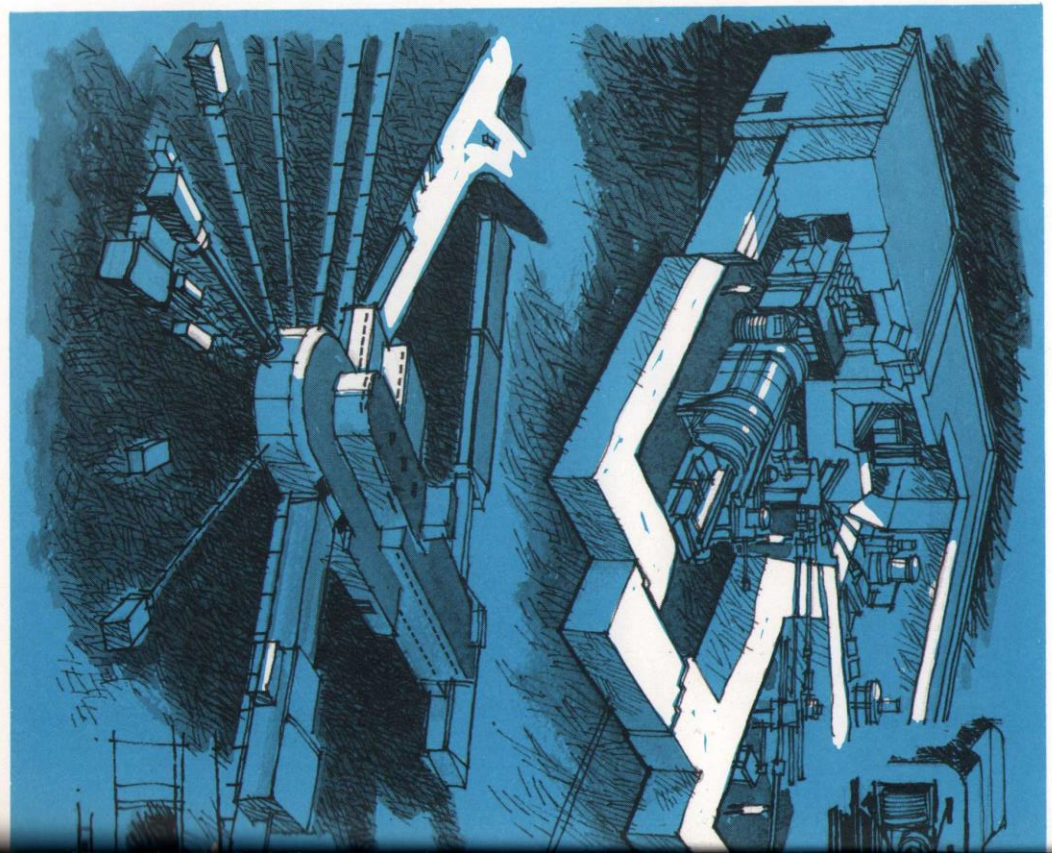

Harwell Design Studio **59/1974**