



ATTRON

METROLOGY



WITH THE SUPPORT OF



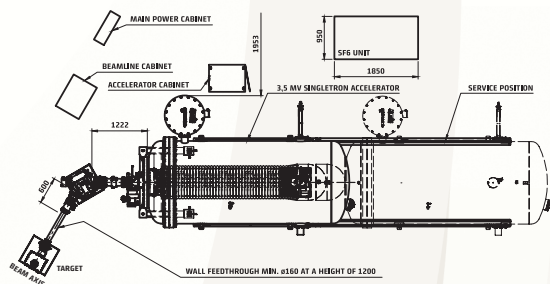
ACCELERATING YOUR AMBITIONS

IN COLLABORATION WITH



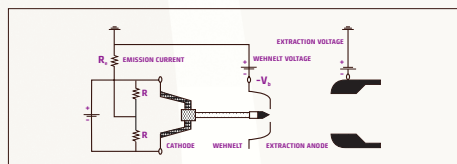
Electron beam X-ray radiation line

- The electron beam is generated by a 3.5 MV Singletron designed and produced by HVE for ATRON.
- This electrostatic electron accelerator has a floor space requirement of 10.4 x 6.9 m².
- The continuous electron beam, delivered on a removable conversion target, is adjustable in current (from pA to mA) and in voltage (from 0.2 to 3.5 MV) so that a very wide dose-equivalent rate range can be achieved from 0.1 μ Sv/h to 500 Sv/h at 1 m from the target.



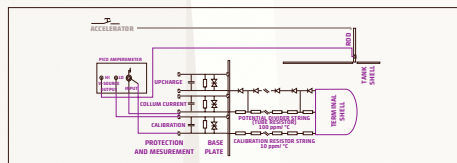
3.5 MeV Singletron HVE e⁻-beam & X-rays

ELECTRON SOURCE



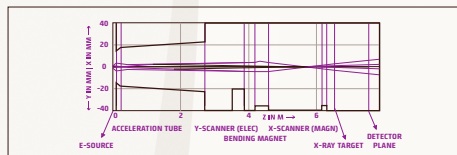
- The electron source consists of a 300 μ m LaB6 cathode.
- The emission current is controlled both by the current of the filament and the voltage of a Wehnelt cylinder which surrounds it.
- It has a service life of 4000 hours at 1 mA.

ACCELERATOR ACCURACY



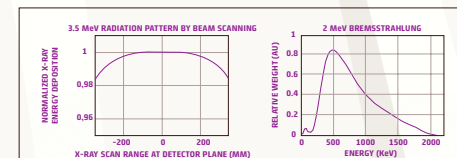
- The stability of the accelerating voltage is ensured by the measurements of a calibrated resistor string and a potential difference (GVM).
- The calibration string presents an accuracy of 0.15% and preliminary studies have shown a drift of less than 0.3% over an eleven-month period.

BEAM OPTICS



RADIATION FIELD

- The conversion target, measuring 40 x 220 mm², consists of a 1.5 mm tantalum layer attached to a copper support which facilitates its cooling.
- The 2.5 kW beam power is distributed on the target by a 1 kHz vertical scan. In addition, a triangular-shaped 25 kHz horizontal scan is applied in order to uniformise the radiation field over a range of $\pm 15^\circ$ with respect to the normal of the incident field.



- For a given beam energy, the energy spectrum of the X-ray radiation field produced by braking radiation (bremsstrahlung) extends from zero up to this energy and the resulting dose-equivalent rate is proportional to the current of the beam.

Geometry of the beam

Horizontal beam, at 120 cm from the floor
Electron window and removable X-ray target

Voltage (U): 0.2 – 3.5 MV

Stability: ± 350 V (short term), ~ 0.1 % (long term)
Accuracy: < 1 %
Reproducibility: ~ 0.1 %

Current (I): 1 pA – 1 mA up to 2 MV, 1 pA – 600 μ A beyond

Stability: ~ 1 % ± 2 pA
Accuracy: ~ 1 % ± 2 pA

Electron beam scanning

1 kHz vertically
25 Hz horizontally with parameterisation

X-ray radiation field: 0.1 μ Sv/h – 500 Sv/h at 1 m

Uniformity < 2 % at $\pm 15^\circ$

ACCELERATING YOUR AMBITIONS

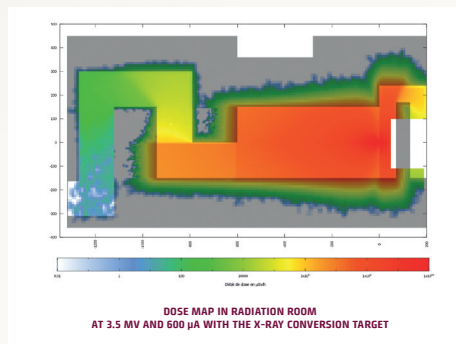
A technological platform

ATRON IS BASED ON A BREAK-THROUGH TECHNOLOGY IN NUCLEAR INSTRUMENTATION WHICH AIMS TO ABANDON THE USE OF RADIOACTIVE SOURCES IN FAVOUR OF CONTROLLED RADIATION.

In partnership with CNRS and CEA laboratories, we have designed the principle of an electron beam and X-ray radiation field connected to a primary source to enable checking of the calibration of radiation meters.

In order to implement this method, ATRON has invested in an electrostatic electron accelerator equipped with a removable X-ray target.

This high-tech equipment offers wide



energy and dose rate ranges, enabling a broad variety of irradiation needs to be met.

In addition, with the aim of ever greater customer satisfaction, we are in line with the *general requirements for the competence of testing and calibration laboratories* and are committed to a policy of accreditation under the ISO-17025 standard.

OUR PLATFORM THUS MEETS THE HIGHEST ORGANISATIONAL, ENVIRONMENTAL AND CONFIDENTIALITY REQUIREMENTS AND PROVIDES OUR CUSTOMERS WITH A FLEXIBLE, APPROPRIATE AND ACCURATE MEANS OF IRRADIATION.

Driven by scientific expertise

The company was born out of CERAP's determined ambition to expand its position in the nuclear instrumentation sector by building a tool to serve innovation in the ionising radiation field.



This application, for which a patent has been filed, was developed with the help of ATRON's in-house expertise in metrology and modelling and regional scientific and technical support.

Our centre, based in the heart of Normandy (a region rich in nuclear skills), is able to mobilise the necessary external expertise to offer its customers a in-depth understanding of physico-chemical phenomena and new areas of application.

We thus contribute to the drive to constantly improve your industrial performances by optimising your processes and making them reliable, in fields as

diverse as energy, aerospace and plastics technology.

ATRON, A TECHNOLOGICAL PLATFORM WITH A WEALTH OF SCIENTIFIC EXPERTISE, AT THE HEART OF A REGION RICH IN SKILLS, THUS GUARANTEES CUSTOMISED ASSISTANCE IN YOUR PROJECTS, FROM QUALIFICATION OF YOUR R&D (RESEARCH AND DEVELOPMENT) WORK TO YOUR INDUSTRIAL PROCESS.

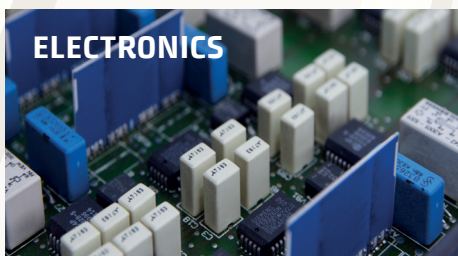


Contributing to your industrial performances



NUCLEAR

Development of detectors
Calibration of radiation measurement instruments
Ageing tests



ELECTRONICS

Semiconductor doping
Fault measurement
Qualification of components for aerospace



NEW MATERIALS

Cross-linking, polymer grafting
Thin film surface treatment
Fireproofing of cables and tubes



CONSULTANCY

Professional training
Drafting of certification application files



HEALTHCARE

Sterilisation of medical equipment
Research in radiobiology



ENVIRONMENT

Phytosanitary water treatment
Improvement of food preservation



**14 Allée des Vindits
Parc d'Activités des Fourches
50130 Cherbourg-en-Cotentin - France**

**Phone: +33(0)233 015 262
Fax: +33(0)233 015 269
contact@atron.fr**