



Deploying an ion beam accelerator to support Nigeria's economic development programmes

The challenge

Accelerator-based technology can play an important role in social and economic development in many sectors. Ion beam techniques are used to determine the age and origin of historical artefacts, to develop resilient and robust materials, to understand the elemental composition of samples, and to understand the ageing of nuclear fuel plant components.

With the goal of pursuing ion beam accelerator applications in energy, food and agriculture, biology, medicine and materials science, and with the intention of establishing suitable facilities to support the education, training and qualification of the nuclear professionals of tomorrow, the Government of Nigeria approached the IAEA for support in acquiring and installing a 1.7 megavolt accelerator, and for help in developing expertise in the use of the new beam line.

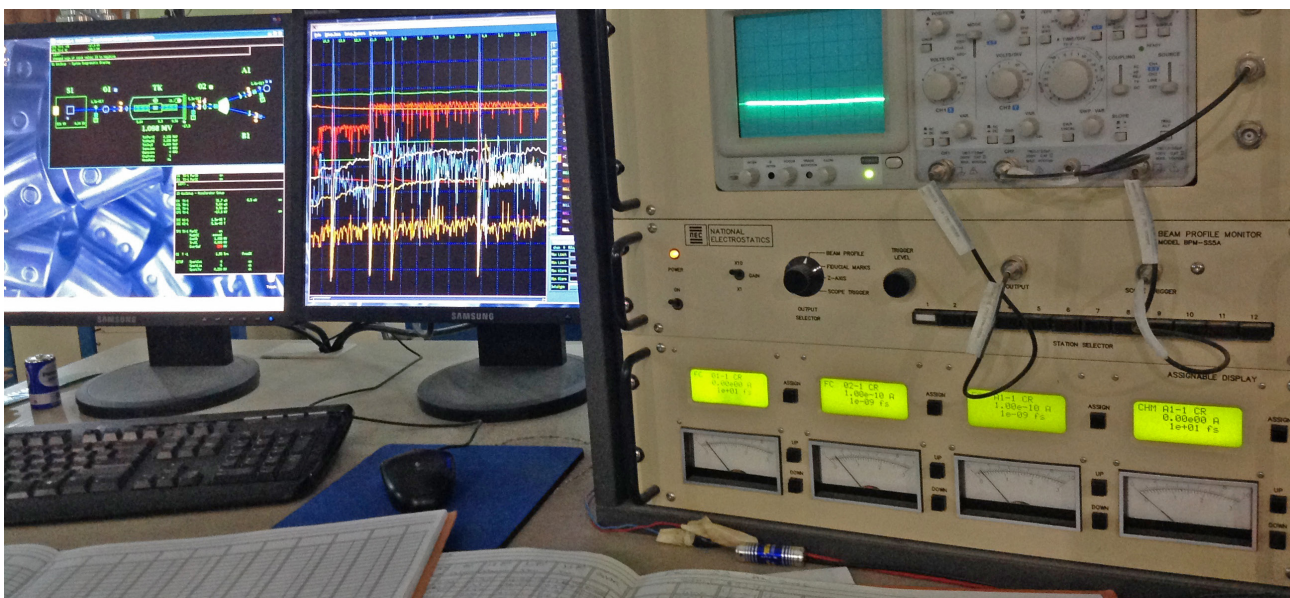
The project

Through two technical cooperation projects, the IAEA worked with Nigeria to support national

plans to effectively leverage ion beam accelerator technology for different peaceful applications.

The IAEA funded the procurement and installation of a new beamline and a vacuum chamber at the Centre for Energy Research and Development (CERD) in Ilé-Ifé, Nigeria. In addition, technical and scientific staff were trained through fellowships and expert missions. These training opportunities were central to the success of the project, providing guidance in nuclear techniques that facilitate the testing and characterization of materials from diverse fields of applications. Furthermore, on-site training workshops and technical meetings helped to familiarize the participants with the accelerator. Through the inclusion of regional partners and scientists, the project also encouraged exploration of opportunities for future collaborative research schemes.

Following the implementation of the project, stakeholders from across the country—including staff from CERD, researchers from Obafemi Awolowo University, and members of the national



View of the instrument control desk. The ion beam settings and the status of the ion beam accelerator's various components are displayed (photo: Yacouba Diawara/IAEA).

scientific community—were able to begin performing a range of experiments, which aim to achieve economic and social benefits for Nigeria. The accelerator now serves as a focal point for interaction between scientific communities and enhances international collaboration.

The impact

The Centre provides outreach programmes for students from various institutions, including universities, polytechnics and colleges, on ion beam techniques. ‘Open day access’ to the ion beam facility has helped to build awareness on the use and benefits of these techniques, and encourage students to pursue studies in science, technology and the applications of ion beam accelerators. Numerous scientific papers and doctoral theses have already been published in journals on the basis of research conducted with the Ilé-Ifé ion beam line, while many PhD, Masters and undergraduate students are using the accelerator for ongoing research work. The accelerator project has triggered research collaboration between CERD staff and the Obafemi Awolowo University faculty members, as well as with researchers from other academic and research institutions.



Internal view of the 17" ultra-high vacuum chamber, where a sample is installed for improved and advanced characterization of materials (photo: Yacouba Diawara/IAEA).

PROJECT INFORMATION

Project No: NIR4006 and NIR1010

Project title: Establishment of a Compact Tandem Accelerator Facility, and Deploying a CERD Accelerator to Support National Economic Development Programmes

Duration: 2005 and 2009–2011 (4 years)

Budget: €648 910

Contributing to:



Partnerships and counterparts

Various partners were involved in the completion of the project and in commissioning the ion beam instruments. The Nigeria Atomic Energy Commission provided technical support and staff funding, and were responsible for the clearing of nuclear related items. The Commission served as the government liaison agency on atomic energy matters. The project was funded by the United States of America through the Peaceful Uses Initiative. CERD staff conducted an outreach programme which successfully reached potential users of the new beam line.

Facts and figures

- Over 75 students were trained on this accelerator.
- Eighteen scientific papers were published in peer reviewed and scientific journals on various fields serving the social and economic development of the country.

The science

The ion beam accelerator can be used for material analysis, and has the ability to reveal the composition of any inorganic material without altering it or destroying it. Studies can be carried out in air or in vacuum. Accelerator-based technologies are regarded by many Member States as a key element in social and economic development, as they have a wide variety of applications in the energy, health, agriculture, environment, materials, natural resources and education sectors. Accelerators also provide an effective tool for the education, training and qualification of tomorrow's nuclear professionals.