

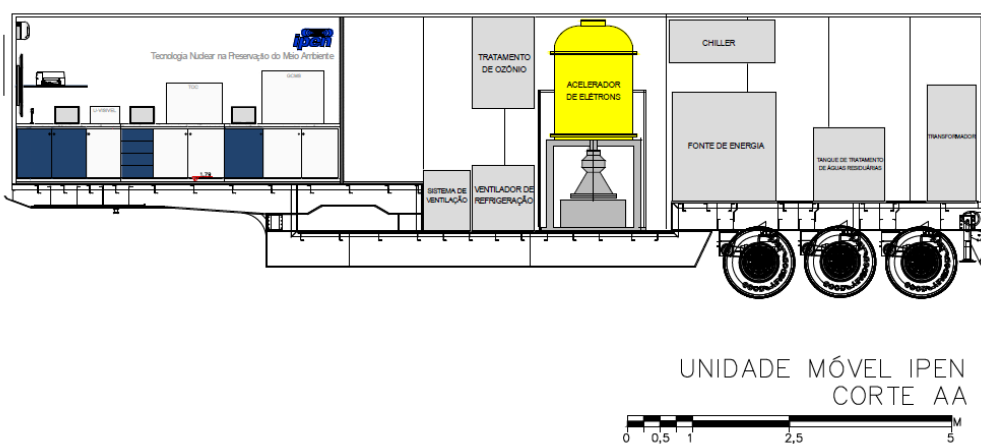
7th edition of the cross-disciplinary International Summer School INFIERI series

Roberto Blatt – IPEN

August 28 to Sept 9, 2023

Development of data acquisition and transmission system to control operational and radiological parameters in mobile irradiation unit with electron accelerator

The mobile unit shown in the figure on the side and in the schematic diagram below will serve for technology demonstration purposes, undergraduate and graduate education, and service delivery. However, it will be essentially intended for the treatment of effluents for reuse purposes, for example, domestic, textile, pharmaceutical or petrochemical industries, as a non-polluting alternative to conventional processes of degradation of organic compounds, such as: flotation, biodegradation, oxidation and incineration.



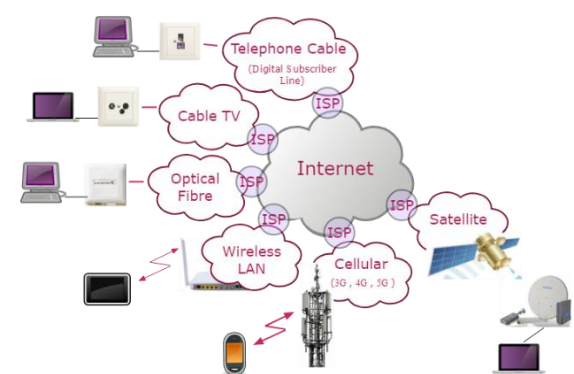
THE INITIAL IDEIA

SOMESSARI et al. (2020) proposed, in October 2019:

“...to install an electron beam accelerator (20 kW and 700 keV) in a mobile unit for treating effluents from oil production, for oil desulphurization and also for degrading toxic organic compounds in effluents for reuse, in partnership with public and private institutions.”

The advantages of using radiation in the treatment of effluents are presented below, as extracted from REVISTA TAE (2010):

- Production of highly reactive species regardless of pH, in the range of 3 to 11;
- No need to add chemical reagents;
- Decomposition of organic compounds, its degradation not being selective;
- Low temperature reactions;
- Safety in the operation of industrial electron accelerators;
- Easily controlled and clean process, without the formation of polluting and radioactive substances; and
- No generation of organic sludge in the process.



The proposed data acquisition and transmission system enables accurate data collection and secures a wireless transmission and real-time monitoring. Various means of radio communication will be researched, so as to have the most suitable solution for each location where the unit will be located, facilitating remote control and visualization of critical parameters.

I would like to express my thanks to my Master’s Advisor, Dr. Wilson Aparecido Parejo Calvo, and to the support from the Technical Cooperation Fund of the International Atomic Energy Agency (IAEA), the National Council for Scientific and Technological Development (CNPq Brasil), the Financier of Studies and Projects (FINEP), Truckvan Industry and Commerce Ltd., IPEN-CNEN, the National Service for Industrial Learning (SENAI), Petrobras and Sabesp.