RESEARCHES FOR THE DEVELOPMENT OF A DEVICE FOR THE DECOMMISSIONING OF THE HORIZONTAL FUEL CHANNELS IN THE CANDU 6 NUCLEAR REACTOR. CUTTING AND EXTRACTING DEVICE PRESENTATION

Constantin Popescu [1], Gabi Rosca Fartat [2], Constantin D. Stanescu [3]

[1]*Polytechnic University, puiu_2001uss@yahoo.com.*
[2,3]*Polytechnic University, rosca_gabi@yahoo.com, prof_cstanescu@yahoo.com.*

Abstract: *This paper present a constructive solution proposed by the authors in order to achieve of a cutting and extracting device for the decommissioning of the horizontal fuel channels in the CANDU 6 nuclear reactor. One of the most important part of the decommissioning device is the Cutting and Extraction Device (CED) which perform the dismantling, cutting and extraction of the fuel channel components. This flexible and modular device is designed to work inside the fuel channel. The main operations performed by the Cutting and Extraction Device (CED) are dismantling and extraction of the channel closure plug and shield plug, cutting and extraction of the pressure tube. The Cutting and Extraction Device (CED) consists of following modules: guiding-fixing module, traction modules, cutting module, guiding-extracting module and articulated elements for modules connecting. The guiding-fixing module is equipped with elastic guiding rollers and fixing claws in working position, the traction modules are provided with variable pitch rollers for allowing travel speed change through the fuel channel. The cutting module is positioned in the middle of the device and it is equipped with three roll knives for pressure tube cutting, having a system for cutting place video surveillance and pyrometers for cutting place monitoring temperature. The operations performed by the Cutting and Extraction Device (CED) of fuel channel are as follows: unblock and extract the channel closure plug, unblock and extract the channel shield plug, block and cut the middle of the pressure tube, block and cut the end of the pressure tube, block and extract the half of pressure tube. The Cutting and Extraction Device (CED) is fully automated, connected by wires to a Programmable Logic Controller (PLC) and controlled from a Human Machine Interface (HMI). The design of the Cutting and Extraction Device (CED) shall be achieved according to the particular features of the fuel channel components to be dismantled and to ensure radiation protection of workers.*

Keywords: *Candu reactor, decommissioning, dismantling, radiation protection, fuel channel, cutting, extraction*

1. General Introduction

In the decommissioning process of a nuclear reactor CANDU-6, due to safety reasons, the protection measures of personal are required against the nuclear radiation, and using special decommissioning devices with command and control from the outside.

2. General Presentation Of The Device

The decommissioning activities involve the remote devices coordination to prevent the contact of the operators with some removed components proximity.