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**CNEA Developments in U-Mo-Zry-4 Miniplates, Dog Bone Studies
and Plates Co-Rolling Control**

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ABSTRACT

The Uranium Molybdenum alloy was the material chosen to develop the fabrication of high density nuclear fuel. At present, the study is focused on the application of this alloy to monolithic fuel plate development. The Zry-4 alloy used as cladding material is extensively known in the nuclear industry due to its low neutron capture section efficiency and excellent mechanical and corrosion resistance properties. Since first experiments in 2003, CNEA is employing this material as cladding. Miniplates fabrication process involves a welded compact made of two Zry-4 covers and a frame surrounding a monolithic U-Mo core, which is co-rolled under temperature. Mo contains of 7% to 10% (mass) in U-Mo alloys guarantees the presence of meta-stable bcc gamma phase without penalizing in excess the neutron economy due to the capture cross section of the isotope Mo⁹⁸.

The calculation from initial dimensions (length, width, thickness) final ones for cladding, frame and core to fulfil after co-rolling the prescribed specifications is a key issue regarding miniplates and plate fabrication. Important facts are that U-Mo and Zry-4 have different strength shield values and different deformation rates under hot co-rolling.

Based on theoretical calculation and empirical data corroboration, this work presents the development of a control loop to properly fabricate in specifications U-Mo/Zry-4 miniplates and plates.