

Advanced Spacer Grid Design for the PLUS7 Fuel Assembly

Yong Hwan Kim, Kyu Tae Kim
KEPCO Nuclear Fuel Company

Yu Chung Lee
Westinghouse Nuclear Fuel Business Unit

Abstract

The PLUS7™ program is a joint KNFC and Westinghouse project to develop an advanced fuel assembly product to have extended burnup capability for a number of Korea and US reactors. This Fuel design utilized the proven advanced design features including mixing vane spacer grids to increase thermal performance, advanced high burnup materials to enable high-duty, high burnup fuel management and optimized fuel rod diameter which improves fuel cycle cost while resulting in significant standardization of Korean fuel manufacture. PLUS7™ uses a patented spacer grid design with conformal fuel rod support designed to provide superior fuel rod fretting wear resistance and high seismic strength while minimizing pressure drop. PLUS7™ also uses small hole/slot bottom nozzle and protective grid to improve debris filtering efficiency. With aforementioned advanced design features and well-defined verification tests, PLUS7™ is found to have seven outstanding benefits as compared with the current 16×16 CE type fuel, which include overpower margin increase as much as 12.8 %, high burnup capability of 72 GWD/MTU, increased seismic grid mechanical strength, enhanced fuel rod fretting wear resistance, enhanced debris filtering efficiency, improved fuel productivity and more than one million dollar per cycle savings imported enriched uranium product(see Table 1 and Figure 1). For in reactor performance verification of the PLUS7™ fuel assembly, four(4) PLUS7™ Lead Test Assemblies have already been manufactured and are scheduled to be loaded in Ulchin Unit 3 in December of 2002.