

DESIGN & ANALYSIS OF A NOVEL ARRANGEMENT FOR COUPLING AND DECOUPLING OF ROTATABLE PLUGS IN PFBR

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Large and Small Rotatable Plugs (LRP & SRP) form part of top shield and are used to position transfer arm over any required subassembly location during fuel handling. The annular gap between the Roof Slab and LRP as well as between LRP and SRP is sealed with the help of two types of elastomeric seals - Primary inflatable seals and secondary back up seal. These seals have a design life of 10 years and need to be replaced after every 10 years. The procedure to be adopted for replacement of seals involves removal of the hexagonal socket head screws connecting top & middle ring to support ring of LRP/SRP, lowering of the LRP/SRP onto roof slab/LRP respectively and lifting of top & middle ring to gain access to the seals. Similar procedure is applicable for carrying out maintenance of large diameter bearings also. To remove top & middle ring, load on the screws connecting the top & middle ring to rotatable plugs (400t / 200 t for LRP & SRP, respectively) needs to be relieved and then the plug needs to be lowered onto the Roof Slab. To relieve the load and lower the plug, a novel concept of multiple tie rod & nut arrangement, with each one operating in a sequential way was conceived & implemented. This dedicated arrangement was designed taking into account the space constraints over the Top Shield and the eccentric nature of the loading of the plugs. In this paper, the design aspects of arrangement conceived for lowering / lifting of LRP/SRP are discussed along with the results of structural analysis carried out to confirm the design. The maximum allowable torque and nut turn during each operation in the tie rod is estimated and presented.

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