MAINTENANCE CONCEPT FOR THE SLIMCS DEMO REACTOR

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Maintenance scheme is one of critical issues for DEMO. SlimCS adopts the sector transport hot cell maintenance scheme taking account of (1) compatibility with the sector-wide conducting shell, (2) flexibility for access to core components, and (3) high availability.

In the sector maintenace scheme, the number of in-situ cutting/re-weldng points of piping is minimized. In addition, use of spare sectors minimizes time required for the maintetance because the most time-consuming procceses such as re-welding and its inspection can be carried out in the hot cell during tokamak operation. The sector which needs replacement is transported using a cask. The cask has double seal doors so that a cryostat port is closed with one of the doors when the cask is undocked for transporting the sector to the hot cell. There are two options for transfering mechanism of the cask. One is the carrier composed of wheels and roller bearings. A sector with a weight of 750 tons seems to be transported with the existing technologies. The cask runs on rails and change direction with turntables installed on the floor. However, the concept using wheels and roller bearings has a technical difficulty of how to avoid a load concentration to some of them. As an alternative transfering option, air caster is under consideration. In the air caster, the required driving force for cask transportation can be as low as thousandth part of the total weight of the sector and the cask so that a comparatively small tow car with about 10 tons can transport the cask.

A critical design issue for sector maintenance is how to support an enormous turnover force of TF coils. In the case of in-vessel maintenance scheme like ITER, the turnover force is supported by inter-coil structure. In contrast, large open ports of sector maintenance scheme do not allow to setup inter-coil structure. In order to support the turnover force, a support structure with the use of tension force of rope and shaft (Fig.1 (a)) is studied. Merits of the concept are ease of balanced loading and length tuning of support. To support the resulting torsion, two options are considered: (1) support by the mezzanine floor of the reactor building (Fig.1 (b)), and (2) support by cryostat.

The estimated replacement time of sectors and the design issues will be presented as well.

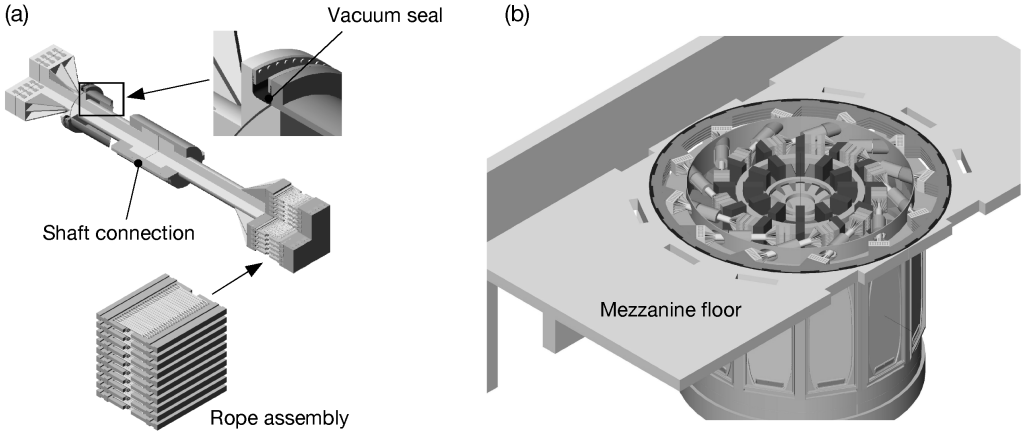

Figure 1: (a) Rope and shaft support and (b) concept of support by reactor building