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P3.144 Remote handling tools for hydraulic connection of divertor cassette in JT-60SA

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This article introduces remote handling tools for hydraulic connection of Divertor Cassette in JT-60SA, especially for cutting and aligning tools for re-welding accessing from inside of the cooling pipe. Remote handling system is necessary for the maintenance and repair of the divertor cassette in JT-60SA. Because the space around the cooling pipe connected with the divertor cassette is very limited, the cooling pipe is to be remotely cut and welded from inside for the maintenance. The outer diameter, thickness and material of the cooling pipe are 59.8 mm, 2.8 mm and SUS316L, respectively.

The remote pipe cutting tool head equips a disk-shaped cutter blade and rollers which are subjected to the reaction force. The tool pushes out the cutter blade by decreasing the distance between two cams. The tool cuts a cooling pipe by both pushing out the cutter blade and rotating the tool head itself. The roller holder is not pushed out anymore after touching the inner wall of the pipe. In other words, only cutter blade is pushed out after bringing the tool axis into the pipe axis. Technical issues are longer life operations of disk-shaped cutter blade and slide members concerning cutter and rollers. In order to solve these issues, more than 5 kinds of rollers and cutter blades were assembled. In addition, the most optimum conditions in the pipe cutting operation were also investigated. In primary results, more than 5 times long life of cutter blade and rollers without any maintenance operations was realized.

Before welding the hydraulic connection between Divertor Cassette and vacuum vessel, aligning of the groove is required. Divertor Cassette equips bellows nearby the hydraulic connection. A prototype of the aligning tool, which aligns the hydraulic connection against the bellows, was manufactured.

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