

ITER IVVS-GDC plug design and integration activities: status and plan

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Fusion for Energy (F4E) will manage the European in-kind contribution of various remote handling (RH) systems for the maintenance of ITER, including the so-called IVVS-GDC plugs consisting of six identical units, mounted in penetrations located at the lower level of the tokamak, where two different systems will share the in-vessel access from behind the blanket shield modules: the in-vessel viewing and metrology system proper, and the glow discharge cleaning system, named IVVS and GDC respectively.

While the six GDC probes and feeding lines will be in-kind contribution from China, the rest of the plugs will be designed and procured by Europe.

The IVVS will be used to perform scheduled and on-demand inspections into the vessel to make a survey of the status of the blanket first wall and divertor plasma facing components. This will be accomplished by making a laser-based scan where the image of the surfaces and their distances from the scanning head are taken.

Because of the operational requirements and constraints, the design of the IVVS-GDC plug poses many challenges with regard to:

- lay-out and integration of the various plug components into the geometrically constrained environment
- resistance to the design loads like those coming from plasma transients and seismic events
- compatibility with the ITER environmental conditions (within the primary vacuum boundaries): neutron fluence, activation, gamma doses, vacuum, baking temperature, magnetic field
- fail-safeness and recoverability, reliability, availability, maintainability, inspectability
- system lifecycle from first assembly and installation, operation, transportation via transfer cask to the hot cell for repair/substitution of components.

This paper presents an overview of the various aspects of the design issues, the activities recently accomplished or on going, a possible layout of the plug, the next steps planned in view of the procurement, and the long term strategy.