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## P2.140 Upgraded concepts and design of an in vessel inspection system for fusion reactors

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ENEA Frascati Laboratories has been involved since 2000 years in the development of a specific technology to afford the issue of the inspection of the internal vessel's surface of large fusion reactors characterized by hostile environmental conditions (high vacuum, temperature, high magnetic field, high fluxes of gamma and neutron radiations). The development took place in a series of intermediates steps under EFDA contracts and successively F4E Grants. An early prototype was developed to cope with the constraints of the JET machine then, starting from this experience, a second prototype was developed for the ITER fusion reactor. At the end of this phase the system has been redesigned keeping into account all the actual ITER environmental conditions and mechanical constraints and passing the conceptual design review by ITER organization, thus the design became the reference scheme for the successive industrial business case and procurement phase. ENEA Frascati Laboratories continued in the development of this technology applying it to a wide spectra of applications like underwater survey in pool of fission reactors, submarine environment and in the fine arts survey.

More recently a complete revision of the design developed for ITER has been done, applying all the expertise gained in the years and in the different applications to overcome some limiting characteristics of the old design. The revision completely modified the scanning system part and added further functions in the optical part like embedded calibration systems and related calibration procedures in order to improve the performances, making them more insensitive to the environmental conditions. The new revision has been protected by an international patent.

The paper describes the main architecture and the characteristics of the new revision evidencing the improvements compared to the old design.

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