

Role of Mechanical Engineering in the development of the European Fusion Project

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European countries decided to reach energy independence through two groups of power sources. The first group includes renewable sources such as wind and solar which have already been greatly implemented. The other group includes a new generation of nuclear powerplants which are based on nuclear fusion process instead of the more conventional nuclear fission. The goal is to develop the first fully functional demonstrative nuclear power plant (DEMO), which will generate electricity at a commercially viable price. To successfully build and operate such a powerplant, two major sets of know-how must be acquired in addition to existing knowledge gained from the current fission based nuclear powerplants. The first set relates to generation, handling, and usage of plasma on a large scale by means of dynamic electromagnetic fields. Successful construction of ITER (International Thermonuclear Experimental Reactor) will provide the possibility of development of such technologies. The second set relates to the operational characteristics and degradation of materials which are influenced by long-term high intensity neutron radiation. Hence, a facility which will enable exposure of various materials to neutron radiation is planned, named International Fusion Materials Irradiation Facility – Demo Oriented Neutron Source (IFMIF-DONES). Within DONES plant project, several pieces of equipment are to be supplied by Croatia, with the largest two being cranes. These include Heavy Rope Overhead Crane (HROC) whose goal is to lift the cover of the test cell and the Access Cell Mast Crane (ACMC) whose role is to replace the sample and maintain the equipment within the test cell.

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