REQUIREMENTS DEVELOPMENT, VERIFICATION AND VALIDATION FOR CENTRAL CASSETTE AND STANDARD CASSETTE END-EFFECTORS

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Requirements management including requirements traceability, verification and validation for complex mechanical designs are becoming critical more than ever; to produce a design that fulfills the customer needs within the allocated budget. Requirements management is used as part of the system engineering (SE), which can be the basis for the complex project success. The requirements development and implementation is an iterative process, which is used to define the requirements for the product. Clearly defined requirements, goals and targets are defined during the requirements management development stage and are documented into system requirement document (SRD). Tracing, validation and verification of requirements are conducted in the implementation stage to ensure the product satisfies the requirements. The requirements management process use can reduce the time and cost of the design and development of project, by defining, tracing, verifying and validating the requirements. The requirements tracing across the product life cycle ensure the product quality. In this paper, the central cassette end-effector (CCEE) and standard cassette end-effector (StCEE) case studies from system requirement development to conceptual design are presented. The use of various tools such as CATIA, DELMIA, DOORs, and SmarTeam for the CCEE and StCEE requirements development, verification and validation will be discussed. The resulting designs form this stage will be used as basis for full scale operational models for both CCEE and StCEE, hence it is important to build a mature design that satisfies all design needs identified in the requirements. This paper presents requirement management process developed for ITER end-effectors concept design, which includes the explanation of development, verification and validation, while utilizing ITER relevant design tool platforms, to generate end-effectors conceptual design and their task simulations.

This paper mainly focuses on following points

- Requirements management process
  - Requirements development process for development of complex system
  - Tracing of the requirements to improve the quality of the product in design
  - Verification and validation approach to embed the requirements into the product
- Case studies of RH equipment
  - Central Cassette End-Effectors
  - Standard Cassette End-Effectors