On Design, Quality and Exchangeable aspects of Indian Materials Database

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The vast materials data have been generated in various national and academic institutions in India. Such public data are now being put in a centralized Indian materials database. Within the Indira Gandhi Centre for Atomic Research (IGCAR), India in over the past three decades valuable property data for the structural materials used in nuclear power plants have been obtained in the laboratory. The data have been generated as per international standards to ensure high reliability. For example, low cycle fatigue testing is carried out as per ASTM E 606, fatigue crack growth as per ASTM E 647 and sensitization as per ASTM A 262 practice E etc. Further, the average of three tests is taken to assure good repeatability and reliability in results. As a part of centralized Indian Materials Database, one materials database for IGCAR has been designed and developed.

MS SQL server is used for storing data. The data is stored in multidimensional database schema for efficient and convenient storage and fast retrieval. Also every page on display is available in extensible markup language (XML) with which it is possible to compare the data generated in a particular laboratory with the similar data generated in another laboratory.

Data may be searched based on material class, material type, source, property etc. Large amount of data in the form of graphs, tables and microstructures are available. In each of these categories the data is further classified according to the fields such as mechanical properties, corrosion properties, non-destructive characterization and physical metallurgy studies. For example, mechanical properties, data is sub-divided into tensile, creep, fatigue, fracture toughness, fatigue crack growth and creep-crack growth. Fatigue is subdivided into low cycle fatigue, creep-fatigue interaction and thermo mechanical fatigue and fracture toughness into quasi static fracture toughness and dynamic fracture toughness.

In this paper, the challenges faced in designing a database, concentrating on ontology data and developing a secure web application are discussed. This project would ultimately be a data repository for the experimental data in the country.