

# Setting up of Indian Materials Database with Rich Metadata in Exchangeable Format

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Research on materials science is very well established in India. But it lacks effective archives to hold the experimental data on structural materials. Today there are many institutions that are doing advanced research for development of various structural materials to suit energy, chemical and power sectors.

The mechanical and corrosion properties of the various materials developed are tested for repeatability and reliability using test standards. These results are published in various international forums and journals but not available in a single place as transparent information in an exchangeable format.

This project of setting up of Indian Materials database was taken up a few years back with the inspiration from CODATA task groups and national committees in India. The most difficult part of the project was data collection. Premier Institutions from all parts of the county are chosen and nodal officers were identified. These nodal officers are responsible to send data on experiments conducted on structural materials that meets the quality norms. Experiments should follow ASTM standard, should have been repeated thrice for reliability, composition, history, heat treatment data should be complete and the owner of data should also be listed. This way the reliability and authenticity of the data collected was ensured for hosting on the database. Frequent workshops on data generation, archiving and nodal officer meets ensured that the data flow is continuous.

The data is stored in a relational database system .With the addition of every new material, the required metadata library is built up automatically. This speeds up and enhances the search of materials in the website. A multidimensional database structure is used to store materials metadata. The dimensions used are source dimension, materials class dimension materials property dimension and metallurgical conditions dimension .Presently all searches in the website are through source, material or property of materials. The metallurgical conditions are the second level. The source dimension has data on the organization where the experiments were conducted, group of people participated, period, journals published, title etc. The materials class has data on material class, material type and subtype details. The property dimension stores the material property and sub property if any. The metallurgical variables found in the database for austenitic steel are like Grain Size, Heat to Heat Variation, Thermal Ageing -Weld Joint, Weld Metal, Cold Work etc. The website uses eXtensible Markup Language for easy data exchange.

The website is developed as a data driven website so that future data additions does not require any changes to the website. The website is ready and undergoing security auditing. It will soon be hosted on internet.

The database consists of materials ranging from steels, alloys, ceramics, Composites, intermetallics etc. In addition to the initially compiled corrosion and mechanical properties the database has been further extended to other properties such as Dielectric, Electrical, Failure Analysis, Micro Structural Studies, Multi axial Forging, Non Destructive Characterization, Optical, Process Parameters, Resistivity, Structural, Thermal, Welding etc .

**Keywords:** Metallurgical variables, reliability, materials database, mechanical properties, corrosion properties, physical properties.