A Database for Performing and Archiving Oxygen Hazards Analyses

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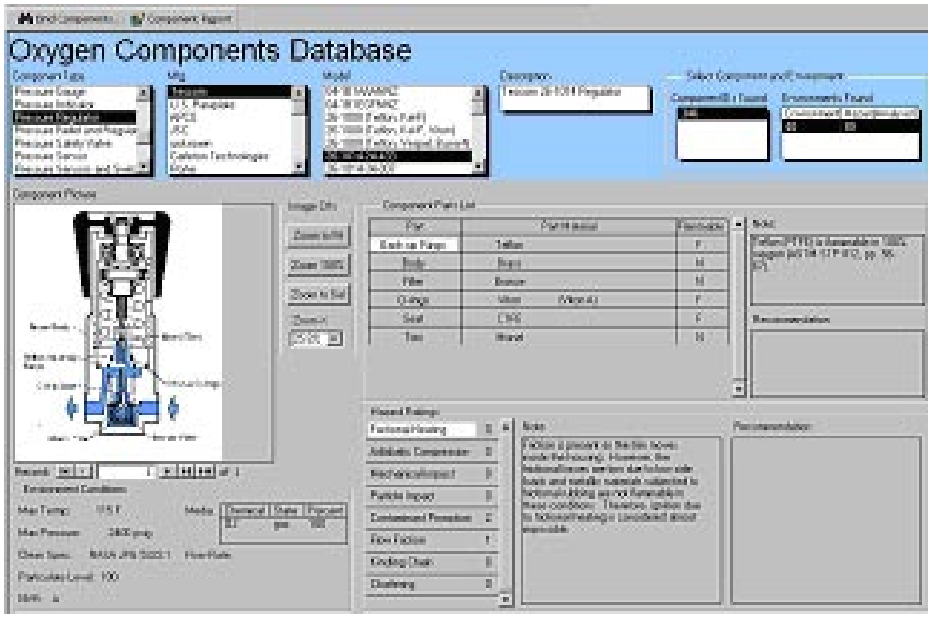
American Society for Testing and Materials Committee G-04 has published several guides and a manual outlining a process for identifying and analyzing fire hazards in oxygen systems. Many companies and government agencies have accepted this process as standard and, therefore, require hazards analyses to be performed on oxygen systems. When an oxygen hazards analysis is performed, the results are usually documented to identify the hazards associated with the system and its components.

The information needed to perform an oxygen hazards analysis includes details on system components, configuration, and operating conditions. Material flammability, ignitability, and potential damage data are also used when analyzing oxygen hazards. In the past, word processing and spreadsheet tools have been used to document results. However, the wide variety of numerical data, explanatory text, and pictures or graphics make it difficult to retrievably catalog hazards data using word processing and spreadsheet tools.

Recently, White Sands Test Facility (WSTF) performed an increased number of oxygen hazards analyses. The analyses revealed that many oxygen systems use the same components with slight variations. However, with the existing tools, all data had to be reentered for each analysis. To increase efficiency and precision of analysis, WSTF developed the Oxygen Hazards Analysis Database, an electronic database for performing oxygen hazards analyses.



The WSTF Oxygen Hazards Analysis Database is a relational database built using Microsoft Access 97 software. WSTF chose Microsoft Access because of its wide acceptance and general availability as a reputable database platform. A relational database uses tables as the basis for modeling "real-world" data. In common database terminology, the columns and rows represent fields and records, respectively. Each table (relation) represents a particular object or event (e.g., a hazard analysis). However, a hazard analysis is made up of many different parts, with some parts being related. Having all information for a particular hazards analysis in one table would make the database large and cumbersome, especially if many different hazard analyses were stored

in the table. Therefore, to model real-world data, a database needs to contain many different relations, or tables. By using the relational database principals, a hazard analysis is relatively easy to model and allows data to be queried and generated in various ways. The database provides a repository of all information used in hazards analyses including drawings, materials data, and environmental information that can be used for future analyses. Furthermore, the analyses of both systems and components remain available for future reference by allowing users to quickly access all data and past analyses as a reference for performing current analyses and answering questions that arise during the process. This paper presents the design, layout, advantages, and potential uses of this database.

One of the goals WSTF has for the Oxygen Hazards Analysis Database is to share the analysis data with other people. Currently, there are plans to make the database available on CD-ROM so a user can install the database on a personal computer and use the existing information. Users could add their own analyses to the database, generate reports, or run queries. Another long-term goal is to make the data available via the Internet. The database could be queried for information on the performance of analyzed components in various environments. This type of information is valuable to people selecting possible components for use in oxygen systems.

Performing oxygen hazards analyses has become a very efficient process with the development and use of the relational Oxygen Hazards Analysis Database. Engineers performing analyses need only input the hazards analysis data and information into the database. Since the database application contains a predefined format for a final report, the engineer is freed from the formatting duties normally carried out using a word processor. The Oxygen Hazards Analysis Database provides a repository of information used in developing hazards analyses. It allows users to quickly access all data from past analyses as a reference for performing current analyses. The data-relational structure makes it easy to find answers to questions about the data. A simple query can easily be constructed and run. New user interfaces can also be constructed to handle greater amounts of data from a more complicated query or to manipulate the data in other useful ways.