

STEP - Standard for the Exchange of Product Model Data

What Is STEP and How Is It Used?

by Howard M. Bloom

STEP is the international standards effort (officially entitled ISO 10303) to develop a neutral mechanism capable of completely representing product data throughout the life cycle of a product. The completeness of this representation makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing databases and archiving.

The basic strategy of the STEP community is to create a set of "application protocols (APs)" that convert end-user requirements into specifications that can be used to test conformance of vendor implemented application software (i.e. configuration control of design data) to the standard. The APs define the scope (using an activity model), the information to be exchanged (using an information model), the means of testing (using test suites), and a users guide for implementing the application.

Although the APs essentially define the scope of the standard, there are many supporting parts of the standard as well. There are a collection of **resource models** which contain a generic set of basic product information entities (such as tolerance, geometry, shape, material, drafting, kinematics, etc.) that are used to develop the emerging APs. There are also a set of **Methods** which define the means in which STEP APs will be tested (e.g. conformance), implemented (e.g. file exchange, shared database), described (i.e. using an object-oriented information modeling language EXPRESS) and constrained.

The first version of STEP is scheduled to reach Draft International Standard status in December, 1992. The two key APs to be issued are "Explicit Draughting" and "Configuration Control of Design Data". In the years to come, there are APs scheduled to increase the mechanical parts capability, and then introduce capabilities in such products as electronics, apparel, construction, sheet metal, and other areas.

The Department of Defense has put product data exchange in its Critical Technologies Plan issued in 1991. In the next five years, STEP should be operational for machined mechanical part production. In addition there will be (1) a conformance testing service, (2) at least the file exchange mechanism, and (3) transitional tools available to move legacy data into STEP part files.

CALS has identified STEP as playing a key role in supporting the three CALS objectives: **Reduce lead time** (through shared database), **Reduce cost** (accurate data), and **Improve quality** (data consistency to support CAD/CAE). In addition it is expected that as both JCALS and STEP mature, STEP technology will play a key role in the integration of the JCALS applications into the Integrated Weapons

Systems Database.

Up to recently there have been four key organizations in the U.S. involved in PDES (Product Data Exchange Using STEP). The IGES/PDES Organization (IPO) is the ANSI organization that supports product data exchange. The ANSI U.S. Technical Advisory Group to ISO TC184/SC4 provides the basis for U.S. participation for STEP. PDES, Inc. is a consortium of several major U.S. technology companies with the specific goal of accelerating the development and implementation of STEP. The NIST National PDES Testbed (supported primarily by CALS) is a government effort to assist in the development of the testing methods and supporting technologies.

An industry led, government facilitated National Initiative for Product Data Exchange (NIPDE) has initiated a program to accelerate and coordinate research, standards development and deployment of systems through the involvement of organizations that contribute to the entire range of PDE activities.

Howard M. Bloom

is Chief of the Factory Automation Systems Division at the National Institute of Standards and Technology. His organization is responsible for chairing the IPO, chairing and the secretariat for the ISO/TC184/SC4, secretariat for the U.S. TAG to SC4, managing the National PDES Testbed, serving as a government associate in PDES, Inc., and is a member of the NIPDE. Mr. Bloom serves on the steering committees for the IPO, NIPDE, and PDES, Inc. and is a member of the CALS Journal Editorial Advisory Board.

Abstact

This note provides a brief description on the definition of the Standard for the Exchange of Product model Data (STEP) and how it will be used by industry. Emphasis is placed on the development of "Application Protocols (APs)" that convert end-user requirements into specifications that can be used to test conformance of vendor implemented application software. The APs are further described in terms of other parts of the overall STEP. A description of the first release of STEP as a Draft International Standard is given. The importance of