



ISO 10303



STEP – Supporting innovation in the global market

by Howard Mason, Chair, ISO/TC 184, Industrial automation systems and integration, SC 4, Industrial data

Major industrial products, such as aircraft, ships, buildings and industrial plants, are increasingly being created and maintained through life using information held in digital form, by alliances of enterprises working in a long and complex supply chain. The use of digital data is intended to increase speed and accuracy, reduce costs and improve quality, and also offers the scope for new and innovative customer services based on more comprehensive knowledge. For example, accurate tracking of all the parts in an aircraft at all times allows the original supplier to offer better predictive maintenance and cost-effective operation.

However, there are a number of practical difficulties in realizing the full potential of these new capabilities.

- Individual enterprises use different software tools to undertake their work, with the data held in different forms, leading to potential barriers in communication.
- The life cycle of a product is often measured in decades, far longer than the software tools, operating systems and equipment used to create the information in the first place. This means that, unlike electronic transactions, information must be maintained in a usable form over an extended period.

- Different business functions often require diverse aspects of the product information to be extracted from a comprehensive model.

These problems have a common solution by using information standards to communicate between different computer systems.

Linking systems

ISO 10303 – usually known as STEP, the standard for the exchange of product data – provides a common data backbone for linking systems that create or use product information. The standard defines an integrated information model that supports multiple views of product data for different applications. For each application area covered by the standard, a standardized application protocol (AP) describes the scope of the information requirement in terms that are familiar to domain experts. This may be illustrated by an activity model which shows the business processes that are covered. The AP then links the users' view of the informa-

About the author



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is responsible for information standards in the corporate IT office. He has been involved in industrial automation standards for over 20 years, and has chaired ISO/TC 184/SC 4 since 2000. He also chairs the OASIS consortium technical committee exploiting the STEP standard, and the management group of the MoU on eBusiness among ISO, IEC, the International Telecommunications Union (ITU) and the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT).

tion to the integrated STEP information model. The resulting standardized definition of information can then be used to develop and validate translation software to allow different computer systems to communicate using agreed semantics.

One standard for varied industries

STEP has been in use for over a decade to provide open communication in the engineering industry. The aerospace industry makes extensive use of the standard for exchanging design and configuration information on projects such as the Eurofighter Typhoon, Boeing C-17 and civil programmes, and the Airbus family of commercial airliners. Automotive and shipbuilding applications are growing in many countries, and the use of STEP for printed circuit assemblies is also gathering momentum.

Supporting the product life cycle

The continuing development of application protocols to support different business information exchange and sharing requirements has revealed an increasing range of common packages of product information, or modules, which can be reused as building blocks in multiple applications. Over 240 modules have been published as technical specifications, and these may be assembled to meet specific information exchange and sharing requirements.

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The first application protocol (AP) to make use of the modular structure is ISO 10303 part 239, *Product Life Cycle Support (PLCS)*. This AP extended the STEP model to support all the information required to design mainte-

nance solutions for a product through life, to track planned and unplanned maintenance based on the actual state of the product, and the changing configuration of the product as components are replaced and repaired. PLCS implementations are now in production use in Norway, Sweden and the USA, and many more are under development or pilot testing. This standard is being used by the Organization for the Advancement of Structured Information Standards (OASIS) consortium to develop a range of consistent data exchange sets to support different business processes across the life cycle.

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The modular approach means that another new AP – the second edition of ISO 10303 part 203 on configuration-controlled 3D design – uses the same configuration model as PLCS for the initial design and manufacture of the product, so that information can be transferred directly from manufacturing to the support systems covered by PLCS.

Other new modular application protocols currently under ballot spread the coverage of STEP still further, into the manufacture of such diverse products as furniture and process plants for the oil, gas and chemical industries.

The real advantages of the modular approach comes from re-use of the modules, both in accelerating the development of new standards, and in developing information sharing applications, where tried and tested software can be re-used to build new applications. The first example of this is the proposed new work on a generic model for the through-life support of buildings, where most of the required information model is already available as STEP modules.



Using the Web to maintain the standard

The need to maintain information over extended periods places a particular emphasis on the maintenance of the standard and ISO technical committee ISO/TC 184, *Industrial automation systems and integration, SC 4, Industrial data*, has developed an innovative approach to the module specifications. All the content of all the modules is coded in a database under configuration control, and scripts are used to extract the relevant content for a module or set of modules, inserting all the standard text, including that required from the Directives, and converting it into a set of HTML (Hypertext Markup Language, the authoring software language used on the Internet's World Wide Web) files with the correct hyperlinks for immediate publication. Changes to a single module, or to the format, can be easily accommodated.

One STEP further

Major developments continue to support the information needs of systems engineering and printed circuit assembly functions, building on the available suite of modules.

The STEP standards and data modules represent hundreds of millions of dollars of proven investment, and are available to help in the generation of consistent product information models through the entire range of products covered by ISO.

Other standards groups, such as ISO/TC 29, *Small tools*, WG 34, *Cutting tool data representation and exchange* have already used STEP technology to develop their own information standards. Another area currently being explored is the use of existing information models to support application standards for the emerging radio frequency identification (RFID) technology (*see pages 20 and 23*), so that information about products can be stored on the products themselves, and maintained through life. ■