ISO 15926 – Lifecycle Data for Process Plant

A Bentley White Paper
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Introduction

Ever since CAD and 3D modeling were first computerized, there has been a need to exchange 2D and 3D geometry information between different CAD systems. In order to provide a common file format for this geometry information exchange, the development of standards began.

The industry required a standard that could record changes to a process plant throughout its life – a data warehouse that would contain information about:

- The requirement for a process plant and changes to the requirements
- The design for a process plant and changes to the design
- The physical objects that exist in a process plant and changes to these physical objects

As a result, ISO 15926 "lifecycle data for process plant" was proposed. The ISO 15926 initiative has been steadily increasing in maturity ever since, and with that increase in maturity so the interest and the adoption of this important standard has gained acceptance throughout the plant industry. By going beyond data handover, ISO 15926 is fast becoming the standard for interoperability and collaboration between complex data models of all types, including both 2D and 3D data models.

With the broad industry acceptance of this standard, organizations are now looking to software providers to support the standard within their product offerings so the plant industry can move to delivering content using this open standard. This paper outlines the benefits of adoption that this standard brings to the industry, how Bentley is responding to the challenge, and where the industry is heading.

Background

The ISO 15926 initiative is an outgrowth from other ISO initiatives that have defined particular domain data models in the process industry. The early 1990s saw the definition of ISO 10303 (STEP) with Part 221 defining the 2D schematics environment, Part 227 the 3D model, and Part 231 the process engineering content. ISO 10303 Part 227 has been successfully implemented as the XMpLant data model and has been used as the basis of conversion from one plant design system to another for several years now.

ISO 10303 Part 221 took a more generic approach to model definition and was the basis for the offshore oil and gas data model initiatives driven by the POSC Caesar organization (http://www.posccaesar.com/). To unify these various data models, ISO 15926 was created as a standard description of plant-related objects that provides a standard vocabulary and description that can be interchanged across diverse systems and across the lifecycle of the asset or facility.

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To date, POSC Caesar and Det Norske Veritas, known as DNV (http://www.dnv.com/), have been the principle driving forces behind the creation and maintenance of the ISO 15926 standard. More recently, the FIATECH consortium (http://www.fiatech.org/) joined forces with these two organizations to accelerate adoption of the standard by the industry and identified multiple areas in the FIATECH Capital Projects Technology Roadmap (http://www.fiatech.org/projects/roadmap/cptri.htm) where the benefits of the use of the standard can be gained.

Usage and benefits

Some examples of the business benefits that can be realized through adoption of the ISO 15926 standard include:

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- Selection of best-fit software for each organization. Different organizations have different software needs and being able to select the software and systems that provide the most benefits for an individual company's internal work process and practices without being limited to a proprietary format or a particular software vendor means that the organization can focus on the best tool for the job. This saves unnecessary expense in software purchases, training, infrastructure support, and, most importantly in today's economy, time to market for products and services.
- Participation of both large and small organizations on the same level playing field. There is no requirement to implement large-scale proprietary systems that do not meet a smaller organization's needs, select a system that cannot grow with the company, or to force selection based on the lowest common denominator in order to achieve interoperability. Ultimately, this leads to more competition and cooperation in the market by providing the flexibility to scale up or down without having to change software and infrastructure systems.
- Greater flexibility within the project team. Availability of a choice of software to use on a project means there is a larger pool of resources available to work on the project without the requirement to learn new software systems or transfer skills sets. This leads to shorter project schedules and reduces project risks and dependencies.
- Choice of toolset for revamp and expansion of existing facilities. The ability to transfer legacy information about an existing facility and then immediately use that information on the latest revamp or expansion project, without having to go through expensive and time-consuming information gathering exercises for the in-place facility, can significantly reduce project schedules. This legacy information may be transferred along with the project scope to the contractor, which in turn may use the design software of its choice.
- Protection of access to lifecycle data. The software industry is ever-changing, with vendors entering and leaving the market through acquisition, change in market opportunity, change of company focus, or simply going out of business. This in turn creates uncertainty regarding the future accessibility of asset information stored in a proprietary format 20, 30, or 40 years from now. Adoption of an open standard obviates that uncertainty.
- More competition. Open data exchange creates more competition between software vendors and results in better software as vendors move away from the locked-in proprietary formats and compete based on improvements in productivity and efficiency. Freeing up data access and data exchange also provides more competition for services because there is no longer the dependency on specific software expertise in order to compete for these services.
- Effective use of more data over the lifecycle. The ISO 15926 open standard enables data to be used more effectively across the lifecycle of the asset, with the appropriate data being available on a timely basis to each individual and organization that needs it. For example, operations may be heavily dependent on P&IDs and equipment and instrumentation data sheets, and a maintenance engineer may want to review

a rich 3D model to evaluate accessibility for shutdown planning. This ultimately creates a safer plant with the right information being available at the right time to the right person.

- Fostering of innovation. Finally, with time and energy no longer required to be expended on data transfer, location, or exchange, innovations leveraging the accessibility of the asset data can be developed and this can lead to better and more sustainable plant design, engineering and operations.

What is Bentley doing?

Bentley is an active supporter, contributor, and adopter of the ISO 15926 standard by providing intellectual talent and software tools to make the development and maintenance of the ISO 15926 model practicable and sustainable.

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Specific initiatives that are currently underway at Bentley include:

- Delivery of a common class editor for the development and maintenance of the ISO 15926 Reference Data Library. Bentley has provided the class editor to working groups within various consortiums as well as other individual software vendors that are developing and expanding the ISO 15926 data model. Bentley continues to enhance the class editor to support new extensions to the ISO 15926 model as it matures.
- Development of a common set of tools and utilities that provides conversion from legacy application formats into the ISO 15926 format. One of these common tools is the class editor mentioned above, which not only supports the definition of the ISO 15926 model but also allows the definition and mapping of proprietary data models onto the ISO model. This helps existing systems adopt the open standard without having to wait for new software to be developed.
- In addition to providing data transfer and exchange for legacy systems, Bentley is developing generic exchange capabilities between SQL databases and the ISO format.
- Enhancing collaboration with ProjectWise® Navigator™. The ability to view and collaborate using the native ISO file format, as well as with many other proprietary formats, enables every member of the project team the ability to access the same data-rich information.
- The ability to add vendor-specific catalog information quickly and easily. In the past, this meant that the manufacturer might have to deliver its component catalog in multiple different 3D system formats, or that the EPC or owner would have to implement vendor-specific catalog information into their 3D systems themselves. Bentley has developed an ISO 15926 based standard catalog format that allows all manufacturers to provide their information in an open common format and provides the ability to exchange between this format and the proprietary formats of existing 3D systems. Conversions that will be available in the near future include AutoPLANT®, PlantSpace®, and PDS catalog formats.
- Strengthening engineering analysis applications through the use of the neutral model exchange. Bentley has demonstrated the benefits of combining piping and structural analysis in one common environment, resulting in more accurate analysis including interactions between piping and steelwork systems. Being able to quickly analyze any 3D model based on ISO format means that it is much easier for these disciplines to be integrated with the design departments and leads to better overall designs.
- Leveraging a common 3D model format to generate isometrics from any 3D model and output. Using both Alias's Isogen and Bentley's PlantSpace Isometrics package provide more choice for isometric generation and management.

Looking to the future

To date, Bentley has developed and implemented significant ISO 15926 capabilities within the functionality parameters of today's tools. But in order to fully realize and leverage the advantages of the common ISO model, it needs to be a fundamental part of the software application. This is where our OpenPlant™ set of products is positioned.

Bentley has started to fully implement ISO 15926 with the P&ID, which is one of the key documents necessary for both the design and operation of plants around the world and will soon be delivered in the OpenPlant PowerPID product.

What does it mean to have an ISO-based P&ID application? It means that the application's configuration is a result of the object definitions contained in the data model. For example, any new pump type added to the ISO model will automatically be available in the P&ID application.

In OpenPlant PowerPID, data is stored using the native ISO format and therefore any application that manages ISO models can be used for data storage. Bentley will implement support for this storage format within both DGN and DWG files using the features of each of those formats to add extended entity information. Opening OpenPlant PowerPID in the native CAD environment will provide the same data-rich content as is found within the P&ID application itself. Other formats or repositories including XML, Bentley's AutoPLANT Data Manager, ProjectWise, or ProjectWise® Lifecycle ServerTM databases will also be provided.

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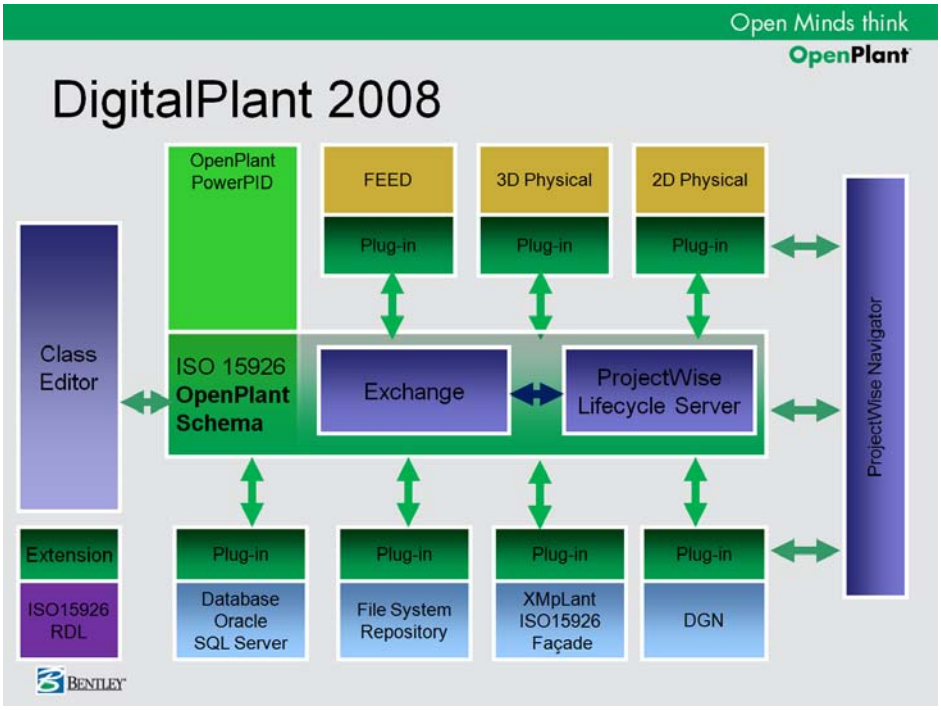
For 3D models, Bentley is developing an ISO 15926-based model management system that will allow users to execute model-centric plant design in a distributed environment using different 3D modeling systems. These OpenPlant products will support component level selection, check-in, checkout, and security definitions, and have model management capabilities extending beyond 3D to include management of 1D or 2D models in the same environment.



Bentley will also be developing new tools and products for the OpenPlant series. Using a neutral format as the basis of application development opens the door to other new solutions. For example, it enables the:

- Ability to add company-specific extensions to the base level applications without having the overhead of supporting a cumbersome customized environment. Users can concentrate on adding functionality that provides value to their business or gives them a competitive edge, without impacting any other applications that may be using that data or limiting the ability to exchange information with others.
- Ability to manage work no matter where a person is located, and no matter which tool is being used, so long as that tool supports the ISO model. Imagine having P&IDs edited by several people using different

tools with all the security and data sharing required without having to worry about formats, standards, or the software being used. Users will have the ability to improve their expertise and efficiency, configure the system to meet their needs, add custom utilities that add value, and still deliver without the inefficiencies of having to learn or use software with which the users are unfamiliar.

Extrapolate this to the corporate level and consider the benefits of being able to selectively outsource work without being concerned about the tools being used by the outsourced company, or take this one step further and imagine a world where expertise can be located anywhere and where the infrastructure necessary to support outsourcing to an individual is available. Collaboration could then take on new forms and provide the ability to collaborate within the application context, reserving or locking individual objects or even properties to indicate what is currently being worked on. When done, changes could be submitted and team members notified of the changes made.

Beyond software

But adopting a software strategy for your company is not all about the technology. It is also about enabling individuals to do their jobs effectively and efficiently, and in that context a software vendor needs to be able to deliver to the individual the content and education that makes the software easy to adopt, use and extend.

For Bentley, this includes:

- The BE community discussion forum where users can discuss and collaborate with a larger audience,
- The Bentley Web site (www.bentley.com) where users can download software, take remote learning classes, and attend on-line seminars,
- Flexible licensing models including the first-of-its-kind license exchange policy providing the ability to trade in unused software license for new licenses of other products,
- 30-day trials and the flexible pay-by-usage enterprise licensing.

Conclusion

With the adoption of ISO 15926, the traditional command and control software construct is being replaced with flexible and adaptable connect and collaborate software. The plant industry has the opportunity to re-invent work processes with the adoption of a common protocol for sharing data and models. In a MySpace, Facebook, or Linked-In world, it can only be a matter of time before new engineering business models emerge that embrace and leverage an open data protocol.