Engineering Practice

Three Insights for Managing Legacy Data

Safety, maintenance and acquisitions efforts demand rigorous engineering due diligence and access to complete, accurate engineering information

Jamie Fierlage
Intergraph Corp.

Existing chemical process industries (CPI) facilities possess years, if not decades, of legacy engineering information. The data exist in a myriad of formats and are typically siloed across multiple systems and locations. In cases where the engineering data are either lost or damaged, undocumented, or limited to the institutional knowledge of the local operations team, control documents related to piping and instrumentation diagrams (P&IDs), equipment data sheets, and maintenance or inspection documents, rarely reflect the as-built state of the asset.

Delays associated with finding accurate, usable engineering information can cripple management’s ability to make the most timely, cost-effective decisions. As a result, information-intensive operations — such as process hazard analyses, regulatory audits, due-diligence efforts required for acquisition activities, unplanned shutdowns, catastrophic events, and insurance-validation exercises — are exacerbated by inaccurate engineering information. This can lead to scheduling delays, added labor costs, human error, potential fines and lost production.

This article offers three recommendations to help engineering and operations stakeholders manage legacy engineering data in existing facilities.

A three-step approach

1. Capture and centralize both physical and digital P&IDs and datasheets. An important first step to capturing and centralizing legacy engineering data is determining where the data “live” for any given asset. The data will most likely reside in two forms: physical and digital. For microfilm, paper or photographs, management should agree on a standard means of digitizing the information and then invest the time and effort to convert relevant input data to a ubiquitous format (for instance, PDF). Many organizations choose to scan these documents into a central repository and output the results in an OCR-compliant format (OCR = optical character recognition).

Once the physical data are captured, owners should shift their focus to collecting and consolidating all digital forms of engineering data that may exist throughout the facility, such as P&IDs, 3D models, laser scans, Microsoft Word and Excel documents and PDFs. If future plans call for the ability to intelligently link supporting documents (such as process data sheets, instrument and equipment data sheets, vendor data and more) to the P&IDs, be sure to include the latter in this data-capturing phase.

To automate the data collection and organization processes, use a commercial, off-the-shelf (COTS) software solution that consists of pointers and search technologies that can be used to search workstations, servers and document management systems by file type, extension or name. Realize that with document management systems, the cabinet-folder-file paradigm is susceptible to duplicates, mis-filings, inaccuracies and missing documents. You can mitigate these issues later on by identifying the master documents, but only after all the data has been captured and centralized.

2. Identify authoritative or near-authoritative P&IDs and related information. Once the data have been captured and centralized, local operations teams can begin the process of identifying authoritative drawings and their associated documents. Most owner-operators focus on the integrity of the P&IDs and using a combination of automated COTS solutions and visual inspection, owners can qualify and compare P&IDs for inconsistencies and eliminate duplications (For more on P&IDs, see Chem. Eng., April 2014, pp. 62–71).

It is possible that some of these data sets may be categorized incorrectly, due to missing data, human error or outdated information. Be-
fore the organization stumbles upon one of these data sets, it should establish decision criteria that will predetermine whether or not the gaps in information need to be filled. If the missing data elements need to be redlined, reworked or recreated, ensure that current engineering standards and naming conventions are incorporated into the changes, to harmonize the captured data.

For many organizations, an automated solution for querying, compiling and reviewing legacy engineering information does incur costs, but it also incurs a substantial return on investment. Be sure to ask your vendor to identify reuse scenarios (such as acquisition due diligence) to help you justify the project. To improve overall communication and project management, consider offering key stakeholders — including your partners, engineering, procurement and construction (EPC) contractors and internal support organization — access to this repository via a secure Internet portal.

3. Build intelligent, tag-centric images and P&IDs that enable document linking. Legacy engineering information that has been centralized, virtualized and sanitized, becomes increasingly valuable to asset-management teams, engineering managers, and safety and maintenance planners. The data collected thus far should be representative of the current operating configuration and should accurately reflect the state of the asset.

At this point, owners can use a COTS solution to automate the creation of intelligent, object-oriented, tag-centric P&IDs, laser scans or images (Figure 2). These solutions usually include functionality for enabling the inclusion of hotspots (underlying software code that enables multiple documents to be related) within the P&ID or scanned image, thus allowing the knowledge worker to link these hotspots to related documents used by operations, maintenance, safety and procurement teams.

Today’s software solutions offer standalone platforms that can help to not only organize the data, but also integrate the digitized data into existing engineering data management (EDM) solutions. For maximum flexibility, owners should focus their attention on vendor-agnostic software systems that offer multi-format data interoperability and integration. If system integration is warranted, align the solution architecture with solutions that enable automated change management and avoid egregious (and expensive) customization.

Leverage business intelligence

The engineering information associated with an existing facility has “lived” within that particular plant and its operations team for years. As the organization builds its plant information-management strategy, it should involve the onsite engineering knowledge of workers early on in the initiative, and conduct interviews with the IT staff, to compile a detailed picture of systems — both commercial and homegrown — to determine the appropriate integration scenarios for maintenance and operations systems, and to reduce the need for in-depth customization wherever possible.

The spectrum of information for a given plant or facility, once organized, centralized and quality-controlled, can be more easily accessed, and thus reused and repurposed throughout the life of the asset. By capturing the legacy engineering information for a brownfield asset or fleet, management will possess a valuable new source of business intelligence that can be used to unite partners and EPC firms, control costs, improve project performance, mitigate regulatory non-conformance and improve operational effectiveness.

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Author

Jamie Flerlage is a business development professional for Intergraph Corp., Process Power and Marine (7840 N. Sam Houston Parkway West, Houston, TX 77064; Email: James.Flerlage@intergraph.com). He is an experienced writer, researcher, and speaker, with 20 years in the technology industry. His articles have appeared in national and international magazines and in syndicated business and technology publications. Among other credentials, Flerlage holds an MBA with Distinction from DeVry University.