Sharing Engineering Information

Steve Pearson, Pearson-Harper Ltd., UK.

About the Author

Steve Pearson is a senior consultant with Pearson-Harper, an engineering information management company.

The company is heavily involved in the development of ISO15926 and has developed an innovative web based multi-supplier catalogue to facilitate information sharing.

1 Introduction

Corporate and financial decision-makers realise the importance and significance of “operating and maintenance” and “information technology”.

However, the combination and optimisation of these subjects to increase equipment performance, which yields improved plant uptime and reduced maintenance support costs, will prove a very compelling argument for our leaders!

The common factor, which underpins most corporate initiatives, is engineering information. Reducing the number of equipment suppliers, reducing stock levels, improving equipment reliability, reducing maintenance and operating costs, compliance with latest regulations and a variety of other initiatives all prove difficult to execute with poor engineering information.

This paper describes the life cycle process associated with the selection of an item of equipment through to the support of the item during the operating and maintenance phase. The paper then describes the related international standards, which have been, or are being, developed to help all industries describe engineering terms to a common language. Finally and most importantly, the paper highlights the areas where information can be shared to accelerate your performance improvement initiatives.

Figure 1 – A typical Control Valve

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2 Equipment Life Cycle

2.1 Design Data

Consider the purchase of a control valve as shown in figure 1. The design engineer includes the valve on the Engineering Flow Diagrams, or P&ID's, allocates a tag number to the valve and records the pipeline number associated with the valve. Other documents and datasets are developed and ultimately a valve datasheet is produced.

2.2 Procurement

The datasheet is forwarded to several valve manufacturers for competitive bidding. The valve manufacturers compare the design data with their product offerings trying to match the specification. Eventually a valve model number is quoted along with the price and delivery.

2.3 Supplier Support Information

Once the valve is purchased a variety of information is requested by the designers and/or the operator, and supplied by the manufacturer, namely:

- Product datasheet, or specification detailing the technical characteristics of the valve.
- Valve calculation results.
- Factory seat leakage test results.
- Material certificates and conformance certificates.
- Valve outline drawings showing face-to-face and other valve dimensions.
- Valve installation and commissioning instructions.
- Recommended spares listings with associated parts drawings.
- Valve operating and maintenance instructions.

2.4 Stocking of Spare Parts.

The recommended spare parts are sometimes reviewed and agreed by the design engineers and in most cases the maintenance engineer has the final say. Once the recommendations are agreed then parts are procured for stock. In some cases a whole valve replacement philosophy is adopted.

2.5 Preparation of Maintenance Instructions

To support the valve on plant some companies elect to produce a specific maintenance instruction, which bridges the gap between the manufacturer's manual and the specific requirements of the maintenance team.

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2.6 Preparation of Maintenance and History Reporting Data

To help guide the maintenance technician technical data is required to support the valve. For example for those companies carrying out control valve leakage tests the valve class and maximum permissible leakage rate is stored.

For each leakage test the actual leakage rate is stored so that history can be trended.

To facilitate history performance analysis, some operators prepare fault and repair lists for job reporting. This approach provides a technician with a list of possible faults that a valve can exhibit along with the appropriate repair option. The simple selection of the appropriate option makes for consistent data entry and facilitates data analysis.

2.7 Reliability and Performance Analysis

Some operators have reliability sections with the responsibility for calculating MTBF's, MTBR's, etc. This statistical approach makes use of structured maintenance history.

The results of this analysis are fed back into the above processes to improve the maintenance regime and to modify maintenance frequency. Reports on equipment performance are also used to influence equipment selection, and we are all aware that feedback helps us to close the loop!

3 A Review of External Standards and Services, which support the above

If you ask a valve manufacturer to define the data required to specify a valve, one will find the same answer for each potential client. Therefore in an ideal world we could all use the same valve datasheet!

3.1 Datasheets

This logic has been taken up, by the Epistle community (see the web site details at the end of this paper), where teams of engineers from different communities and companies are developing "standard datasheets". These datasheets offer several benefits, namely:

- The content is organised into logical reusable components.
- The content descriptions follow the standard set in the ISO 15926 Reference Data Library (RDL).
- Solutions make use of existing and emerging technology, for example datasheets based on XML are available.

3.2 ISO 15926 Reference Data Library (RDL)

Process operating companies, leading design contractors, information systems houses and other service companies from the UK, Norway and the Netherlands have worked together to produce the above RDL.

In basic terms the RDL provides details of how to define the following: -

- Equipment Classes. (Control Valve, Centrifugal Pump, Pressure Transmitter, etc.)
- Equipment Characteristics. (Design Pressure, Leakage Class, size, etc.)
- Units of measure (Barg, Deg C, etc.)
- Characteristics specific to each, Equipment Class.

The RDL in not just a glossary of terms, it provides comments on the meaning of each entry. This reference dataset helps the engineering community to find the appropriate terminology to encourage the move towards standardisation. The descriptions are very logical and should do not prove difficult to follow. If any company finds omissions and anomalies then there is a team of people dedicated to making justified and controlled changes to the RDL in a timely manner.

Making use of standard terminology makes the sharing of engineering information possible.

3.3 Manufacturer's Technical Data

The specifying industry is making use of an RDL to define the requirements for a valve in a consistent manner. One day all manufacturers will also use the RDL to describe their products and associated specifications. At the time of writing major process operators are slowly moving towards, ISO 15926. It will take some considerable time longer for the manufacturers to follow.

However companies such as Pearson-Harper are currently building product catalogues, for use on the Web, for most of the leading equipment manufacturers. Part of this work includes the cross-referencing of the existing terminology used by each manufacturer to that used in the RDL **(see Steponthenet reference at the end of this paper).**

Structured History and Reliability Analysis - ISO 14224 Taxonomy Codes

The long-standing offshore reliability database OREDA has now been incorporated in ISO 14224. This standard describes typical fault and repair codes for different equipment types.

The use of this standard will once again facilitate the sharing of reliability information across and outside of the nuclear industry. The combined reliability results from large populations of equipment, from many industries, will help all concerned make positive moves towards the growth of reliable products.

There are also plans for the mapping of ISO14224 into ISO15926 RDL.

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4 Further Sharing Potential

Pearson-Harper is one company developing Web services to hold and share generic product information for it's clients. The following information can be regarded as generic and therefore held once for all to share:

- Product datasheet, or specification detailing the technical characteristics of the valve.
- Valve outline drawings showing face-to-face and other valve dimensions.
- Valve installation and commissioning instructions.
- Recommended spares listings with associated parts drawings. This should not need to vary across the industry.
- Valve operating and maintenance instructions.

Similarly one can see that industry can also share the following information:

- Maintenance instructions. (Most of the text is common across industry.) Using XML to merge the standard text with an underlying database, operators can produce a specific maintenance instruction from a shared template
- Fault and repair descriptions. These do not vary! Every valve across all industries exhibits the same potential group of faults. Therefore there is good reason to share this work.
- Maintenance philosophies and maintenance frequencies. This will vary across the industry however the available philosophy options are small and could therefore be documented and shared. Similarly maintenance regimes can be shared for guidance purposes. If one does not share this information then the interpretation of reliability results becomes more difficult.

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5 Conclusion

Having moved around the process industry, one can see that much of the work we all undertake is very similar.

With ever decreasing resources and increasing legislation it is becoming more essential that we work smarter.

With the emergence of ISO 15926, ISO 14224 and the increasing popularity of web-based solutions, the time is right for increasing the level of information sharing across industry.

The process industry has a very good reputation for high standards of engineering and attention to safety.

This prestigious reputation can only benefit from information sharing. If we are to appeal to our corporate and financial policy makers then we should start working together and start sharing information today!

References:

Useful Web Sites: -

http://www.posccaesar.org/
http://www.spi-nl.info.nl/
http://www.steponthenet.com