Managing nicely... the electronic approach to fabrication management

Traditionally fabrication records for a welding project are kept on paper. By taking a radical IT approach weld data sheets, fabrication inspection reports or weldmaps as they’re sometimes known, could soon all be stored electronically.

As with most paper based systems, there is extensive room for improvement by moving over to an electronic format. Mark Chinery and James Strachan explain how TWI’s new Welding Coordinator software can improve productivity and save costs when managing fabrication projects in industry.

Weld data sheets can be used to record a vast amount of information, and form a key part of any fabrication process. They offer storage of a variety of information from the materials used, the welding process, and the adopted filler material to whoever performed the weld. All this information is vital to be able to assess the state of completion of the fabrication and to ensure full traceability of the fabrication process. Working

James Strachan graduated from the University of Birmingham in July 2004 with a BEng in computer science. He joined TWI in September 2004 as a project leader in the software development section.

Mark Chinery graduated from The University of Kent at Canterbury in computer science. During his degree Mark worked for BAE Systems (combat and radar systems division). He joined TWI in November 2003 and is currently a project leader in software development, with the focus of his work on TWI's welding software packages.

with paper based systems on such extensive data causes numerous problems such as:

- Time consuming data entry
- Poor QA traceability
- Corrections are hard to make
- Issues with keeping shared data up to date

Recording information, finding welding procedures and looking up qualified welders are time consuming and error prone processes. Add to this the difficulties of distributing data to all those on a site who require it, and we find a major weakness in current paper-based systems.

When looking from a QA perspective, traditional methods of recording weld map data have further
inherent flaws. With no easy way to guarantee that the data recorded is correct and up to date, companies involved in large scale or high risk projects require more reliable traceability back to welding procedure and welder qualification documents. Errors at an early stage of a project can have huge ramifications at a later date.

How Welding Coordinator can help

Welding Coordinator provides an electronic alternative to paper based methods of recording data, allowing the user to:

- Reduce time spent recording information
- Share data more easily
- Reduce errors and the impact of errors in weld data sheets
- Make use of built in materials databases
- Easily re-use data

Issues with the speed of recording data are tackled by eliminating many of the laborious tasks involved in recording and looking up data by hand. Built in base materials, shielding gases and fillers databases allow quick searching of resources, and drop down menus allow common data to be re-used easily. The user is presented with a familiar weld data sheet layout, which can easily be customised to suit individual needs. Storing the data in an electronic format allows corrections to be made to the live document neatly and easily, instantly updating the information on any computer with network access, and eliminating the problem of out of date information. Changes are reflected immediately on all computers.

Welding Coordinator also has many helpful features to address quality assurance issues, giving several advantages including:

- Greater QA traceability of related documents
- Built in functions to ensure correct data is entered
- Give contractors peace of mind that projects are managed effectively

Hold points in the project allow the fabrication process to be held up until work has been approved by a QA inspector. Weld sign-offs and locking allow users with the correct permissions to mark a weld as complete, and lock it so the data cannot be edited. Similarly, project locking prevents data in a completed project from being edited. With modern business attitudes bringing legal issues to the fore, these features could provide a useful advantage in a contract bid, where the contractor wants proof that work is completed consistently and to a given standard.

The proof of the project is in the welding

Until now, Welding Coordinator has only been available as a more costly, highly customised application. Customers from many industry sectors have benefited from using Welding Coordinator, including:

- BP Chemicals, Hull
- BP Chemicals, Grangemouth
- Entergy Nuclear North-East, Oswego, NY, USA
- VT Shipbuilding, Portsmouth
- ABB Power Construction, Derby

Entergy Nuclear North-East has been successfully using Welding Coordinator since 2001, managing over 3000 maintenance jobs within the first year of installation of the system. The electronic method provides substantial time savings for Entergy project planners as Neil Chapman explains:

‘One example of time saving is that the previous period for the preparation of a welding data sheet for a package was in excess of one hour for new planners. The current time, using the Welding Coordinator system, to complete a welding data sheet is approximately 10 minutes.’

Entergy continues to use the application in conjunction with Weldspec and Welderqual, to manage all site maintenance welding projects. A successful pilot study of the customised version is being run in collaboration with Heatric, heat transfer engineering specialists based in Poole, Dorset. The pilot study has proved that the standard version of Welding Coordinator is capable of not only replacing, but providing major improvements on the paper based method. A typical project at Heatric might consist of over 90 welds, with information for each weld spread over the width of two pages of A3 to store all the relevant information. This could require eight sheets of A3 to hold data for all the welds. Graham Hole, from Heatric, reports:

‘At Heatric, we have been using Welding Coordinator for almost four months and assessing its usability on four of our projects. The database is monitored regularly and we have been impressed with its operation so far.’

Welding Coordinator eliminates the cumbersome paper based data storage, allowing all of the data to be viewed by any Coordinator user on a
networked computer anywhere on the site. With data sheet printing facilities available if required, none of the functionality of the paper based system is removed. Heatric adds;

"Our manual system is currently run alongside Welding Coordinator, but due to the new software’s fine performance we expect to be using it as a stand-alone system within six months."

Previous customers and the pilot scheme have proved that Welding Coordinator can:

- Save time and money
- Replace paper based management methods
- Provide useful performance reports to identify problem areas
- Reliably manage large welding projects

Integration with TWI's other welding software packages

Welding Coordinator uses TWI’s existing welding software packages to build a complete solution. TWI has been creating welding software for over 20 years, successfully providing solutions for the management and production of ASME IX, EN 287/288/15614 and AWS D1.1 code compliant welding procedures (Weldspec), welder qualifications (Welderqual) and NDT/NDE reports (NDTspect).

Weldspec is used to manage welding procedures based on the above codes. It helps during the creation of procedure qualification report (PQR) by generating the form layouts, generating the test requirements and generating the ranges of approval, all based on the above codes. Weldspec will then write the welding procedure (WPS) automatically from the PQR.

Welderqual manages welder certificates or qualifications. Like Weldspec it includes code rules from the most common welding standards and can help generate documents by generating ranges of qualification for welders and helping determine testing requirements. Unlike welding procedures, welder qualifications expire over time, typically six months, so Welderqual also includes a welder maintenance log to help keep qualifications up to date.

NDTspect is a database for NDT/NDE reports. Pre-defined layouts are included for radiographic test reports, ultrasonic test reports, magnetic particle test reports and liquid penetrant test reports. The program also has databases built-in so you can store details of your radiographic sources or films, etc.

Welding Coordinator makes use of the other welding software applications to maximise output with the minimum of data input. With Welding Coordinator you can:

- Select and trace welding procedures through Weldspec
- Find and track qualified welders using Welderqual
- View NDE Reports through NDTspectrum
- Automatically update welders’ qualifications in Welderqual when satisfactory production welds have been recorded in Welding Coordinator.

Welding Coordinator will search Weldspec data to find a suitable welding procedure specification (WPS) to complete the weld, automatically entering the relevant information into the weld data sheet. Based on material information entered in the weld data sheet or WPS information from Weldspec, Welding Coordinator makes use of Welderqual data to search for qualified welders to complete the work. Once the fabrication has taken place NDTspectrum can be used to select NDE reports and confirm a weld has been examined and its quality approved. As all TWI’s welding software packages are multi-user systems the information will be updated as it is changed and other users will be instantly able to see the current state of the fabrication process and action work accordingly.

Performance reporting

In addition to the printing of weld data sheets, Welding Coordinator will analyse the data to generate several useful performance reports. These might be used to help the project manager identify training needs, design new schedules to iron out bottlenecks in the fabrication process, or to track the amount of work completed within a given time period. The reporting built into the software includes:

- Welder performance report allows the project manager to monitor the performance of each welder in the team, by tracking defective welds and the number of repairs carried out
- WPS performance report provides information on the use of each welding procedure
- WPS per welder report allows a more in-depth analysis of the performance of each welder for each WPS they have worked to
- If a project requires a data book to be printed for the client, the weld data sheet and all associated information (WPSs, PQRs, welder certification and NDE reports) can be printed on the click of a mouse button.
When combined with the rest of the welding software suite, Welding Coordinator offers a comprehensive solution to meet the increase in documentation required to meet the demands of managing welding fabrication projects in the modern day engineering environment. Whether a company’s focus is on meeting quality assurance requirements, improving work scheduling or simply reducing time spent doing paperwork, Welding Coordinator provides an attractive solution. By combining all the functionality of a paper based system with the useful features described in this article, Welding Coordinator is a software package that takes fabrication project management to the next level. For more detail and free demonstration versions of TWI’s welding software visit www.twisoft.com or contact Andy Brightmore, James Strachan or Mark Chinery.

Fig. 4. Welderqual manages welder qualifications and updating of certificates.