PAPER: A THING OF THE PAST?

Jeremiah Kimber, Brad Raabis and Stephen Webb, Metegrity, Canada, reveal the advantages of software that can access all facets of pipeline construction in real-time.

The birth of every pipeline begins with its construction. It is a job both daunting in scope and complex in execution. There are progress reports, materials, production numbers, site and weld imagery, inspection data to meet the regulatory requirements – the list goes on. For too many years, those in the pipeline construction industry have relied heavily on paper reporting or Excel/PDF to manage this data. Such dated practices make it difficult to determine what is going on in the field at any given moment. The file-based format requires extensive man-hours to make the data within them consumable to cost controllers, project controls, scheduling, project quality managers, project managers and more. By the time information is located and consolidated into actionable project intelligence, project staff are already playing catch up to locate the current week's documents.

On the jobsite, this dependency on paper reporting or spreadsheets requires an enormous amount of project overhead man-hours. Field inspectors must decide whether to maintain surveillance on the workface and complete paperwork on their unpaid off hours, or to leave the workface unmonitored and complete paperwork while being paid. They must either add excess hours to their day or sacrifice quality control. Most will choose the latter. The reports then change hands from inspectors, to administrators, eventually on to head office. At every stage in the process, the field reports undergo labour intensive reviews, aggregations and filtering up the chain of command and into other systems (i.e. cost control, scheduling, etc.).

All of this added manual processing creates lag in the file based system. That lag means that the Project Manager does not have real-time awareness of what is going on with the project. They are dealing with every report in isolation, thereby impeding the ability to manage projects simultaneously or react effectively and expediently to any problems. How can a project of such magnitude – the construction of pipelines – be conducted effectively in such an opaque, disparate system?

The answer is, it cannot. Quality of construction suffers. Issues slip through the cracks. Efficiency of the project suffers as vast amounts of overhead are required. Proactive

and reactive measures suffer due to the time lag. With information in such disarray, it takes too long for actionable intelligence on potentially devastating problems to reach the right hands. The likelihood of cost overruns, failures, environmental hazards, and pipeline digs for regulatory compliance verification all go up. The sum of these pain points? A very real financial toll that will ultimately trickle all the way up to the profitability and expenses of corporate.

Software as a solution

That is why, in recent years, we have seen a major trend toward utilising software for pipeline construction data. The concept is simple: utilise a single software tool that can capture and centralise pipeline data on the right of way, as well as facilitate the recording, organising, storing and retrieving of all pertinent project information. Every single bit of information collected in the field should be classified, standardised and stored in separate fields in a database. This makes data integratative (e.g. Hard Dollar, SAP, Primavera P6, Vintri), future-proof and consumable by current and future technologies (e.g. machine learning, cognitive analytics, etc.).

A document-based system cannot give data the platform to use these technologies seamlessly.

Rather than waiting until the end of shift to manually input their reports, inspectors can capture and update data in real-time as they go. They have all their work on one device, whereas before they might have needed a camera, laptop and printer just to build a single report. With the right software, they only need one tablet; with the press of one button, their report is synced, allowing them to concentrate on work.

Instead of waiting for information to climb the chain of command, project managers have instant access to all facets of the pipeline construction process, from all disciplines, in real-time. The benefits of migrating to streamlined, standardised, and centralised software for pipeline construction management systems are tangible and immediate.

Management no longer wastes hours chasing information to perform required tasks. Project staff can refocus their attention to construction management and maximising project efficiency on site instead of consolidation of data from reports. Any problems can be addressed at a low marginal cost immediately – with no extra expense caused by delayed travel of information.

Figure 1. A Quality Inspector capturing inspection data on a tablet at the workface.

Having access to all reports in a single database allows managers to eliminate missing reports, and remedy that issue before anyone leaves the worksite. An inspector can regularly update the database throughout the day with the number of labourers and machinery running, enabling head office to access data points at any time. With all projects in a central database, Business Intelligence (BI) can be run against previous similar projects to give an accurate representation of estimates for tendering and bidding on new ventures. It also simplifies the life of the project managers – who frequently travel for meetings between spreads – and for the corporate office, as they can login to the server and have access instantly to the heartbeat of the project.

Man-hours become reduced across the board and quality surveillance is increased, since there is no need to wait around, manually input data, physically hand off reports, and wait for said reports to filter up the chain. Without having to make the decision between paid hours and unpaid hours to complete paperwork, job satisfaction and morale improve amongst field inspectors – not to mention efficiency and, thereby, reduced expense. Saving so many man-hours also translates into improved overall project expediency and a higher quality product delivered.

Safety is a big factor. Due to the efficiencies rooted in reporting from a tablet, inspectors can remain focused on the workers and not on paperwork.

Further savings occur with regulatory compliance. Companies no longer waste time and money locating inspection reports when the regulator visits the site. Regulatory fines are expensive and avoidable. With a database software, all daily reports for a weld are accessible immediately. This inspires confidence in the construction quality management process in the eyes of the regulators.

With the right software, welding parameters are automatically synchronised with inspector tablet-based applications to make sure the weld is 'in spec' with the current revisions every time. This saves money by avoiding situations (e.g. unqualified welders, wrong/old welding procedure used) that typically result in the weld needing to be cut out, redone or, worst-case scenario, a regulatory fine.

The long-term records department can expect substantial time and cost savings with the ability to pull up records instantly. No longer would they have to filter through paper binders, PDFs or spreadsheets in SharePoint systems, which makes the process of finding pertinent information long and tedious.

The pipeline industry is always under a microscope and cost restraints. Very often the questions asked, or the requirements needing to be met, will change. Having access to all relevant construction data on a single database allows companies to future-proof their data and make it consumable by people and technologies of today and of the future. New technologies (e.g. Internet of Things (IoT), digital

twins, machine learning, cognitive analytics, etc.) will all be digital, but the format required by these technologies can only be serviced efficiently if data is in the correct format – a relational database of fields, and not of files.

The pipeline construction industry already pays for this data in the form of files. We should demand a higher standard of data and push our industry into a brighter future. With real-time access to information, reaction times are substantially improved. This has a meaningful impact on the risk of shutdowns, excess pipeline digs, equipment failures, or other catastrophes in the future. The reduction of those elements brings with it reduced overhead costs and environmental impacts as well as improved safety for all personnel involved. The overall result is an exponential increase in ROI.

Elements of an excellent pipeline construction management software

When it comes to pipeline construction data management software, one size does not fit all. It is important in any new venture to undertake thorough vetting of multiple vendors. First, the company should assemble a team to discuss their unique needs and what they hope to acquire from a solution. Next, analyse objectives and establish a general wish list, and then thoroughly vet multiple options to discover which one might work best for the organisation.

Functionality that should be provided from a vendor includes:

- A single database of information, not files.
  - Every single bit of information collected in the field should be classified, standardised and stored in separate fields in a database. This makes data integrative, future-proof and consumable by current and future technologies (i.e. IoT, digital twins, machine learning, cognitive analytics, etc.)
  - A document-based system cannot give data the platform to use these technologies seamlessly.
- Accept data straight from the field.
  - Data should be accepted straight from the field onto secure cloud servers.
- Real-time access to project information.
  - Any users (be they administrators, project managers, etc.) should be able to access the information pertinent to them immediately, as soon as they synchronise their device. The software should be able to manage different report formats and validate inspection data immediately.
- Analytics for field personnel.
  - Look for the ability to set up analytics for corporate or field personnel, which maximises the near real-time, granular, actionable intelligence without having to sift through binders of printed reports.
- An integrated camera.
  - The software should include an integrated camera, enabling inspectors to take photos and include them in their reports, and also read barcodes of materials. This saves time having to explain issues that instead can be visually ascertained at a glance and enhances material traceability.
- Regulatory compliance.
  - Look for a software that has built-in enforcement of major pipeline regulatory standards, so that all of the required information for an audit is readily and immediately available.
- Push data to the inspectors.
  - Another feature to look for is the ability to push the latest project revisions out to the inspector. This helps further reduce wasted time by removing the need for paper handouts, and the regulatory headache of being caught without the latest versions of welding procedures in an inspector's clip board.
- Daily reporting on contractor presence, materials, tool and equipment expenditures, and more.
  - The ability to compare inspectors' reports with what the contractor is billing, in order to prevent and control cost overruns.
- GPS locations of welds, with pictures.
  - The ability to instantly access GPS locations of welds and any associated imagery is a must.

Conclusion

Pipeline construction is a vast, complex process with many moving pieces – and the larger the pipeline project, the more intricate the web. Relying on dated mechanisms for the collection, management and reporting of pipeline construction data impedes the process at every turn. It compounds excessive man-hours, creates unnecessary delays, and makes it impossible to be aware of (and therefore effectively manage) all the goings on of the project at any given time.

The good news is that technology has evolved to such an extent that real software solutions exist to take on these elements simultaneously. A good pipeline construction data management software allows for near real-time capture, collection, management, analysis and reporting of the entire pipeline construction process across all disciplines. The result? The ability to focus attention where it counts: on quality, expediency, and safety. Improved morale, better results and maximised ROI.

Other industries (e.g. accounting and logistics) have successfully made this transition to the next generation of technology, and the pipeline industry should as well. The benefits are undeniable and inevitable, as companies that adopt these practices will lead those who do not. The time to invest in these technologies is now.