

Volume 20 Number 5 - May 2020

The Future is NON

Generating Value with Digital Data Management



Integration is he new of the second s

Adam Reale, Alex Knittel, and Grant Cooper, MISTRAS Group, USA, outline an integrated approach to data management for pipeline integrity in an industry that is rapidly advancing.

he most widely-used methods of pipeline integrity data management, though effective in years past, are becoming outdated as the industry moves into a new age. With the implementation of the US Pipeline and Hazardous Materials Safety Administration's (PHMSA) expanded guidelines for pipeline integrity management (IM), commonly called the 'mega rule', existing data management practices do not provide the level of integration required to make data "reliable, traceable, verifiable, and complete", as the rule requires. The necessity to make data complete and accessible has created the need for pipeline operators to evolve their methods of pipeline data storage and utilisation.

Pipeline operators require a provider that is able to handle their comprehensive data requirements. A company such as MISTRAS Group – a One Source Provider of Asset Protection Solutions® – that has a history of providing value to its customers by successfully integrating and cohesively analysing data from multiple inputs in the downstream sector, is poised to do the same for pipeline operators. Upon realising there was a void in the midstream sector, the NDT provider acquired member brands Onstream and New Century Software to work jointly with its powerhouse Plant Condition Management Software (PCMS) to introduce a data management solution that supports every aspect of pipeline IM data management.

This integrated data journey is helping to usher in a new era of pipeline IM where operators are able to utilise a holistic digital approach that puts safety, compliance, and cost at the forefront of asset integrity.

Existing issues with pipeline data management

Historically, following non-destructive testing (NDT) and inline inspection (ILI) data acquisition, inspection data has



Figure 1. Digital reporting platforms send inspection data from the field to the database using a tablet or mobile device, efficiently transitioning away from paper-based reporting.



Figure 2. An asset performance management (APM) application is designed to allow oversight of multiple assets across multiple facilities in one, integrated platform.



Figure 3. Advanced pipeline integrity software solutions allow data to proactively inform spill impact analysis, risk assessment, and more, by using inputs from multiple sources.

been housed on spreadsheets and filed away, with some organisations using a combination of hard copy and digital storage of the inspection and integrity data. However, NDT and ILI services are often performed by separate contractors, each with different reporting methods and data storage platforms. Data from even the earliest stages of new pipeline construction must inform personnel years later, and the efficient delivery of this data from field personnel to operators is essential in responding to current and future potential damages. Creating gaps in this interconnected data can cause operators and inspection personnel to potentially miss threats to asset and personal safety, along with potentially increasing costs down the road if necessary maintenance activities are overlooked.

Even with digital documentation, files can be disorganised and misplaced without a centralised location to store information. For pipelines that have been in operation for decades, having documentation stowed away in cabinets does not allow for the quick accessibility required by today's jurisdiction. The lack of a dedicated asset performance management (APM) application or geographic information system (GIS) can potentially result in missing critical data that would indicate a future failure.

In order to remain compliant with increasingly stringent regulations, and to have access to the comprehensive integrated data to make the most informed operations and maintenance decisions, operators can realise significant value by integrating all newly-acquired data.

Integrated data highway

The future of pipeline integrity data management starts with creating a data highway for seamless transportation from the field, and a central data warehouse to store it. Use of digital reporting platforms, such as MISTRAS Digital, can eliminate the need to manually input data into an APM. This has the ability to provide large gains in time and cost efficiencies, and ensure that all data is standardised and accounted for.

A digital reporting platform is designed to optimise the process for requesting non-destructive evaluation (NDE), forecasting schedules, assigning tasks, executing field work, reviewing results, publishing reports, and generating key performance indicators (KPIs). It can allow mobile devices to conveniently store and access data and documentation including:

- Isometric drawings.
- Veld maps.
- P&IDs.
- Uls.
- Pipe schedules.
- Inspection histories.

Field inspection results and photos can be uploaded to the company's APM tool immediately following an

A digital, end-to-end workflow solution aims to prevent the lack of visibility and transparency which customers suffer from in the traditional inspection process. The value of integrating newly-acquired data with existing inspection and integrity data is significant, as this information is crucial to IM planning and mega rule compliance in the US.

Advanced geospatial mapping

Efficiently collecting and storing data is a hugely important component of pipeline regulatory compliance. However, once operators have access to the data, the question then becomes: how can we make the most effective use of it?

Integrating and analysing data from multiple inputs can enable advanced software to cohesively utilise ILI and as-built data, to drive compliance and enhance safety for people and the environment.

For example, PHMSA's regulations institute strict guidelines on pipeline construction and operation within high and moderate consequence areas (HCAs/MCAs). Assessing ILI data alongside pre-existing physical and geographic data enables HCA/MCA identification, spill impact modelling, and spatial risk analysis – all crucial elements for pipeline operators to remain in mega rule compliance.

If GIS centreline data is incorrect or incomplete, ILI data can help to correct it. In times where the GIS centreline data is poor quality, other customer data may be available to achieve similar results. Spatial geographic and linear referencing system (LRS) corrections can be uploaded into a GIS table structure and correct the centreline data.

Generation of ILI alignment sheets is also possible, bypassing situations where operators cannot easily review aligned ILI data with other information like pipe material and elevation profile. Alignment management software that integrates existing and new inspection data can also align this data to Pipeline Open Data Standard (PODS) data.

At times, GIS features and ILI data do not directly add up, with valves, casings, bends, and wall thickness changes in ILI data not being found in GIS. With ILI pipe tally and a copy of the GIS database, the GIS can be updated with missing pipe features, fixing the inconsistencies in the data. In average comparison reports, mismatched sequential joints may go initially unnoticed, but due to the holistic approach, girth weld comparison reports can allow joint-by-joint comparison for multiple ILI runs.

Assessing risk with integrated APM and GIS applications

Digital reporting solutions can feed newly-acquired data directly into APM and GIS applications and combine it with pre-existing inspection data, helping to ensure operators have access to their asset's complete set of integrity data. Large amounts of mechanical integrity data with their own subsets of detailed information can not only be stored, but used as actionable information to maximise safety, enhance productivity, and optimise budgets. An integrated database of all IM data can enable operators to store and analyse the integrity of all facilities, assets, and components across the pipeline value chain – from midstream transportation through to downstream refining, in a single dashboard. With one click, operators are able to see all the necessary physical and geographic data related to pipeline integrity that was collected in NDT and ILI runs, along with:

- Material of construction.
- Pipeline age.
- Type of product.
- 📀 Soil type.
- Likely damage mechanism(s).
- Previous repairs.
- Maximum allowable operating pressure.

As the industry moves towards data-driven, riskbased IM programmes, this data can be used to perform criticality assessments to determine an identified defect's probability and consequence of failure, helping to optimise maintenance planning and drive compliance. With integrated APM and GIS solutions for risk assessment, this data is more accessible and not required to be shipped off-site. A platform such as PCMS can offer a risk-based inspection (RBI) module, using inspection data to feed an RBI calculator to help operators make informed decisions on potential risks. Advanced spatial risk analysis software also helps determine risk along a pipeline with customised algorithms, lending insight into the vulnerabilities of pipeline segments and helping to inform decisions. These complex engineering assessments are impossible without the use of an integrated data programme, as they require input from multiple data sets.

The future of integrity data management is here

Safety, increased uptime, and improved cost are just some of the ways the integrated data management approach is streamlining pipeline integrity management. The integrated approach that is leading the future of the oil and gas industry has an array of benefits for customers, including enhanced safety and better-informed maintenance planning and resource allocation.

Integration allows only for safety to be at the forefront of operations and genuinely improve midstream operations. With new construction data being digitally reported along with ILI data and advanced solutions for increased analysis and accuracy, an integrated approach to data reporting, analysis, and management is set to be the future of integrity management in the midstream industry.