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WHITE PAPER

Harnessing Technology To Strengthen Pipeline Integrity And Transparency

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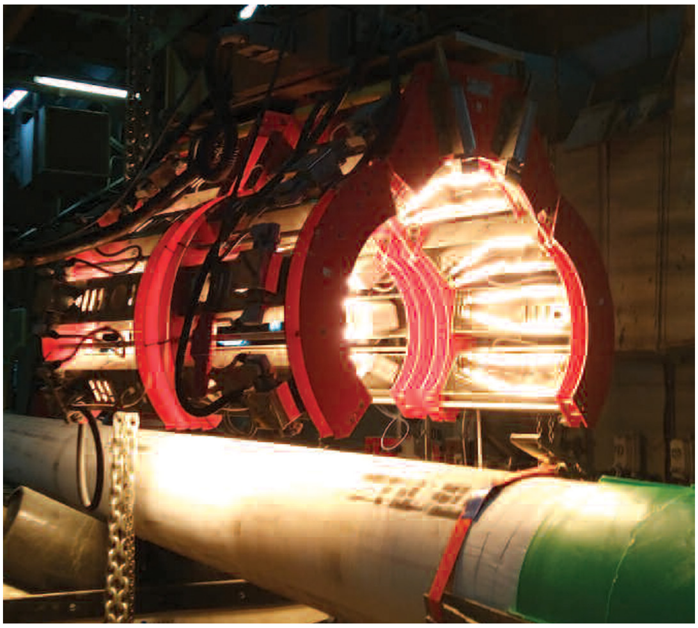
As infrastructure ages, regulatory expectations rise and digital technologies mature, the opportunity to enhance safety, transparency, and efficiency in the pipeline industry is greater than ever before. For those of us in engineering and construction, this is our chance to be proactive—not just reacting to changes but actively shaping the future.

At CRC Evans, our legacy spans more than 90 years, beginning in 1933 with the formation of Crutcher Rolfs Cumming, and the organisation's evolution has been underpinned by a consistent focus on innovation and field-based problem-solving. From the early automation of key welding processes and field joint coating applications to the present integration of artificial intelligence (AI) and digital tools, our approach has always aimed at practical improvements in performance, reliability, and safety.

From Data Accumulation To Data Intelligence

Pipeline construction and maintenance generate large volumes of operational and quality assurance data, but historically, much of this data has been collected in silos, underutilised and disconnected from actionable insights. But the current generation of digital technologies, particularly AI and machine learning, now offers the potential to extract meaningful intelligence from this data, enabling earlier interventions and more predictive quality control.

For example, by applying AI to decades' worth of welding data, we can now build predictive models that identify patterns leading to defects. These models have the potential to make process adjustments in real-time, reducing the incidence of weld failures and minimising the need for secondary inspections. As this approach matures, it may ultimately support front-end quality verification, streamlining workflows and improving project economics without compromising safety or compliance.



Advanced IMPP coating application delivering long-term protection in challenging conditions.

In parallel, the increasing demand for traceability and transparency across project lifecycles is shaping how we manage and integrate data. To capitalise on this and shape the future, CRC Evans is developing a comprehensive digital platform designed to centralise and standardise data across the fabrication, construction and deployment phases of pipeline infrastructure.

This system is designed to serve as a single source of truth, capturing data on material origin, welding parameters, coating application, inspection records, and final installation. It provides essential as-built documentation that is crucial for maintaining, upgrading, and expanding existing energy infrastructure, as well as for future construction projects, ultimately benefiting the end user.

Beyond compliance, the value of such a system lies in its ability to support risk assessment, claims verification and continuous improvement initiatives which can deliver operational insights while ensuring alignment with client requirements and industry expectations.

Navigating A Complex Landscape

By its very nature in connecting landmasses, projects and various assets, pipeline construction brings diverse market conditions, technical requirements and commercial priorities. Offshore environments pose different challenges than onshore while regional variations in regulation, labour markets and resource availability must also be accounted for.

Data360 platform delivers real time, cloud solution for visibility, traceability, and control

To successfully introduce technological innovation in this landscape requires flexibility, robust business case analysis, and an iterative approach to deployment. Essential to this is strategic prioritization, based on project ROI, client needs, and market readiness.

But while technology continues to evolve rapidly, the expertise of experienced personnel remains irreplaceable. At CRC Evans, many of our field team members bring decades of practical insight that directly inform the development and deployment of new systems. This synergy between field experience and technological development is critical to ensuring our innovations are grounded, effective and scalable.

Equally important is nurturing the next generation of engineers. Younger professionals entering the industry often bring purpose-driven perspectives and strong digital fluency. Encouraging their curiosity and aligning their work with meaningful outcomes, such as improved infrastructure safety or contributions to the energy transition, helps sustain motivation and long-term engagement. When engineers can clearly connect their day-to-day work to broader societal or environmental goals, it enhances not only their individual development but also the overall impact of their contributions.

Seizing the opportunity ahead

The integration of AI, digital data platforms and predictive analytics is progressively reshaping how pipeline projects are planned, executed and maintained. These advances, while technically complex, offer tangible benefits in the form of increased safety, reduced rework and improved transparency. But technology alone is not the solution. The continued progress of the pipeline industry depends on an effective combination of deep field knowledge, strategic deployment of digital tools and the cultivation of skilled, purpose-driven professionals. Through this balanced approach, we can continue to raise the standard for how critical energy infrastructure is designed, delivered and sustained.

Katy, Texas, home to CRC Evans' fabrication hub