



The Pipeline Engineering Solution Buyers' Guide

For Oil & Gas Excellence

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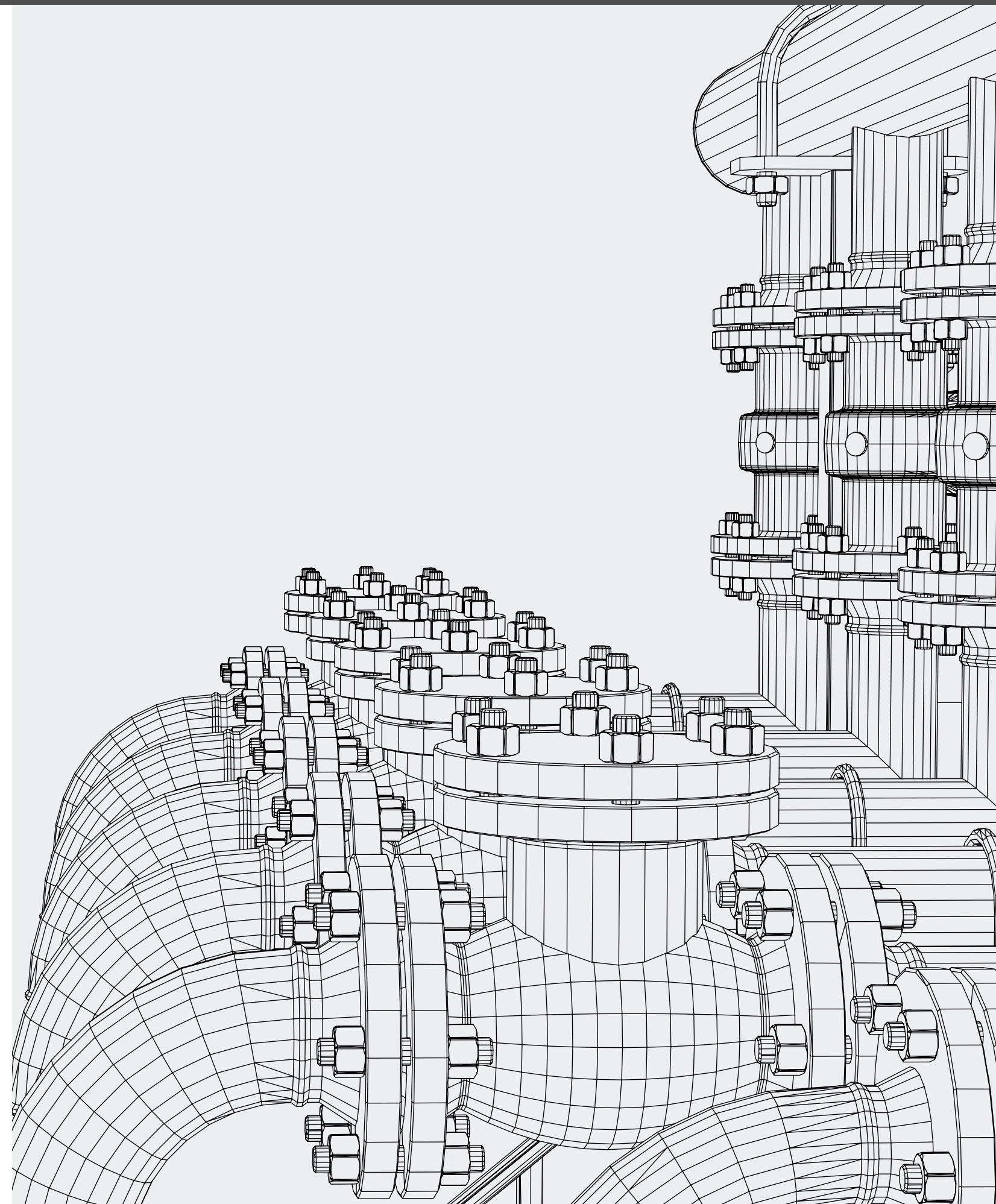
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How to Use This Guide

You are the senior engineer of your company or the executive responsible for pipeline design, construction, operations, or integrity management. Alternatively, you may be an independent consultant or an oil and gas operator seeking to maximize the value you deliver to the industry. The Pipeline Engineering Solution Buyers' Guide for Pipeline Engineering Excellence assumes that you have a working understanding of pipeline operations.

In the 2020s and beyond, anything that can be defined can be measured, analyzed, and improved. In today's world of digital transformation, it is time to move on from paper, PDFs, and spreadsheet solutions. Integrated data analysis drives physical design, operations, and maintenance of pipelines, associated facilities, and the broader economy.

Pipeline engineers that work within an integrated data environment have many winning advantages. The guide explores the fundamental activities of pipeline engineering. It provides insights into data management tools, digital integration, and automation to transform your workflows and results. The teams that grasp this new reality will dominate the competition and expand to new marketplaces.

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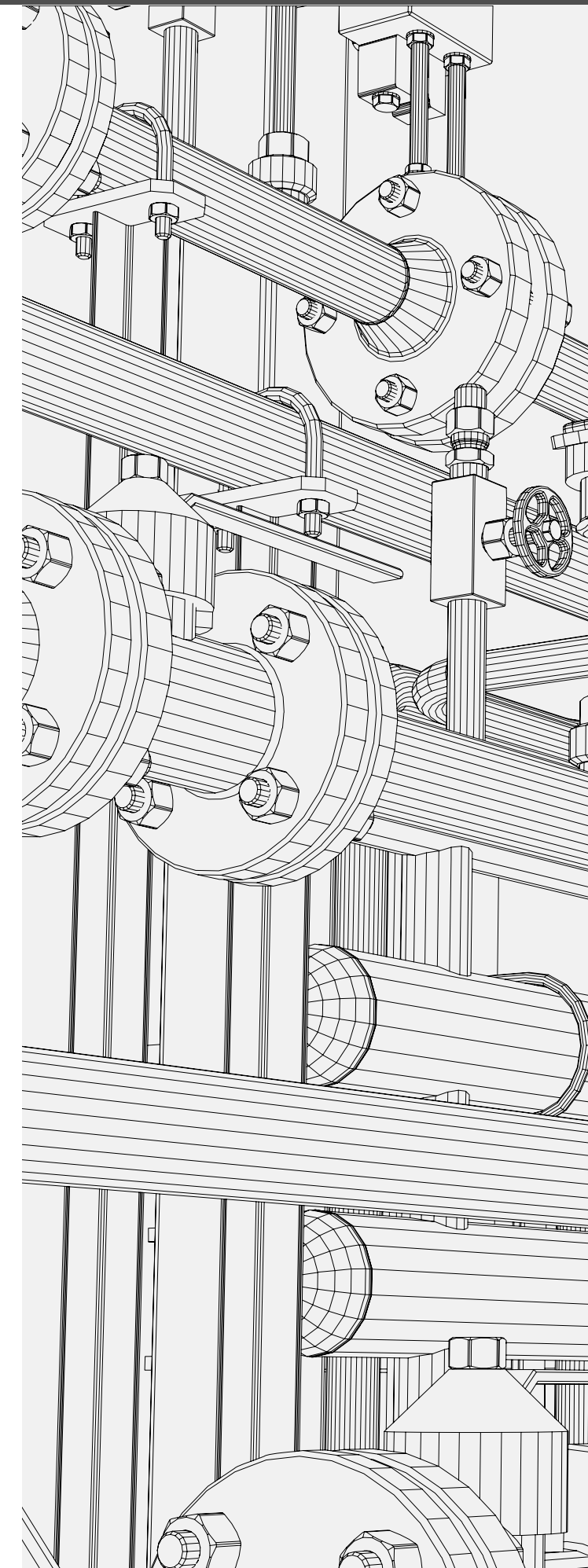


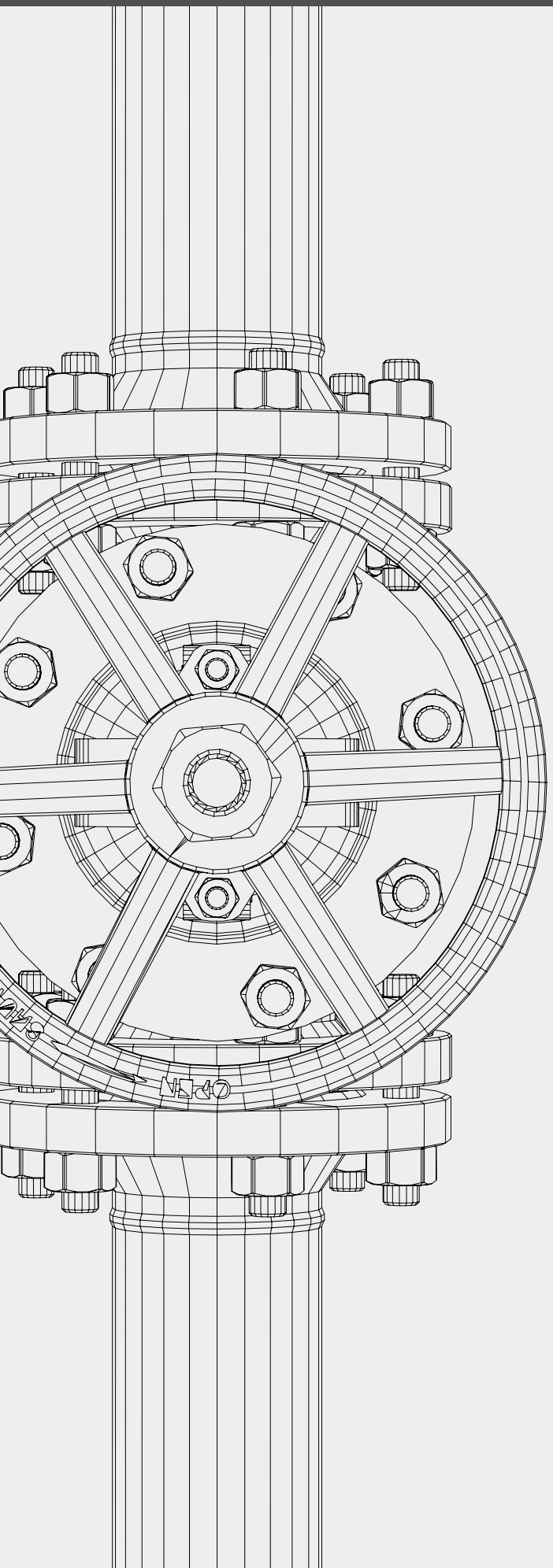
Pipeline Engineering Dimensions

How you manage data, store it, and share it between workflows and users determines your competitive advantage and operational safety. In the midstream oil and gas industry, the fundamental factors determining success remain constant: Risk and safety, cost of operations, and free cash flow. As a pipeline engineer, these can be described as three discreet dimensions that you must consider: Quality, Productivity, and Standards.

Quality — Pipeline engineers must derive actionable insights from data to produce analyses and recommendations that must be accurate. Quality must deliver safe designs and operations that mitigate errors, omissions, and accidents. To achieve those aims, your engineers need to be confident in the calculations they use and the key data that drives them. Failure here can result in loss of life and property, or damage the environment and the industry's reputation.

Productivity — Engineers need to be efficient in transforming data through calculations and exploring business opportunities. However, real-world considerations place other demands on their time. Like friction, these factors limit productivity at the risk of sacrificing quality and safety. A skilled engineer is a significant investment as a full-time employee. Therefore, they should be enabled to maximize the time spent focusing on performing Critical Calculations, which is the source of their productivity.





Standards — Standards impact pipeline engineering on many levels. They appear as company SOPs and as regulations set by government and other industry bodies. The release of the latest amendments to the Federal pipeline safety regulations means that operators have a new level of responsibility to ensure safety at maximum allowable operating pressure (MOAP). Adherence to these best practices can be complex, and trusted tools are required to balance Quality and Productivity in this space.

With the cultural/political climate shift towards supporting the global conservationist movement and decreased tolerance for incidents and new pipeline approvals, the need for a Standard Platform for pipeline engineering has never been greater. Increased regulation is another driver for finding a solution that improves workflow Quality and Productivity. Under the Mega-Rule, the industry will have to re-qualify an estimated half-million miles of pipelines.

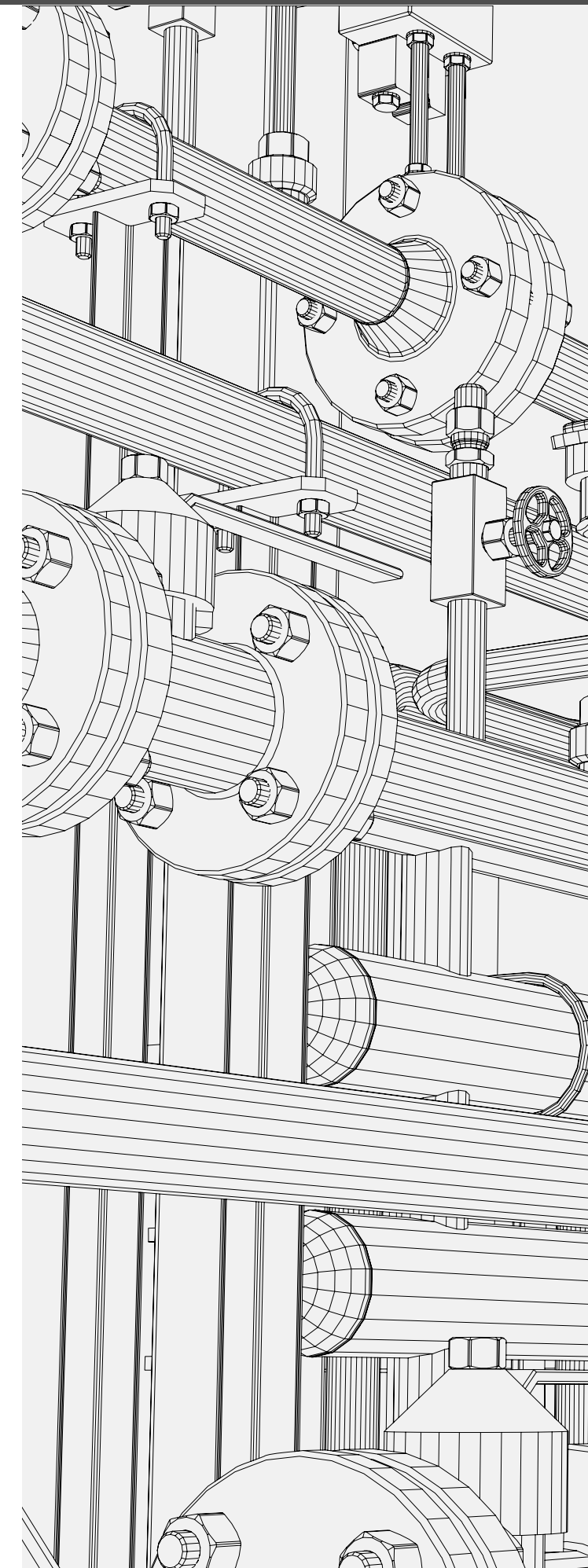
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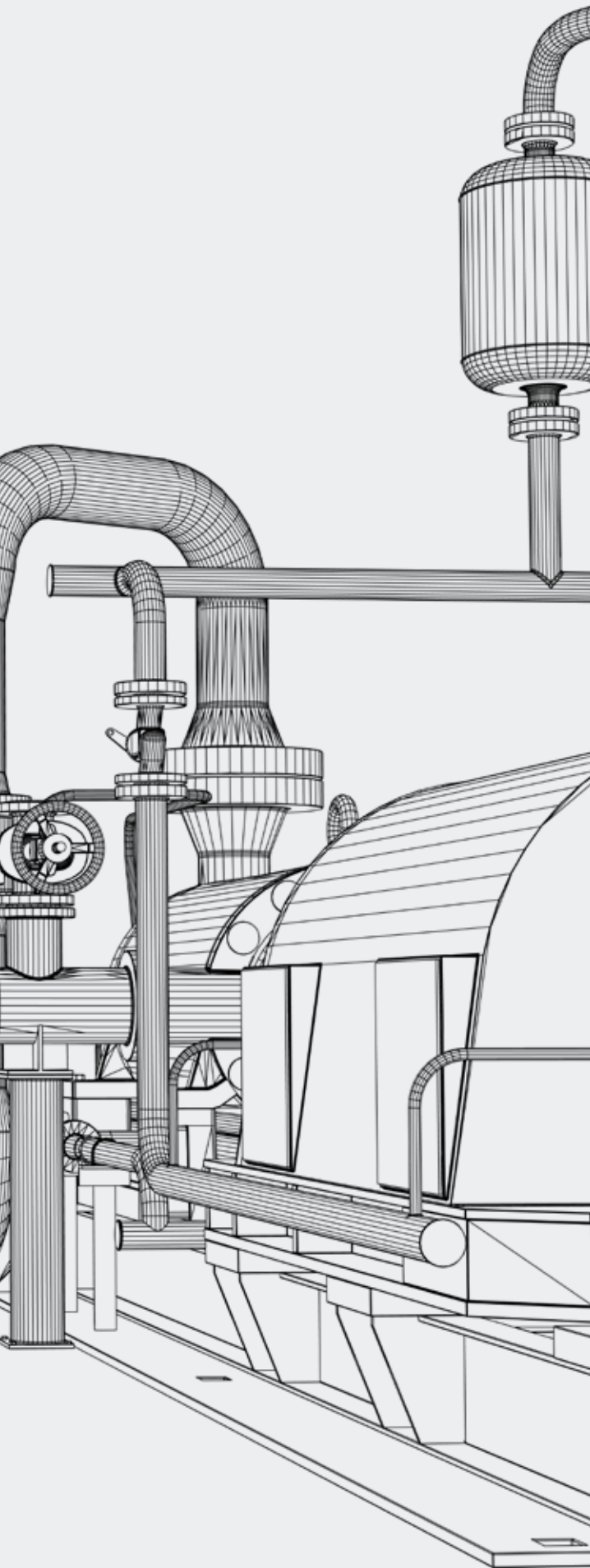


The Integrated Data Environment

Data is critical, but alone it is not sufficient. The interface and experience for users must promote workflows intuitively. Applications should optimize productivity and present information to facilitate the best use of your engineers. Pipeline engineering tools that manage and manipulate data must do so quickly while delivering calculations, analyses, and case histories that are Traceable, Verifiable, and Complete (TVC).

In practice, regulators demand that all of your pipeline records conform with CFR 192 (gas) and CFR 195 (liquid). Your case histories and pipeline records must meet TVC standards, as defined in the CFR rules. The additional new compliance demand of the Mega-Rule amplifies the need for consistency, reliability, and availability in all of your pipeline engineering activities. Your pipeline engineering teams need a standard platform to manage key data assets and critical calculations.





Key Data About Assets

The intent of new regulations is to foster a culture of prevention throughout the industry. With increased scrutiny on records and incidents, a pipeline engineering solution must help prevent failures, releases, or incidents due to inconsistent or inaccessible data.

The value of the answers delivered by the solution comes from facilitating quality, productivity, and adherence to standards via leveraging a data repository. Your team's efficiency and calculation integrity benefit from having an accessible database from which to pull. Additionally, an engineering tool that fosters collaboration within teams and across departments boosts previous work knowledge, enhancing quality and productivity.

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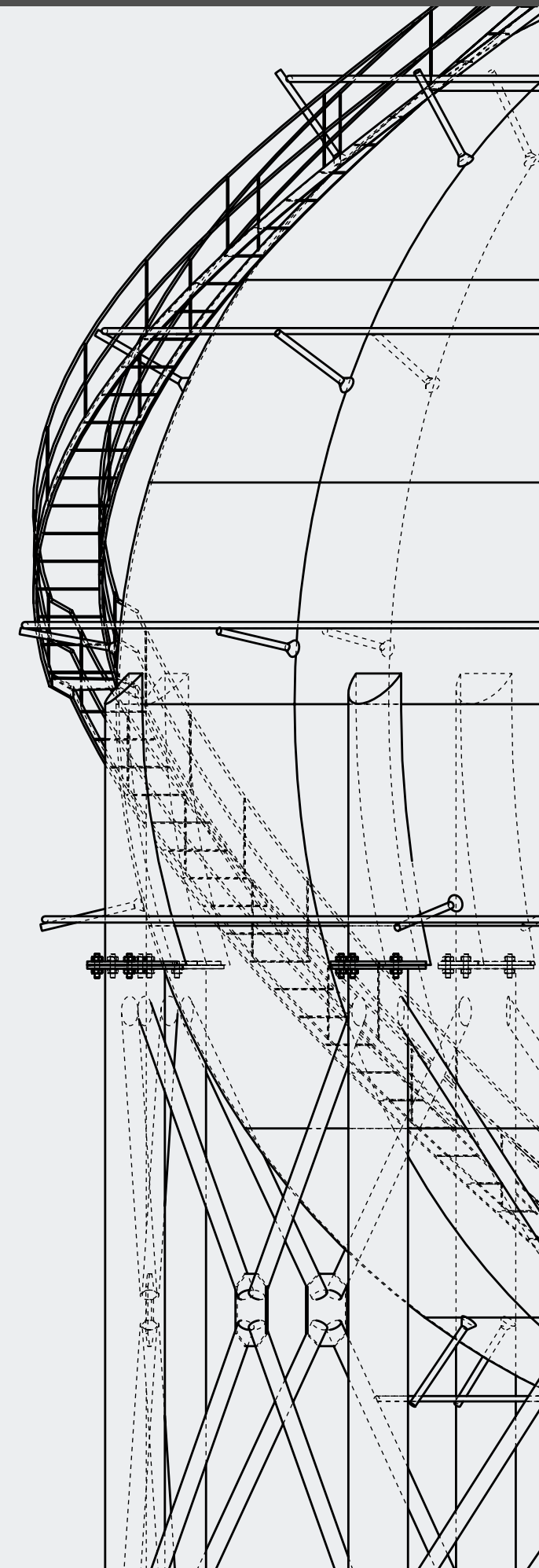


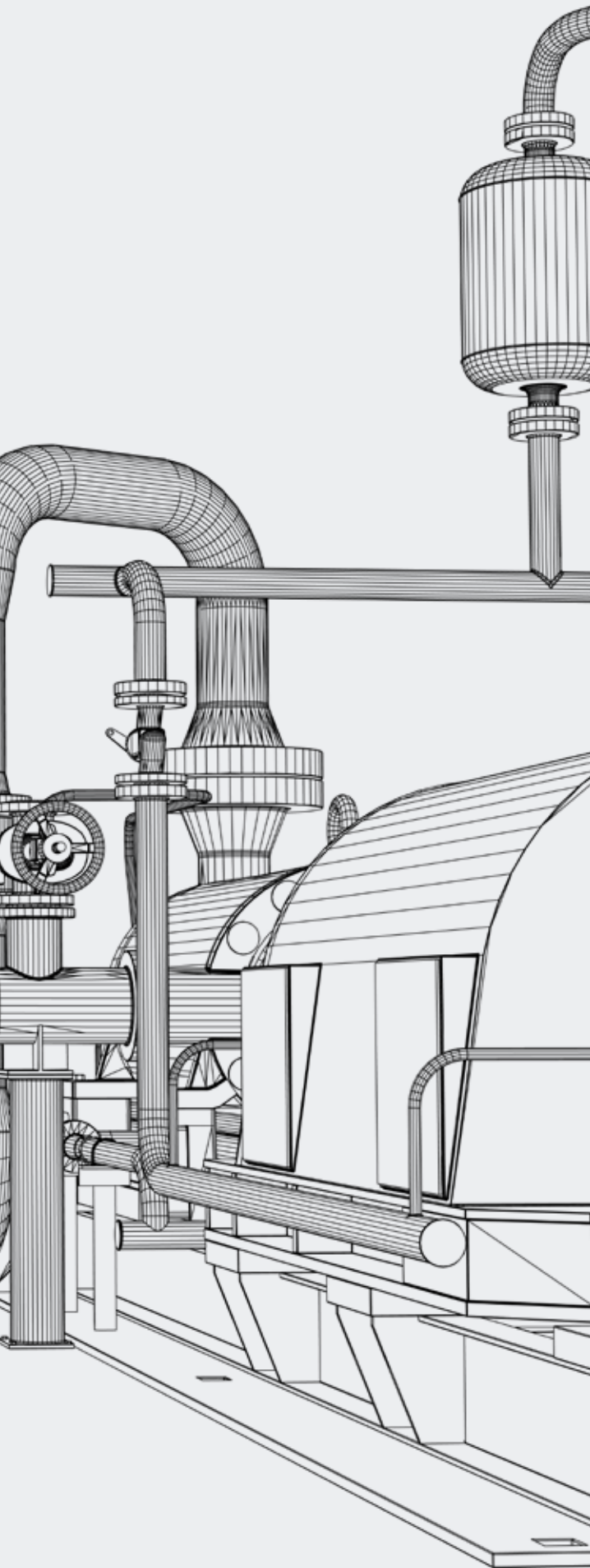
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Critical Calculations

A 2008 study by Raymond R. Panko, at the University of Hawaii College of Business Administration, reviewed other studies on spreadsheet error rates from 1987 to 2007. Panko found that 88% of all spreadsheets have at least one error. Calculations are at the heart of engineering productivity, and many are done with spreadsheets.

Pipeline engineers have relied on spreadsheets for decades, but they can be problematic and introduce unnecessary risk to energy industry companies. Inconsistent formulas in uncontrolled spreadsheets cause errors and add time and cost wasted hunting them down. It is time to replace unreliable and difficult to maintain spreadsheets with a solution that delivers accurate, reliable, and consistent results.





A Standard Platform

The ideal solution standardizes the platform for all the engineering teams in your company. It controls calculations and eliminates conflicts. Additionally, it greatly reduces duplication of past efforts, a notorious drain on engineering productivity. A system that makes standard formulas accessible to all of your users creates confidence in the reliability, consistency, and availability of your engineering output.

Navigating company SOPs and industry standards inflate administrative costs and can also be a source of calculation errors. Any lapse poses a risk due to lost productivity and fines. Your pipeline engineers are best served by a platform that mitigates this burden of compliance. One that manages SOPs has the added advantage of facilitating knowledge retention within your organization. Such a platform gives you a knowledge base independent of individual employees who may be hired away by your competitors or retire.

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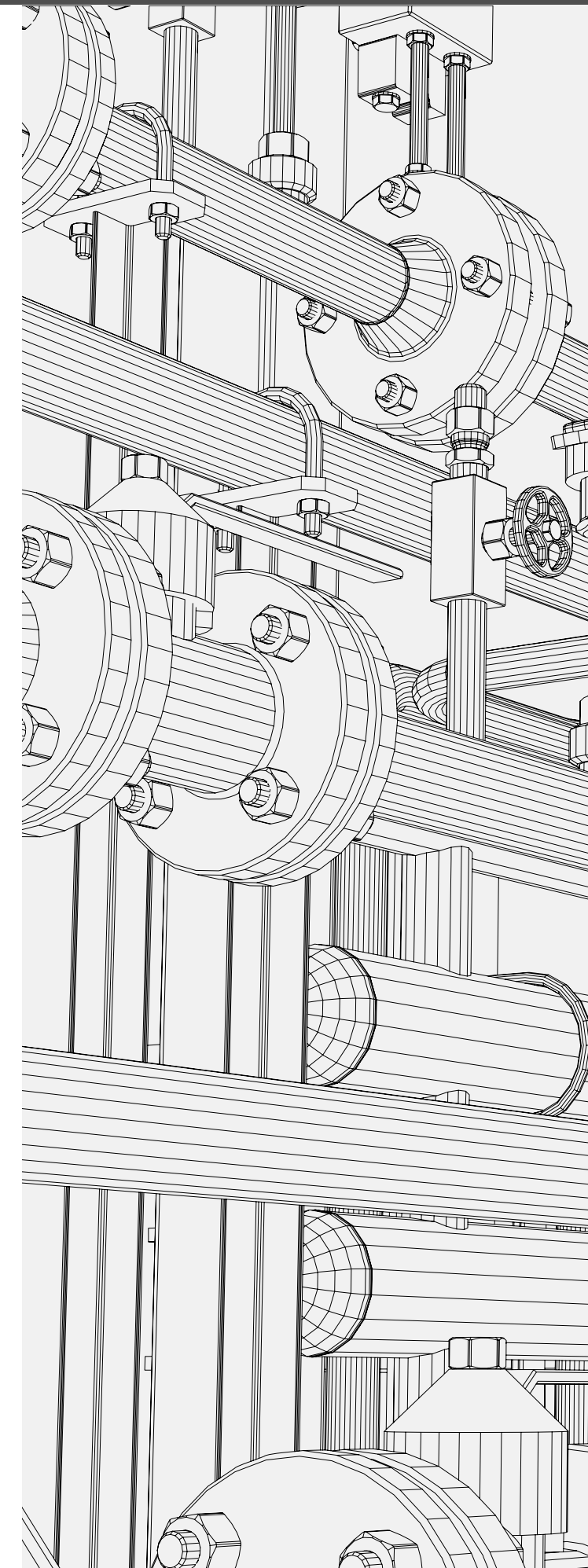
Pipeline Toolbox on The Pipeline HUB

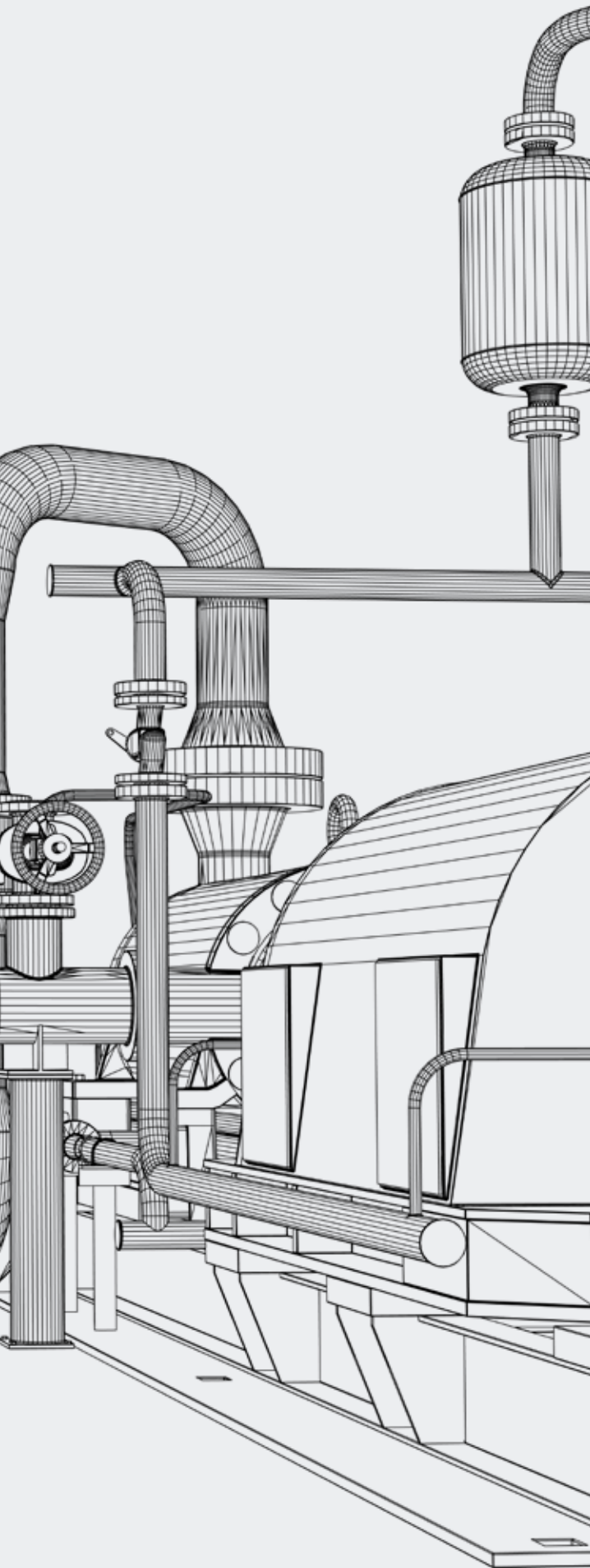
Technical Toolboxes developed a package that simplifies the work for engineers, the Pipeline Toolbox (PLTB). All users compute the same answers across the organization. Users cannot modify the code, which ensures uniformity and consistency. So engineers spend more time on engineering pipeline assets instead of managing spreadsheets.

Pipeline Toolbox has grown to be the industry-standard software for pipeline calculation for design and analysis. It puts your key data about assets in one consistent database and more than 250 calculation tools for pipeline engineers. The software puts your company in control of formulas and aligns the engineering teams' standards, which prevents failures caused by non-verified data.

With the release of v20, the Pipeline Toolbox now provides superior workflow integration as part of the Integrated Data Environment of the Pipeline HUB (HUB^{PL}). All of the analysis tools are within PLTB, and they can access data from other tools on the HUB^{PL}. Pipeline HUB and PLTB combine to automate the data upload and QC process.

PLTB on the HUB^{PL} provides data-driven pipeline engineering workflows built from the many tools and applications it contains. The HUB^{PL} also provides an integrated data environment. Engineers automatically align with SOPs and industry standards. Your teams can build workflows from multiple modules and other applications on the HUB^{PL}, sharing data and case histories, and making them available to any authorized users for further calculations.





Examples of PLTB on the HUB^{PL}

Rapid Design and Feasibility Analysis —

The Engineering Team Leader is waiting when you arrive for work on a Monday morning. He sets a brief for you to plan a ten-mile pipeline to establish cost and feasibility by the end of the morning. The design and feasibility must account for existing pipelines, the potential for wash-outs, ground movement. PLTB has eighteen different tools for design and stress analysis to address these factors. Your engineers can quickly combine data from maps and GIS applications with calculations from the PLTB Hydraulics module. You design the pipeline section, estimate cost, and have the report completed by lunchtime.

Mid-lifecycle Pipeline Re-qualification —

PLTB on the HUB^{PL} provides the critical tools to meet the challenges of updating incomplete records to meet the standard of the PHMSA Mega-Rule. Technical Toolboxes simplifies the process with a combination of tools. Overlaying pipeline data on GIS and keeping a history of analyses gives you a TVC record. As an example, your team might be tasked with bringing a fifty-year-old pipeline into compliance. You combine Inline inspections data from PRCI RSTRENG with PLTB calculations and ArcGIS map data on a pipe section, or an entire pipeline network, to update the records to TVC standards.

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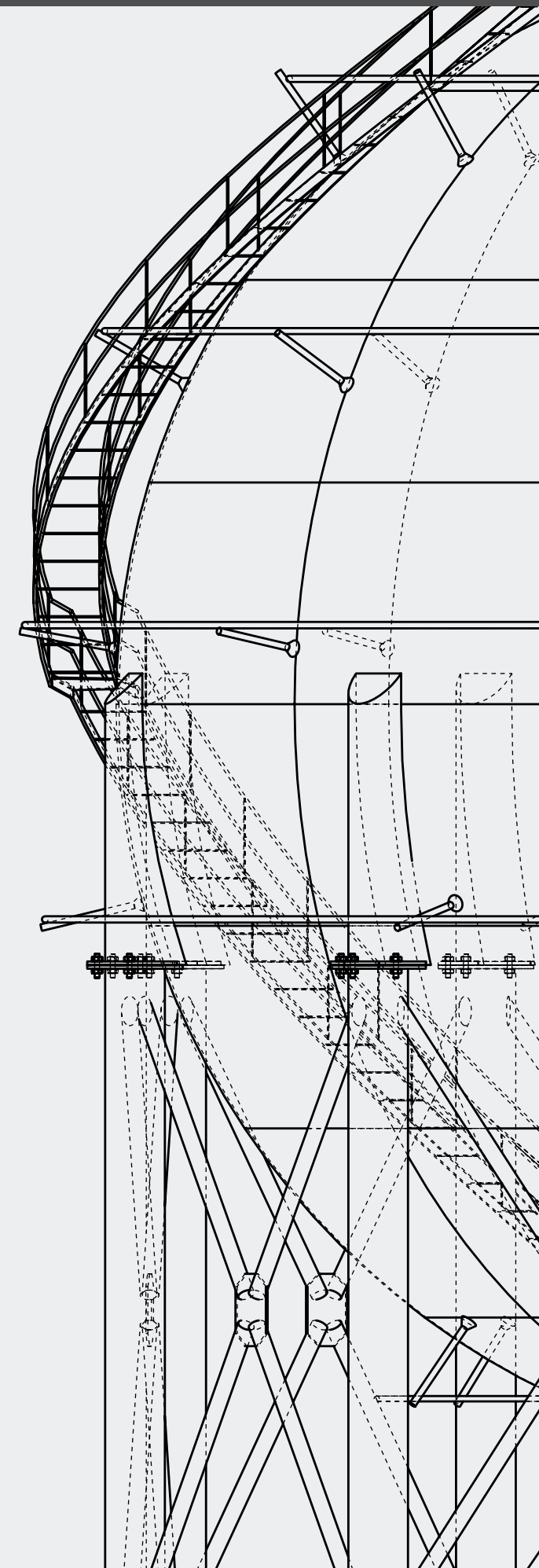


“The end goal of the Mega-Rule is the safe operations of pipeline systems for the sake of the operator and the public.”



Hydrostatic Testing for MOAP — PLTB’s Hydrostatic Testing module gives your engineers another set of tools to find leaks, recertify pipes, and determine the maximum allowable operating pressure. The end goal of the Mega-Rule is the safe operations of pipeline systems for the sake of the operator and the public. Hydrostatic testing with PLTB gives you the answers to qualify the pipe and determine the need for repairs or upgrades.

Pumping and Meter Station Refurbishment — The owners and operators of older pipeline networks are now replacing engines and equipment up to seventy-years-old. Engineers are responsible for refurbishing compressors, pumps, and metering stations as they convert the engines that drive the pumps from antiquated reciprocating equipment to turbines running on the gas in the pipe. Calculations and software to measure gas have to change along with the equipment. Building designs, compression pumps, and all gas and liquid related flow elements deliver quality and productivity in all



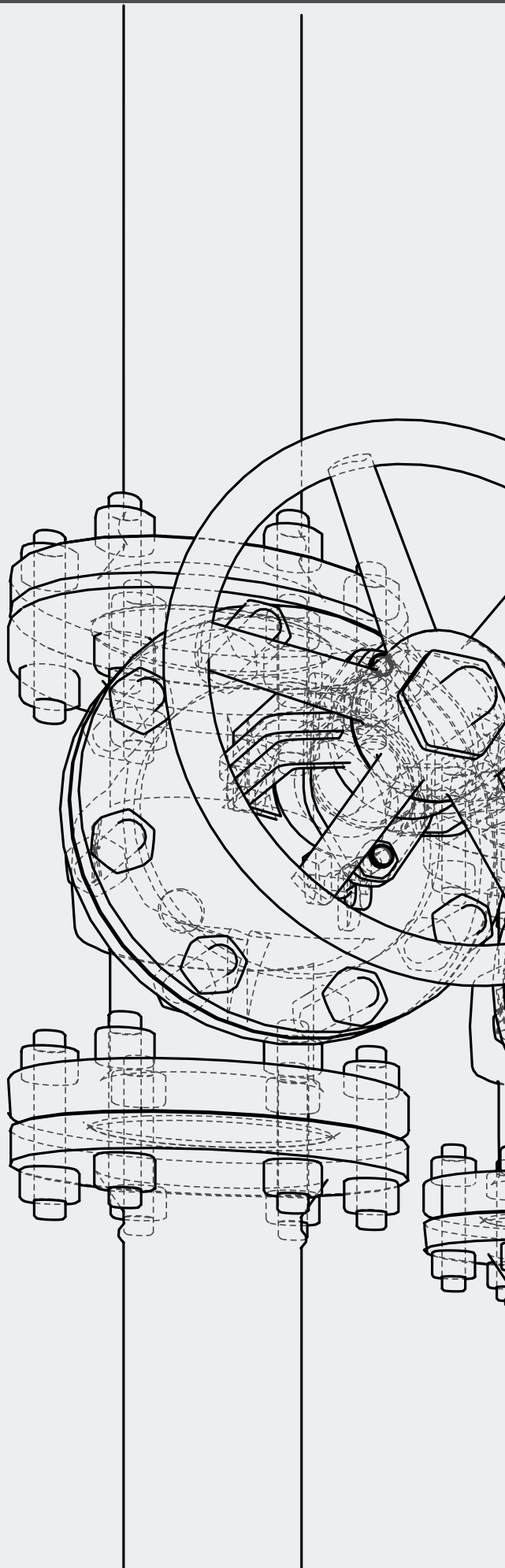
of your engineering calculations.

Stress Analysis for Pipeline Operations —

Since the launch of PLTB v20, all the calculations, data, case histories, and tools are in one place on the HUB^{PL}. You can combine them as workflows to determine the stresses on your pipes. For example:

- **Crossing Analysis** — A construction company wants to cross your pipeline with wheeled or tracked vehicles. The Crossings module provides analysis for the feasibility of such crossings. This program considers soil composition, pipeline depth, and crossings to determine crossing stresses and calculate mitigation measures.
- **Analysis for Unsupported Spans** — Flooding and wash-outs create spans where you must consider the flow of water. Erosion caused by flooding leads to exposed unsupported pipes that create stresses.
- **Many more** — As a component of the integrated data environment of the HUB^{PL}, PLTB allows engineers to gather, QC, and store data. The output of each stress analysis becomes available for all other related workflows on the HUB^{PL}.

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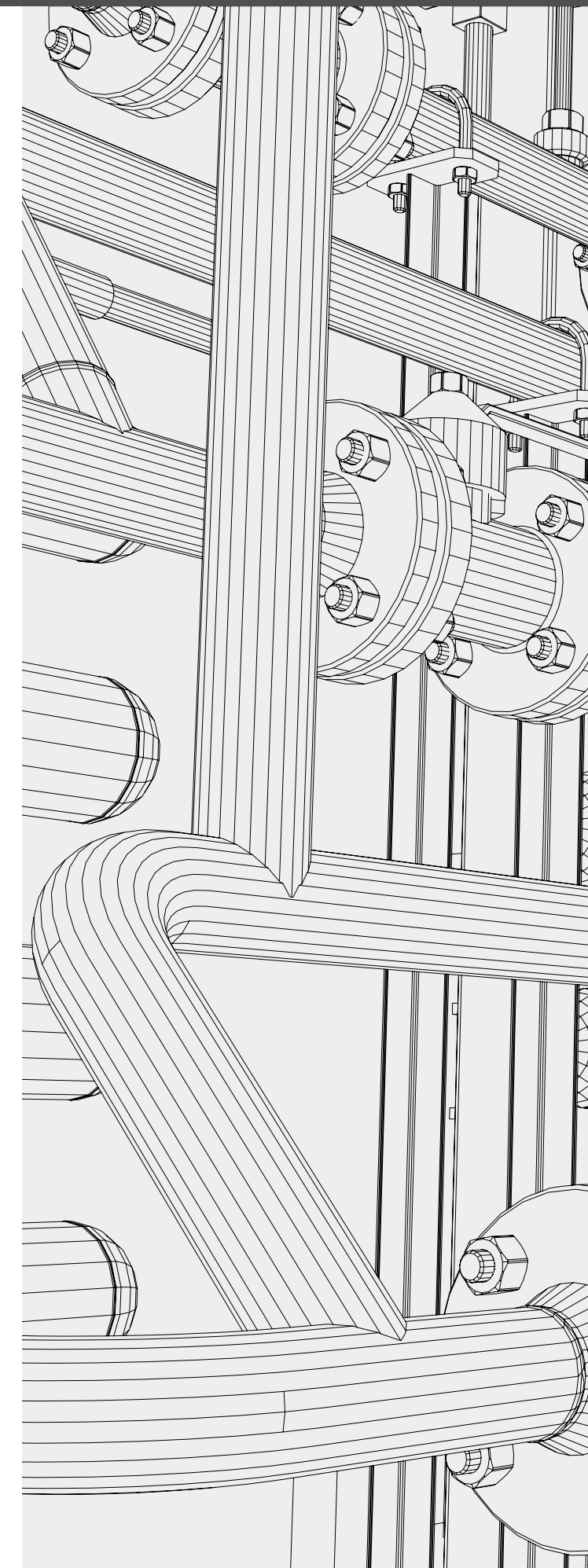
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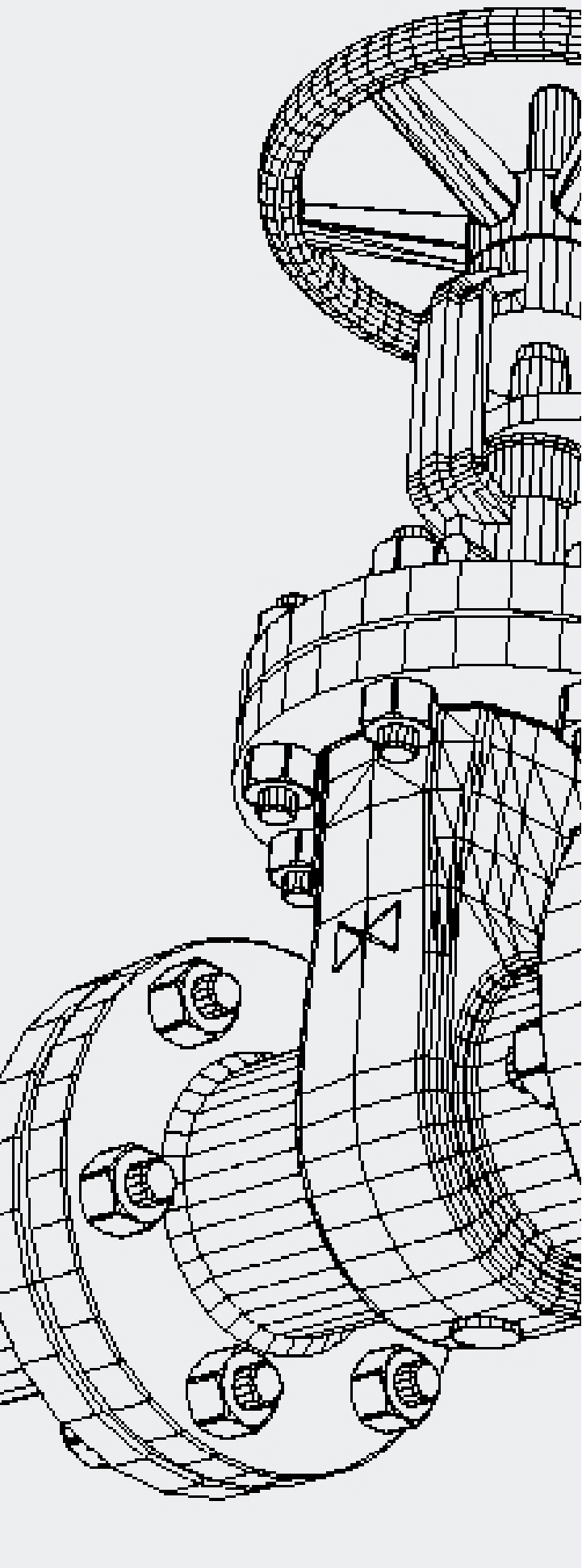
Conclusions

Technical Toolboxes works on the principle of supporting pipeline engineers with the most empowering set of tools possible. As innovation in data tools continues, Technical Toolboxes will provide the means for a data-driven future based on the applications of the PLTB. As an integral part of the HUB, PLTB takes a more critical role in data resources at every level.

PLTB on the HUB^{PL} exemplifies how digital transformation improves the lives of engineering professionals. The platform stores the data and makes it available for calculations. The output of calculations then resides in the repository available for all further workflows. With PLTB and HUB^{PL}, you can meet the challenges of today's industry, as well as new regulations, such as the Mega-Rule, head-on.

If your company is to remain competitive, your pipeline engineers must maximize their productivity. PLTB aligns your company SOPs across all of your teams and responds to the industry's changing standards. The HUB^{PL} and PLTB grow together as data moves faster and more accurately throughout your organization. In combination, they deliver the best data quality possible and the most consistent, reliable calculations, giving you confidence and the freedom to spend your time focusing on business solutions.





Next Steps

- Request a demo or software trial
- Register for a Technical Toolboxes training course or webinar
- Contact us with questions or send us your feedback
- Download the API Buyers Guide and Success Stories eBooks





Technical Toolboxes
10370 Richmond Ave, Suite 1150
Houston, TX 77042, USA

Toll Free: (866) 866-6766
Phone: (713) 630-0505
Fax: (713) 630-0560

info@technicaltoolboxes.com
www.technicaltoolboxes.com

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About Technical Toolboxes

Technical Toolboxes is a leading provider of integrated desktop and cloud-based pipeline software, online resources, and technical training for pipeline engineering professionals around the world. The integrated software products developed by Technical Toolboxes provide engineering software productivity tools for standardization, and we deliver oil and gas industry training courses covering a breadth of topics with industry-recognized instructors.