

# The Pipeline Toolbox ROI Guide

Real-World Examples & Case Studies

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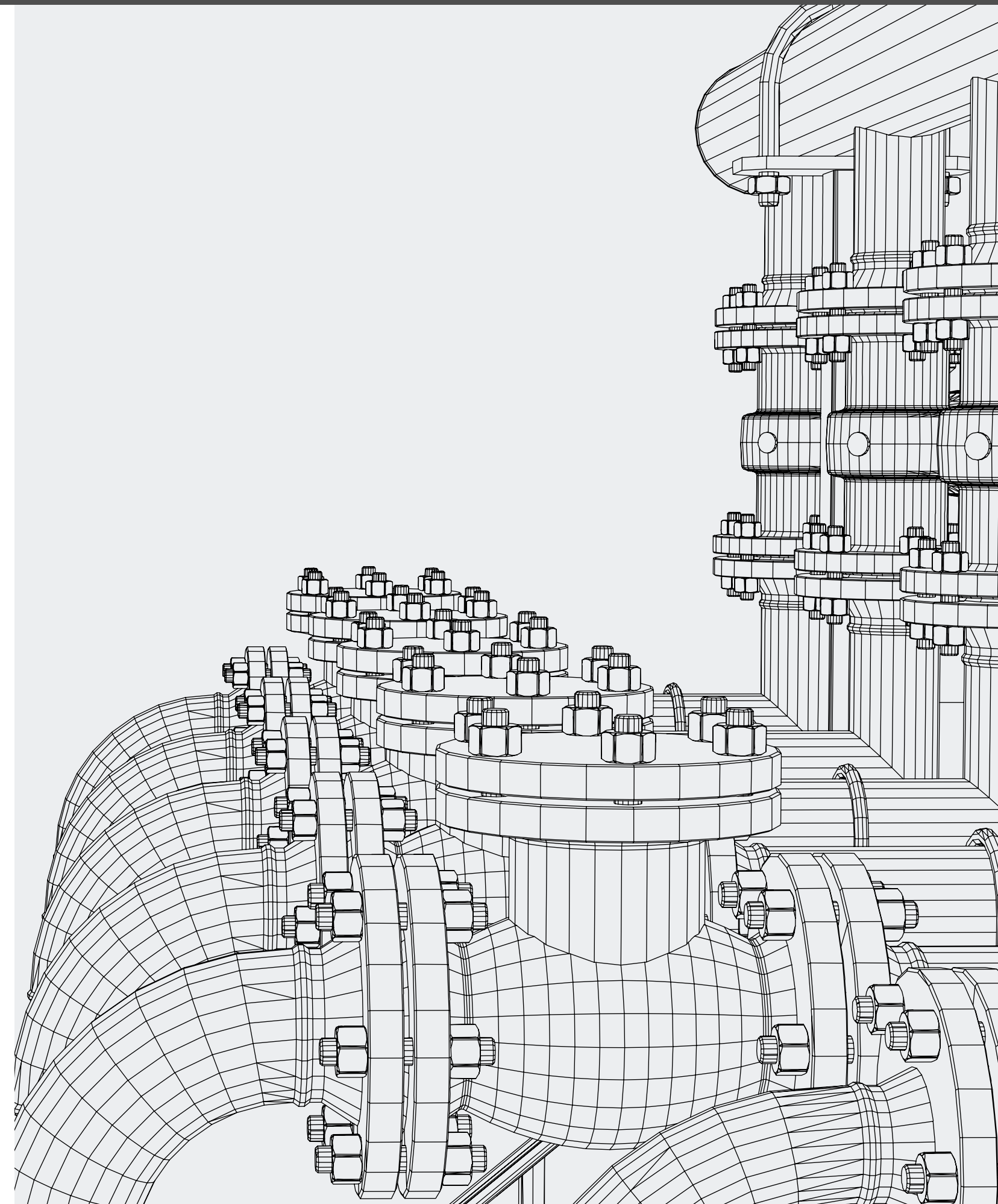
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## Who Needs This eBook?

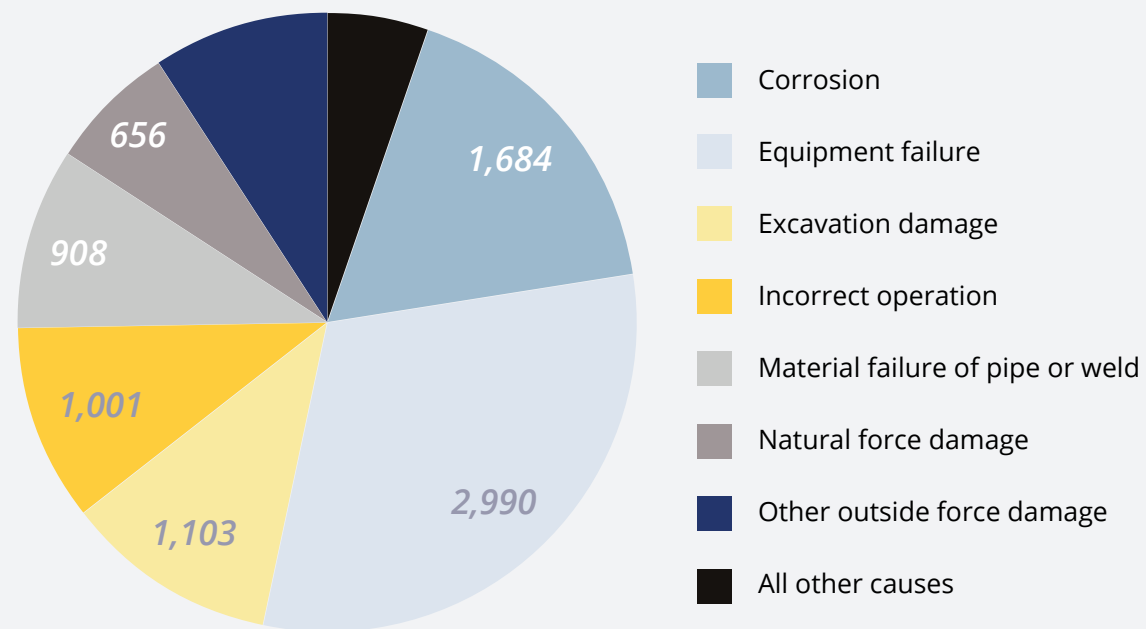
You're a senior engineer in your midstream organization. When your team needs new tools, you need to go to the C-suites or Executives with the facts. The Pipeline Toolbox Return on Investment Guide assists in the decision-making process. It demonstrates how the Pipeline Toolbox helps oil and gas pipeline operators improve the return on investment.

The impact of Pipeline Toolbox (PLTB) on Return on Investment (ROI) is potentially so high that it might not be believed. So, although the PLTB ROI Guide is a qualitative explanation, it includes quantitative examples of actual customer savings. It demonstrates how PLTB improves ROI for engineering teams at midstream services or oil and gas engineering companies, as well as midstream pipeline companies.

**“The impact of PLTB on ROI is potentially so high that it might not be believed.”**



# Overview of ROI with PLTB Workflows



*Causes of Pipeline Incidents - 2005 - Present*

*Figure 1*

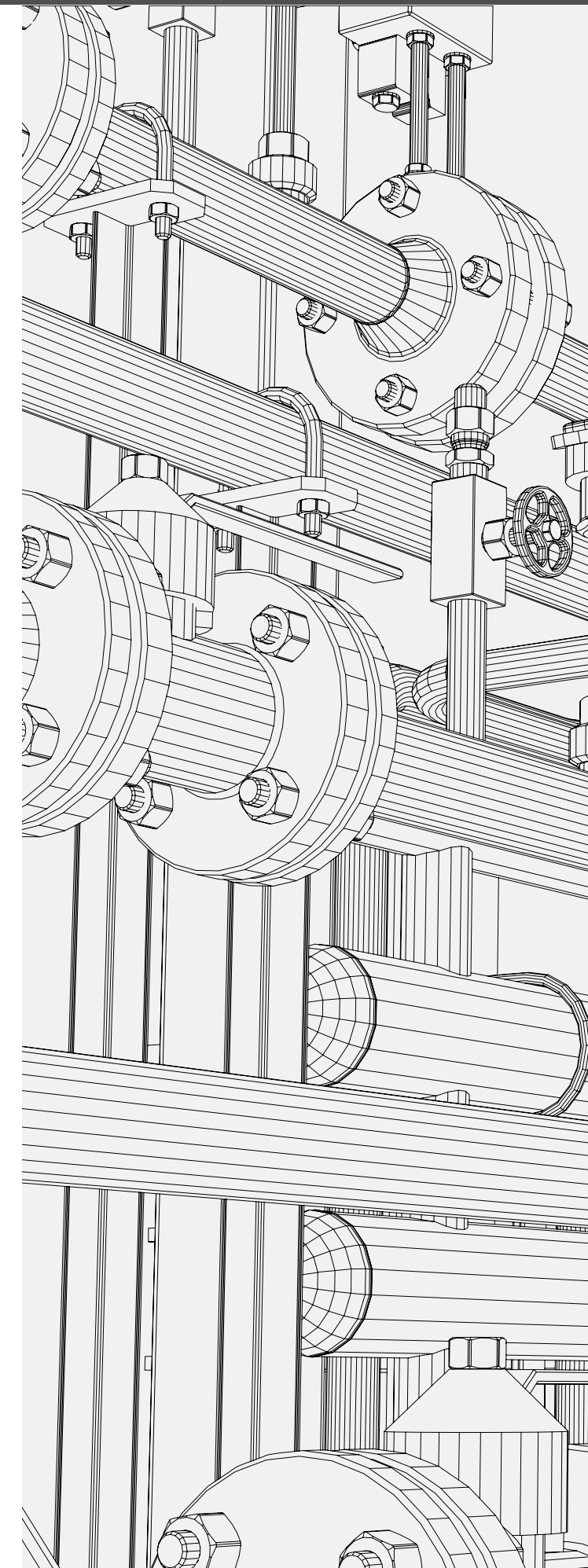
The Pipeline Toolbox (PLTB) is now available on the Pipeline HUB (HUB<sup>PL</sup>). It's a powerful combination that solves engineering challenges across the lifecycle of the pipeline and throughout many aspects of managing a business. It standardizes engineering workflows, accelerates project schedules, and multiplies user capacity. With it, your technical personnel make more significant contributions to ROI and make a positive impact on the company's bottom line.

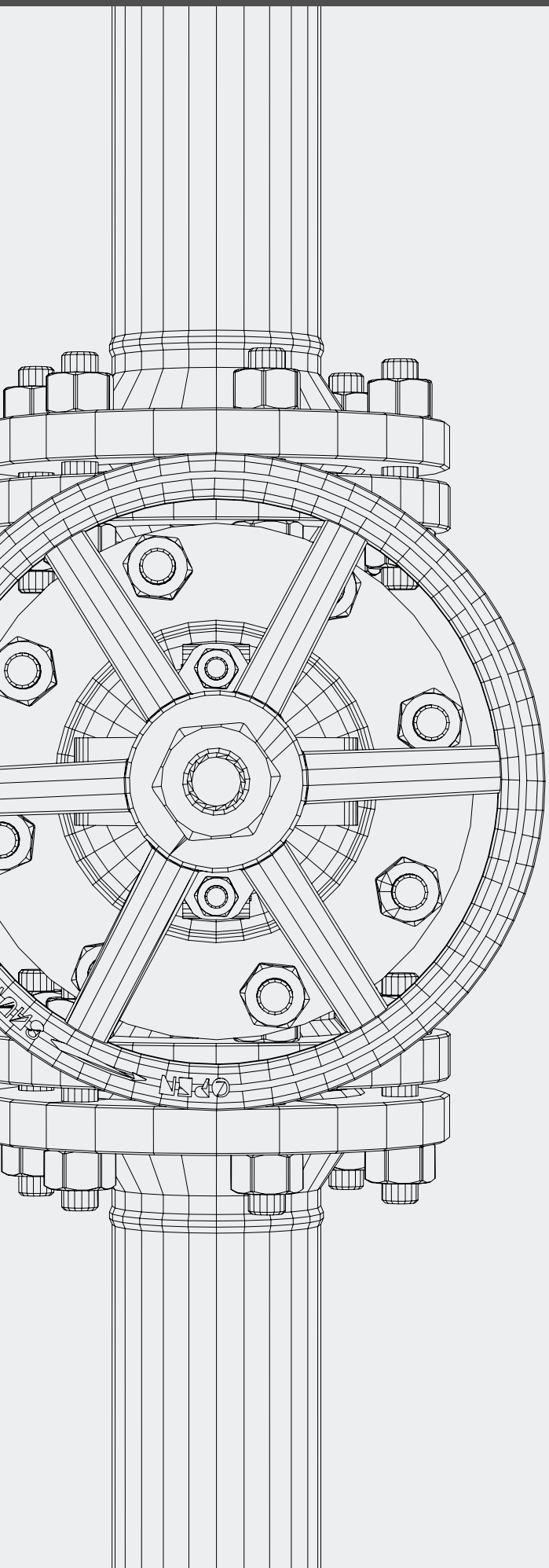
The HUB<sup>PL</sup> environment provides a unified, customizable dashboard that you control with a dynamic Navigator tool. With the Navigator tool, users can organize and manage cases to suit their needs, similar to a project checklist.

Within PLTB, smart automation tools recognize and quality check data as it uploads. Vast quantities of stored data remain available to pre-populate calculations quickly and auto-populate multiple calculations at once, whenever authorized users request it.

As one Technical Toolboxes customer recently noted, "PLTB on the HUB<sup>PL</sup> meets our expectations through lower costs and time efficiency with [the] latest products."

Pipeline Toolbox has become the industry standard for midstream engineering calculations over the past 20 years. There are over 250 engineering analyses available in the software, spanning design, construction, operation, and integrity of midstream assets. These calculations also span every category in the PHMSA diagram that illustrates the various causes of pipeline failures below <sup>[1]</sup>. Pipelines are capital intensive projects, often costing billions of dollars to install, and PLTB aids your team in improving ROI on these assets.





## Examples of PLTB modules in the Pipeline Lifecycle

**Pipeline Design and Stress Analysis Calculations** – 17 design-related modules for gas and liquids engineering

**Gas and Liquid Pipeline Hydraulics** – Calculations based on selectable fluid or high/low-pressure gas equations

**Pipeline Facilities (Gas)** – Modules for sizing of relief valves, hot tapping, and welded branch connections

**Pipeline Compressor (Gas)** – Modules for determining various centrifugal and reciprocating compressor calculations for required horsepower, sizing, etc.

**Regulators & Meters (Gas)** – Modules for determining the volumetric flow/pressure through regulators and meters for sizing to feed distribution systems

**Pipeline Pumps (Liquids)** – Modules for determining various reciprocating pump calculations for required horsepower, sizing, speeds, etc.

**Pipeline Testing** – Calculations consisting of pressure testing, purging, blowdown, and max pressure drop along a length of pipe

**AGR/ALR** – Gas and Liquid calculations for both small and large borehole ruptures

**Wheel and Track Load Analysis** – Calculate overburden and equipment induced loads on buried pipes for wheeled and tracked vehicles at cased or uncased crossing locations

**Pipe Blast** – Modules for calculating single point and complex grid explosive charges on a given interval of pipe.

**Polyethylene Pipe (PE)** – 14 modules for calculating various PE pipe applications, which range from design, HDD, and crossings.

**Horizontal Directional Drilling** – Calculations for pull-force and analysis of installation and operational stresses.

**Pipeline Corrosion** – Several calculations for the remaining strength of corroded pipe during operation, along with external direct-assessment-related capabilities.

**Cathodic Protection (CP)** – 10 gas and liquids modules for CP Design.

“It’s a powerful combination that solves engineering challenges across the lifecycle of the pipeline...”



# The Dimensions That Matter

Plain and simple, you need to know how spending incremental monies on software will result in:

1. Risk Reduction
2. Cost Reduction
3. Project Acceleration

Delivering these benefits involves impacting many aspects of midstream companies, including:

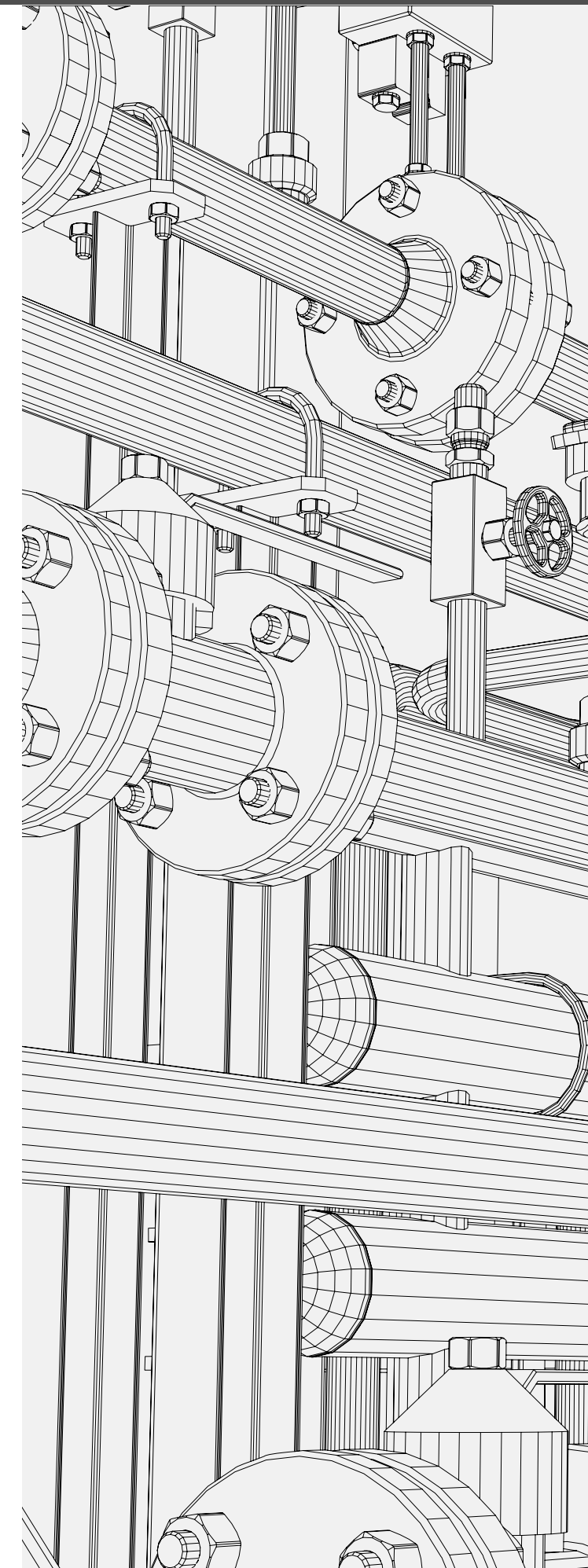
#### **IT Governance & Change Management**

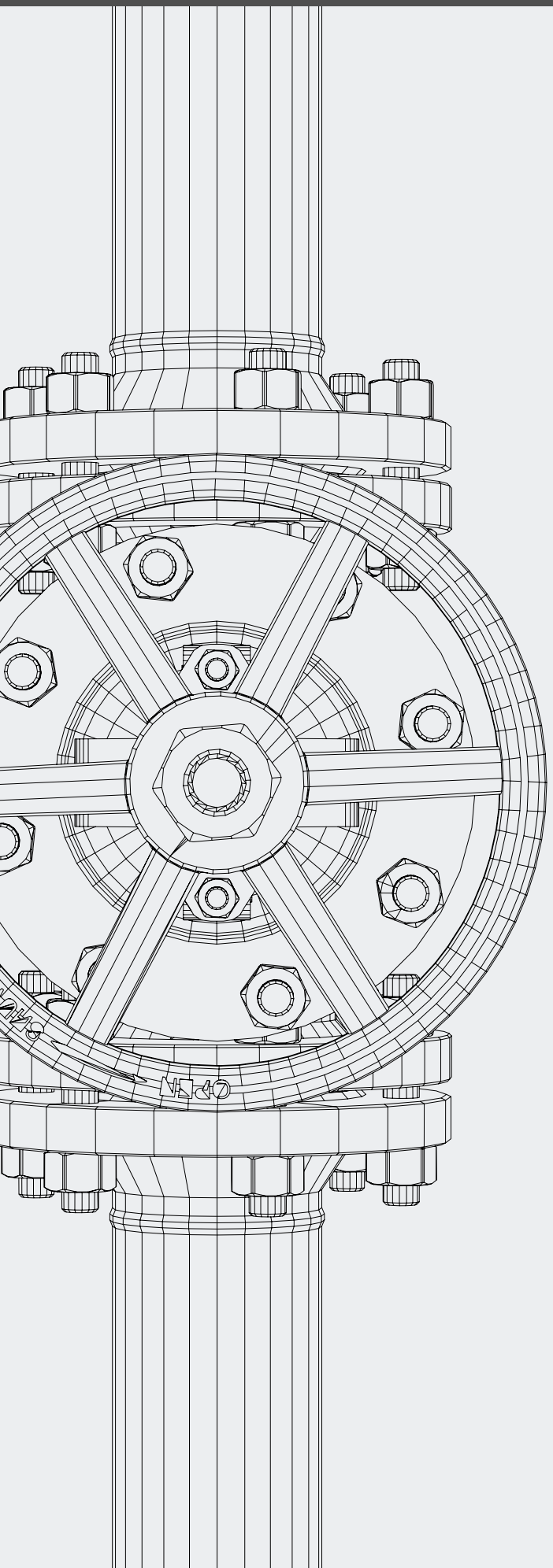
- Corporate Knowledge Retention
- Version Control
- Data Stewardship & Management
- Deployment Management
- Calculation Integrity
- Scalability
- Supportability
- Cybersecurity

#### **Engineering Best Practices**

- Onboarding of New Employees
- Personnel Knowledge Retention
- Fit-For-Purpose Analyses
- Trusted Calculations, Tried & True
- Everyday Working Tool
- One-Off Exception Handling

#### **Regulatory Compliance & Others**





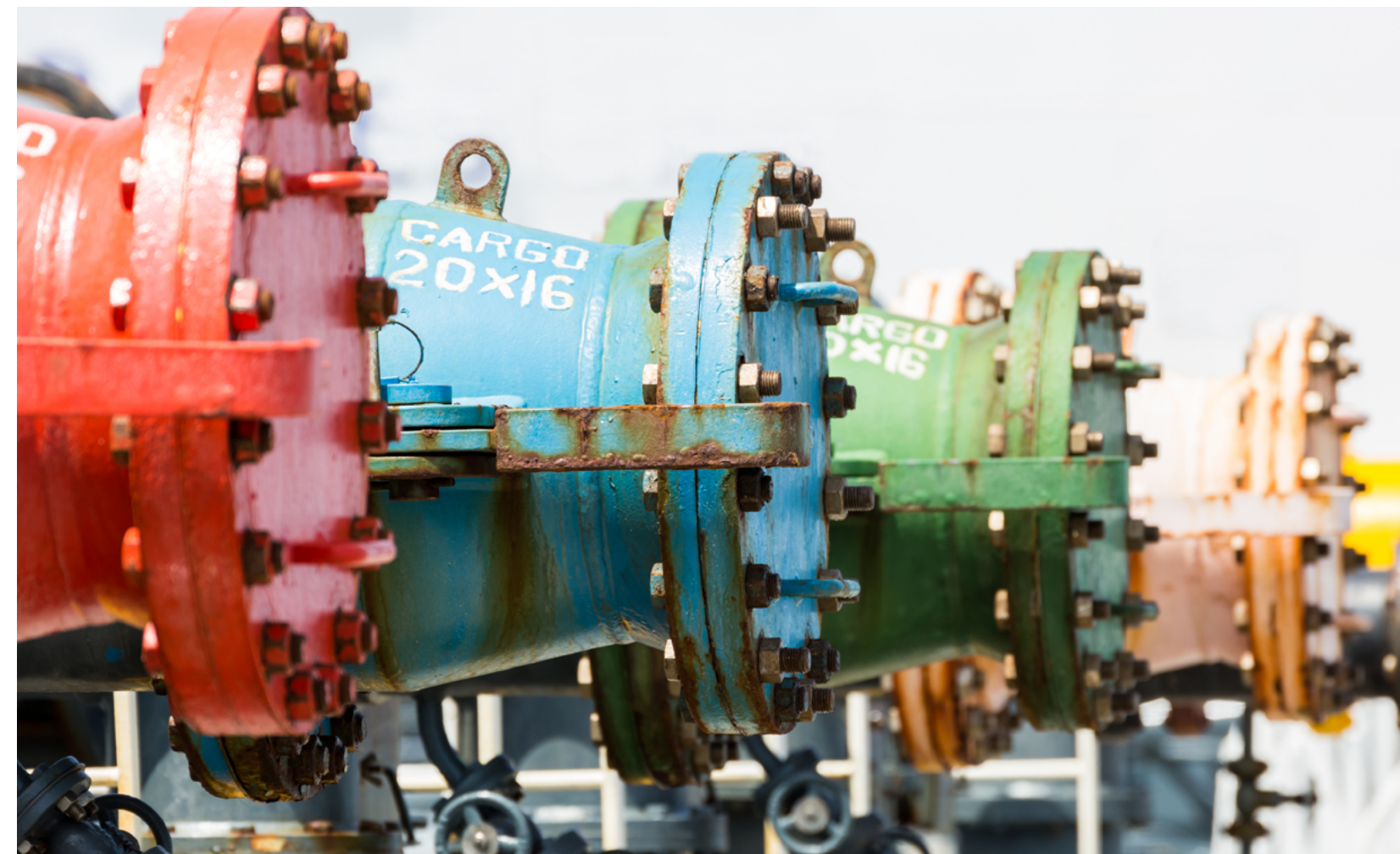
## 1. Risk Reduction

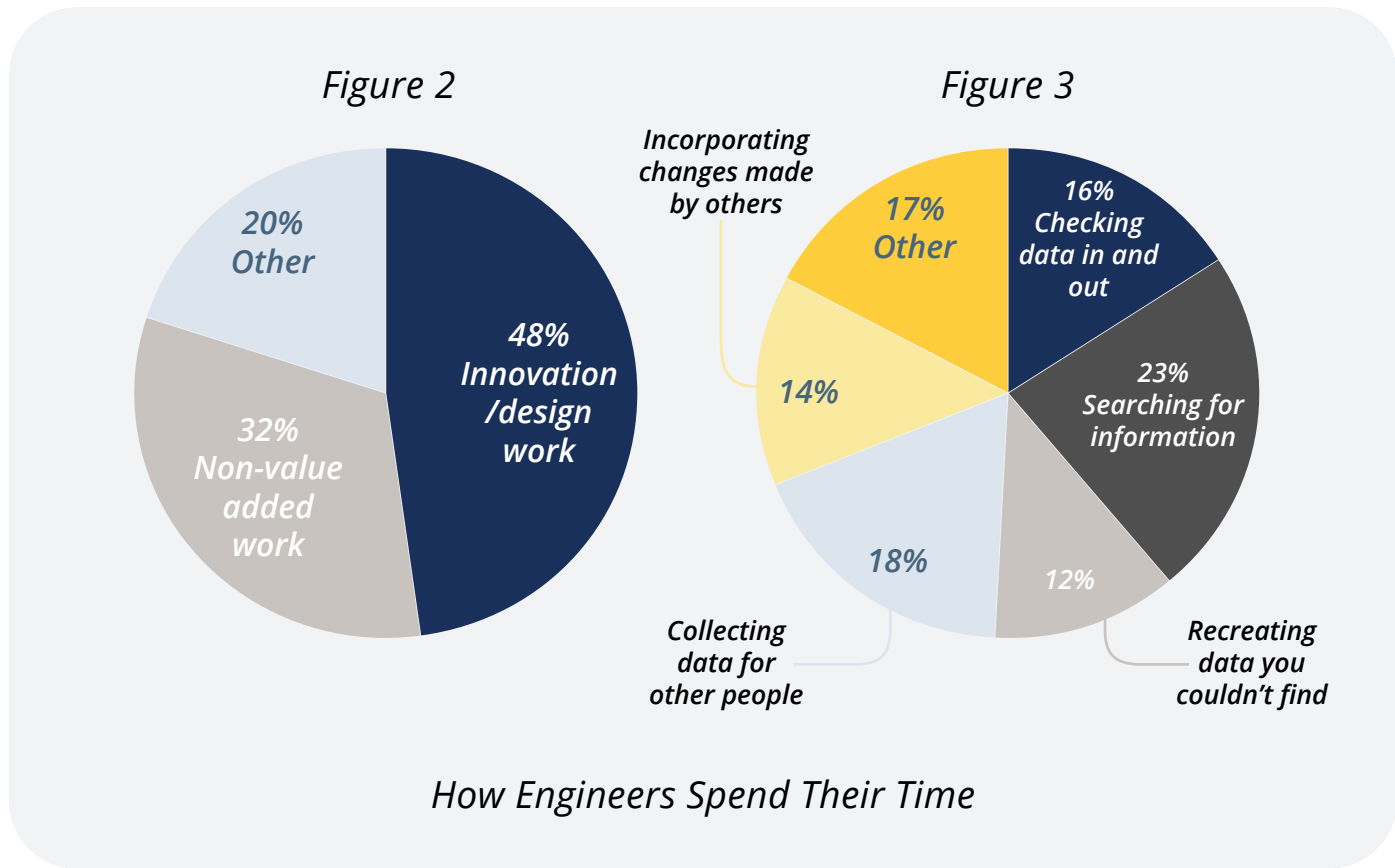
Many oil and gas organizations that strive for zero TRIR <sup>[2]</sup> subscribe to a philosophy that all spills, injuries, and fatalities are preventable. A core tenet of this belief is that human error is the root cause of accidents. When work becomes routine or tedious, people may begin to cut corners and introduce additional risk into processes and operations.

It's the field hand that knows to watch pinch points and wears proper gloves but has been taking more chances to finish sooner. Elsewhere, it's the engineer who works off of memory or sends plans with typos here and there to finish earlier. They are both ticking time bombs that introduce unnecessary risk that could cost the company millions in an accident.

Research has found that while this is sometimes a people problem, this is more often a system and leadership problem that is better resolved through latent cause analysis <sup>[3]</sup>. Management asks, "Why did Jimmy decide to do that? He knows better." The team says, "There's not enough time in the day, and tough choices have to be made. Besides, we've been doing it that way for years, and nothing ever happened."

"...it's more often an issue of system and leadership. The underlying cause is better addressed through Latent Cause Analysis"





### Risk in Spreadsheet Errors

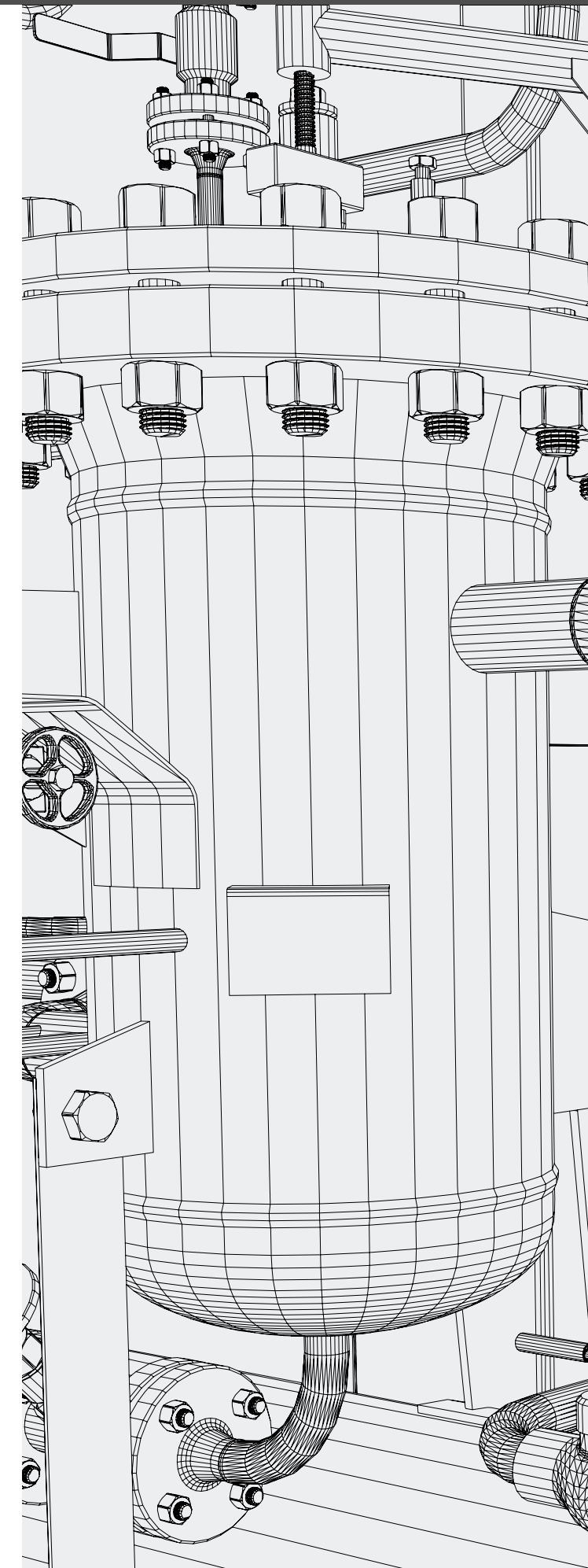
How confident are you that your current solution for engineering analyses does not contribute to additional risk? Many studies have shown that ninety percent of all spreadsheets have errors [4]; where are yours? Will latent cause analysis of your next incident show that corner-cutting in this area was a significant factor?

As a Technical Toolboxes customer, you can rest assured because our calculations are used daily by thousands of pipeline engineers, which results in a thoroughly QC-ed product. We recently commissioned a six-month study to root out errors and bugs, and we invest significantly in automated regression testing and robust IT Governance to ensure we deliver a sustainable, top quality product.

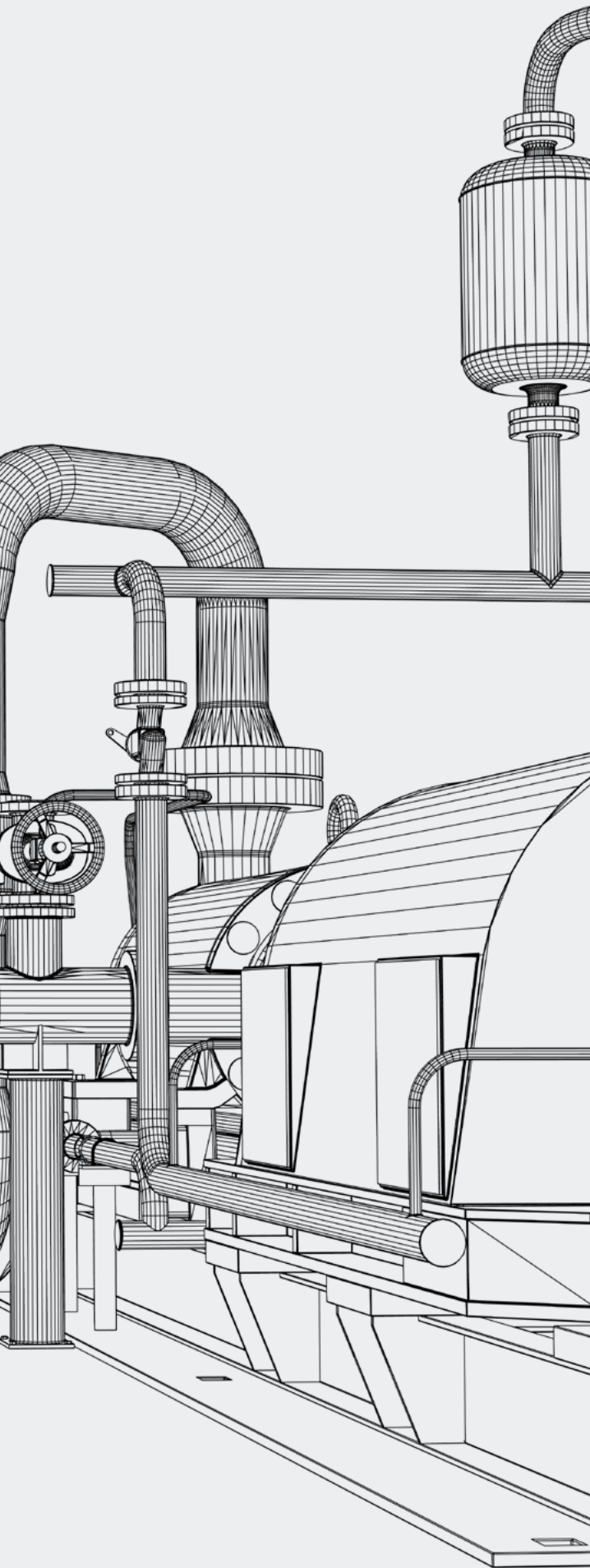
### Risk in Simplifying Assumptions

In many organizations, engineers spend 30% of their time on non-engineering tasks [5], as shown in Figures 2 and 3 (left). Does your current solution require engineers to search for data for manual entry into analyses, and does this time constraint result in engineers making simplifying assumptions instead of following all protocols involved to leverage your asset databases?

Pipeline Toolbox on the HUB<sup>PL</sup> integrates with your asset database(s). It auto-populates analysis inputs directly from your database(s), which reduces risk by decreasing the opportunity for typos and decreasing the likelihood that someone will work off of memory, or make simplifying assumptions, to cut corners due to time constraints or tediousness. Our solution will make a measurable difference in efficiency and accuracy of accessing and entering the correct data, allowing your engineers to spend 25% more time engineering better outcomes.







### Risk in Processes

Does your solution leverage the power of digital transformation and workflow automation? Simple errors can, unfortunately, result in fatalities &/or tremendous fines in our industry. Workflow automation significantly reduces human error through increased productivity, accuracy, and fact-based decision making while minimizing assumptions in decision making and deviations from protocol <sup>[6]</sup>.

Technical Toolboxes designed the HUB<sup>PL</sup> platform to facilitate workflow automation and we are developing additional workflows enhancements for PLTB. Your engineering teams will reap the benefits in the form of efficiency gains and records of their contributions.

### Risk in Lack of Collaboration

Does your current solution encourage a silo-mentality, or facilitate collaboration? Study after study shows that collaboration boosts productivity and delivers better outcomes <sup>[7][8]</sup>. An article in Forbes asks the valuable question, "If leaders at your organization don't use and support collaborative tools and strategies, then why should the employees?" <sup>[9]</sup> Additionally, according to an article by NC State University Poole College of Management, "Organizations need to take on the right approach in order to manage risks effectively. When all is done well, and all the efforts come together, organizations can successfully manage risks through a collaborative process that leads to the fulfillment of the organization's goals and objectives." <sup>[10]</sup>

Empowering/Enabling your engineering team to collaborate with Pipeline Toolbox on the intuitive, collaborative environment of the HUB<sup>PL</sup> reduces risk by having more eyes on the same analysis, encouraging peer reviews, and reducing duplication of effort. This integrated and collaborative environment makes it easier to know what you know and what you don't know. It can also greatly improve your ability to surveil completeness, prove TVC (traceable, verifiable, complete), and prudent operatorship.

"Study after study shows that collaboration boosts productivity and delivers better outcomes."



“A 10% reduction in re-work, troubleshooting, and safety incidents can save millions on a typical new project.”

## 2. Cost Reduction

### Headcount vs Workload:

Do more with less. A recent success story from a Fortune 100 client shows how Pipeline Toolbox enabled an 85% efficiency gain in a team of 7 engineers, allowing 1 person to take on the whole workload. This enables 6 full-time engineers to focus on other value-adding tasks that can improve company performance. During the industry's cyclic downturns, this can be a component of corporate survival.

### Purchase vs Build

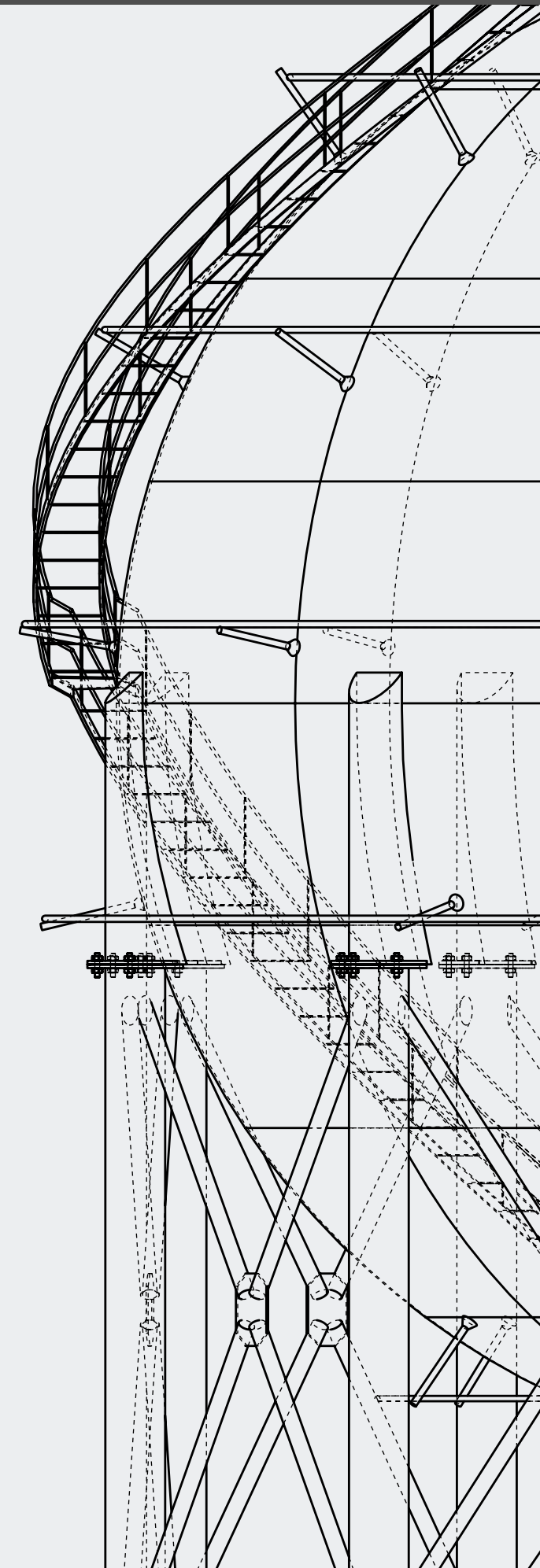
Enable innovators to solve the challenges of tomorrow, instead of reinventing existing, off-the-shelf solutions. A customer recently revealed that an internal study showed it would cost in excess of \$100,000 per year to build and maintain an internal tool that had the basic calculations their team needed, a subset of those available in Pipeline Toolbox. The dramatically enhanced capabilities of the latest version's data integration, workflow automation, and collaborative environments would drive the cost even higher.

### Capital Expenditures

“Lower upfront costs of new midstream assets due to fewer errors resulting from a decrease in accessing and entering data, decrease in simplifying assumptions. A 10% reduction in re-work, troubleshooting, and safety incidents can save millions on a typical new project. For example, say you reduce the workload required for a team by six FTEs, at a fully burdened employee cost of \$200k per engineer. The result is \$1.2 million in annual cost savings.

Thousands of engineers use our product in over 400 operating and service provider companies for this reason. Pipeline Toolbox on the HUB<sup>PI</sup> can easily provide significant improvement in the ROI of our pipeline projects. Additionally, better designs reduce OpEx in mature assets for decades.”

**Example:**  
*6FTE x \$200k fully burdened employee cost  
= \$1.2MM/yr cost savings*

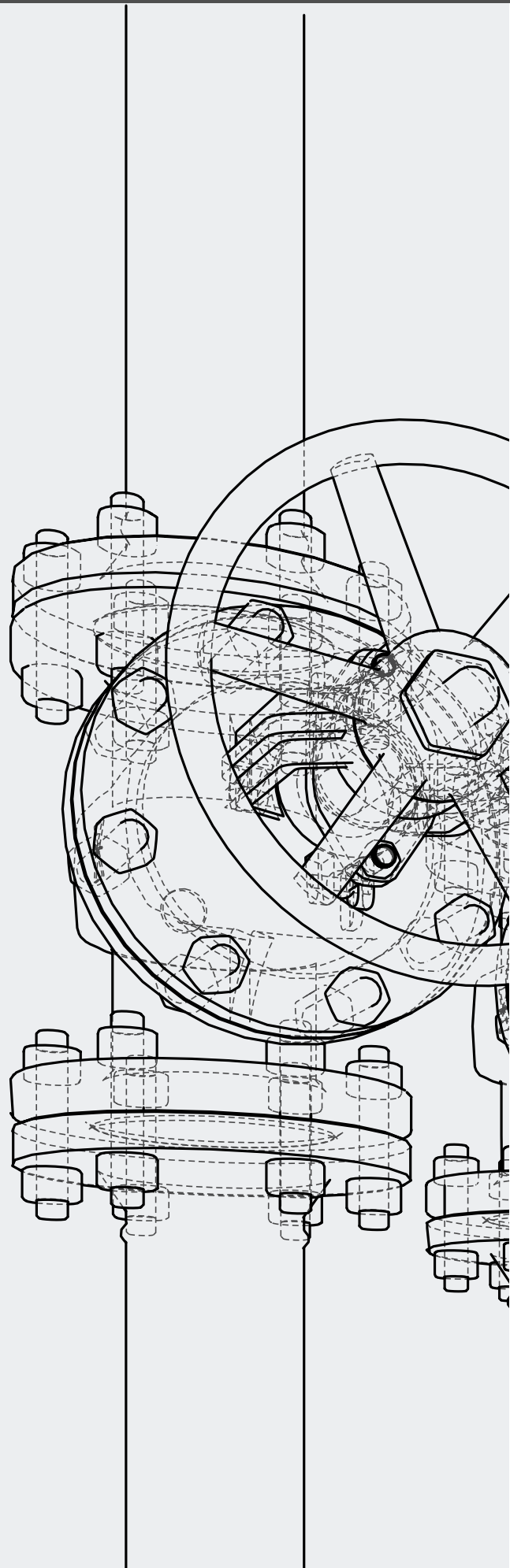


## Incident Response

According to the US Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), there were 635 pipeline incidents in 2018, 37 of them categorized as serious incidents <sup>[11]</sup>. The combined cost of those incidents is reported to be in excess of \$1.8 billion and six members of the public lost their lives. On average, there are 13 fatalities and 50-60 injuries each year associated with pipeline incidents, and mostly members of the public.

The Pipeline Toolbox on the HUB<sup>PL</sup> reduces cost in two primary ways. First, the reduction in risk described previously helps you avoid costly failures. Based on the above figures, a ten percent reduction in risk of experiencing a serious incident correlates to \$400,000 per year in savings. Second, when an incident does occur, having quick access to case histories consolidated in one location and stored in an easily searchable manner can save weeks of time and associated costs for investigating teams.

**“A 10% reduction in the risk of experiencing a serious incident correlates to \$400,000 per year.”**

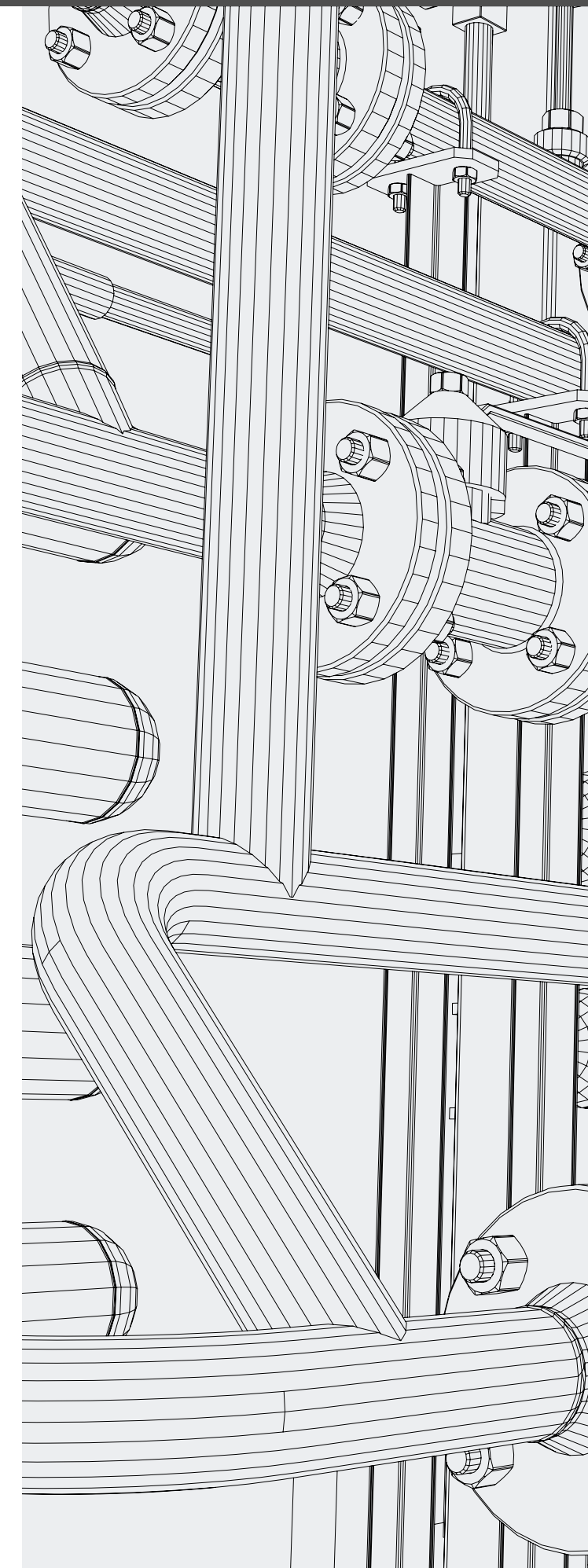


“PLTB on the HUB<sup>PL</sup> meets our expectations through lower costs and time efficiency...”

### 3. Project Acceleration

An operating company can commission new pipelines faster and safer with Pipeline Toolbox. This is accomplished through efficiency and reliability in the design phase, but also in having the tools engineers need to quickly adjust to conditions in the field during construction. Assuming daily throughput of 250,000 barrels of oil and ten cents per barrel transportation fee, advancing the commissioning date by a week generates \$175,000 additional revenue in the fiscal year. Advancing the project by a month generates \$750,000 in additional revenue. Our pipeline owner/operator customers have shown time and again that our software helps them advance their project schedules through efficiency, accuracy, and reliability.

One of North America's top engineering consultancy firms recently cited the efficiency and reliability of daily operational calculation use cases they have found with Pipeline Toolbox, as well as the value of having such a wide variety of solutions at their fingertips. When they encounter projects with challenges they don't usually face, like flume design, the team would spend a couple of weeks trying to figure out how they'd tackle the situation. Now they know there's an intuitive solution already built into another module within their daily working tool, easily advancing projects by 1-2 weeks and generating tremendous ROI for the service provider.



# Additional Customer Success Stories

## Reducing Crossing Decision Assumptions to Improve ROI

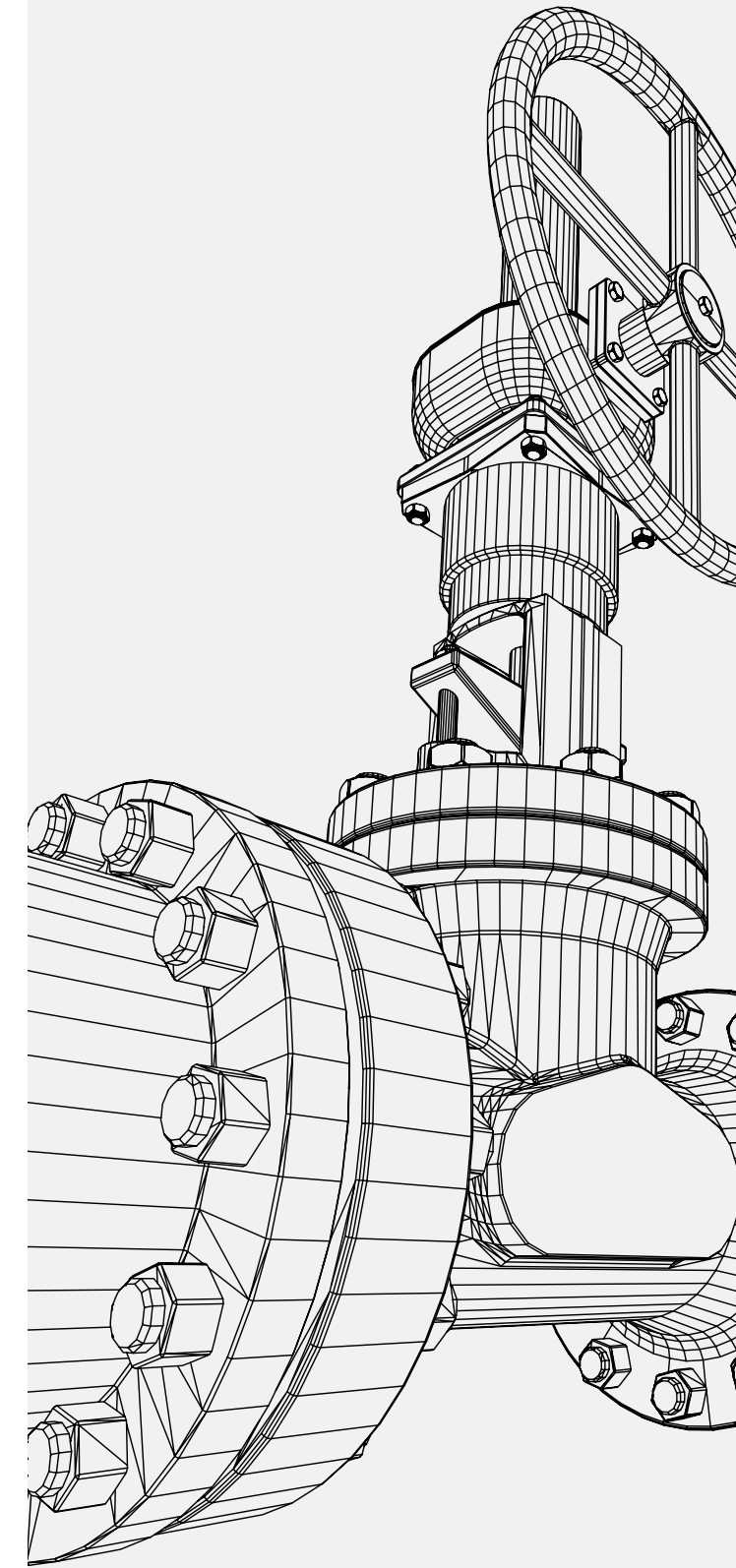
PLTB on the HUB<sup>PL</sup> automates workflows to minimize risk and eliminate any assumptions made due to time constraints. Our customers recently shared some stories with us about how this new capability impacts their engineering teams. The engineers of one Fortune 100 pipeline operator in the Northeastern United States perform dozens of pipeline crossings calculations each week.

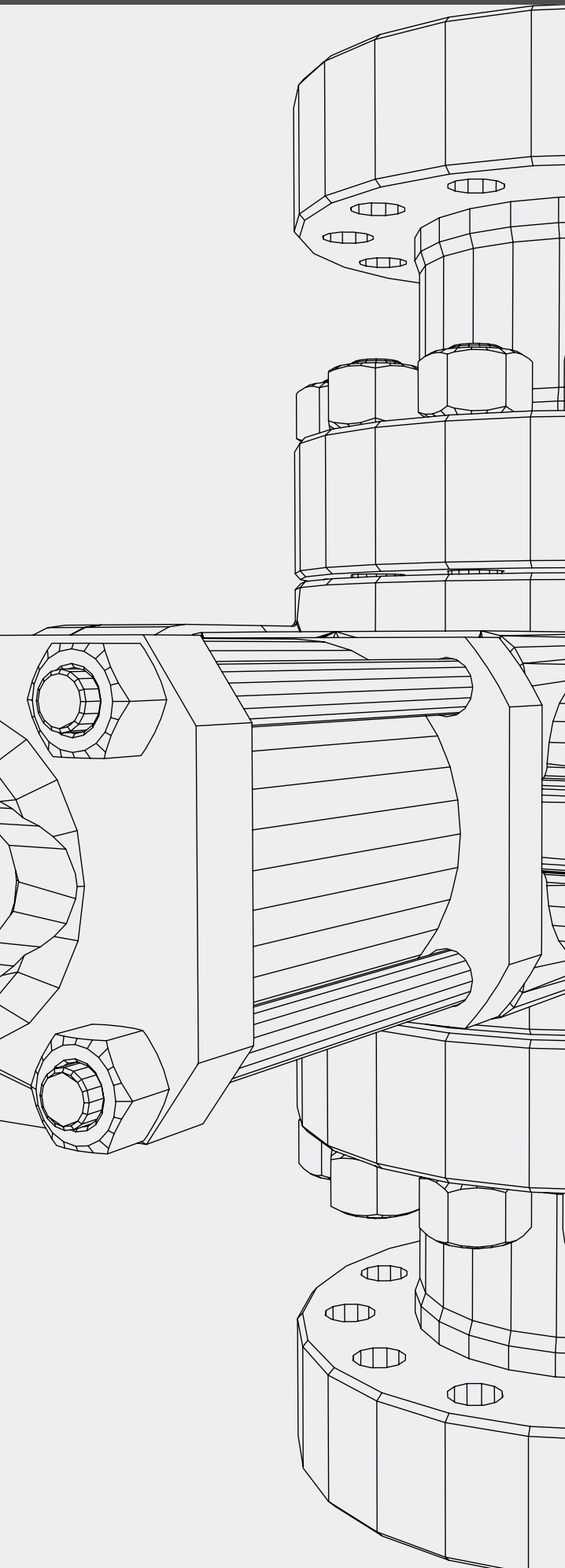
Another Houston-based Fortune 100 pipeline operator once had to perform a complicated pipeline crossing case that involved 90 crossings calculations due to the number of pipelines in the right of way and pieces of heavy equipment that needed to cross them.

To save time, in both instances, the operators assumed worst-case scenarios and didn't run calculations for various crossings calculations. Had they used PLTB on the HUB<sup>PL</sup>, it would have given the engineers automated workflows that pre-populated pipeline data, allowing for one-time entries for pipe and soil characteristics. They could have saved time and avoided making simple assumptions that could lead to costly errors.

All calculations run simultaneously and iteratively to show a pass/fail outcome on one consolidated report. Time savings can be as much as a day to a week for complex calculations, which multiplies the ROI of engineering teams. Additionally, it reduces the risk of inaccurate assumptions made by busy engineers rushing to stay within time constraints.

You can reasonably assume that a team of four or five engineers works on crossings cases for an entire week, each at \$150 per hour. Using PLTB, one engineer can do this the same amount of time, saving the operator \$24K in one week alone. It frees the other four engineers to focus on new business opportunities, which further extends the ROI.





## Houston Engineering Company Saves Millions Via Project Acceleration

A study in the Harvard Business Review <sup>[12]</sup> recently noted that data scientists and other technical workers spend half their time hunting for data or finding and correcting errors within their data. The experiences of pipeline engineers are typical of such personnel. Administrative and data management tasks are costly distractions, which prevent your engineers from performing high-value tasks and proactively affecting the company's bottom line.

PLTB eliminates the kind of repetitive work that takes so much time out of an engineering workday. Utilizing the Navigator and Hierarchy tool on the HUB<sup>PL</sup>, users save time searching for case histories, mining for data, and populating calculations. Moreover, with the collaborative features of PLTB on the HUB<sup>PL</sup>, engineers spend less time quality performing checks. After the initial upload, data is available for all to use until you remove it.

"Time is money," as one Vice President of Engineering for a high-profile Houston, TX engineering company noted to a Technical Toolboxes manager. "If a project goes over schedule by just a couple of months for us, it could cost us millions, thus greatly reducing our ROI for that project."

You no longer have to email, call, or otherwise hunt for the correct data. The collaborative features of the HUB<sup>PL</sup> allow you to check the data, calculations, or cases of other users very quickly and efficiently. PLTB on the HUB<sup>PL</sup> accelerates schedules, which raises ROI. Figure 4 illustrates this transformation and its effects on the time engineers spent working, once your company integrates PLTB HUB<sup>PL</sup> and its various enhancements into your SOP.

The VP went on to say that, "Technical Toolboxes acts as a one-stop-shop for our engineering team during the front-end design, construction, integrity and maintenance phases." He added, "Furthermore, I know everything will be in one place if I need to go look at prior calculations or analyses."

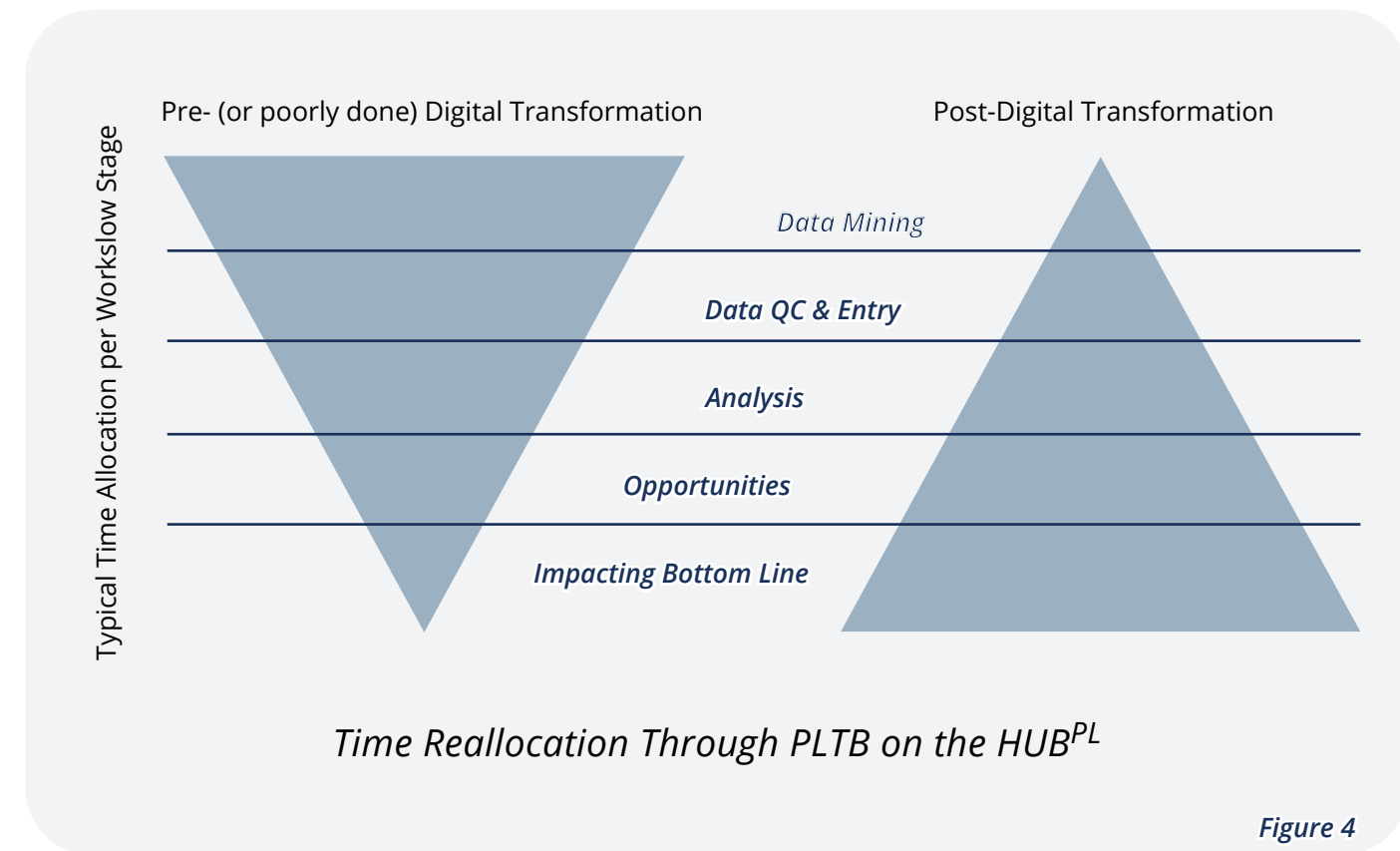


Figure 4

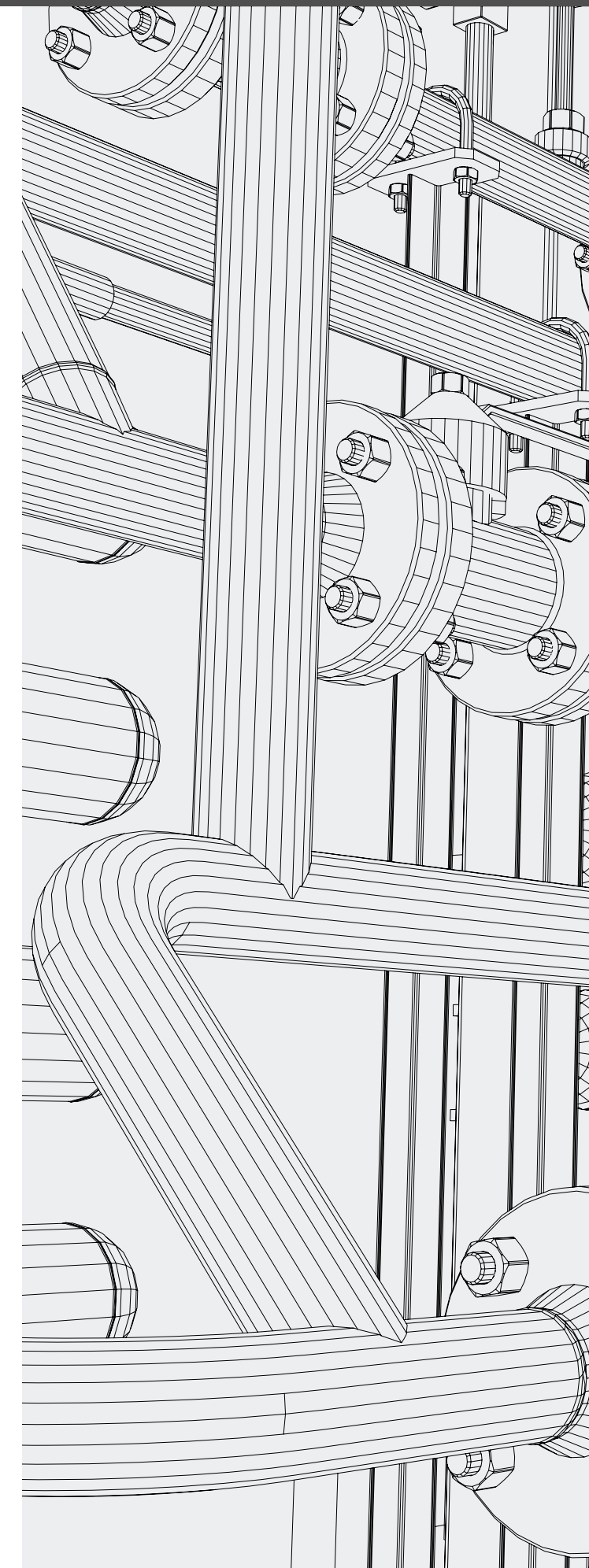


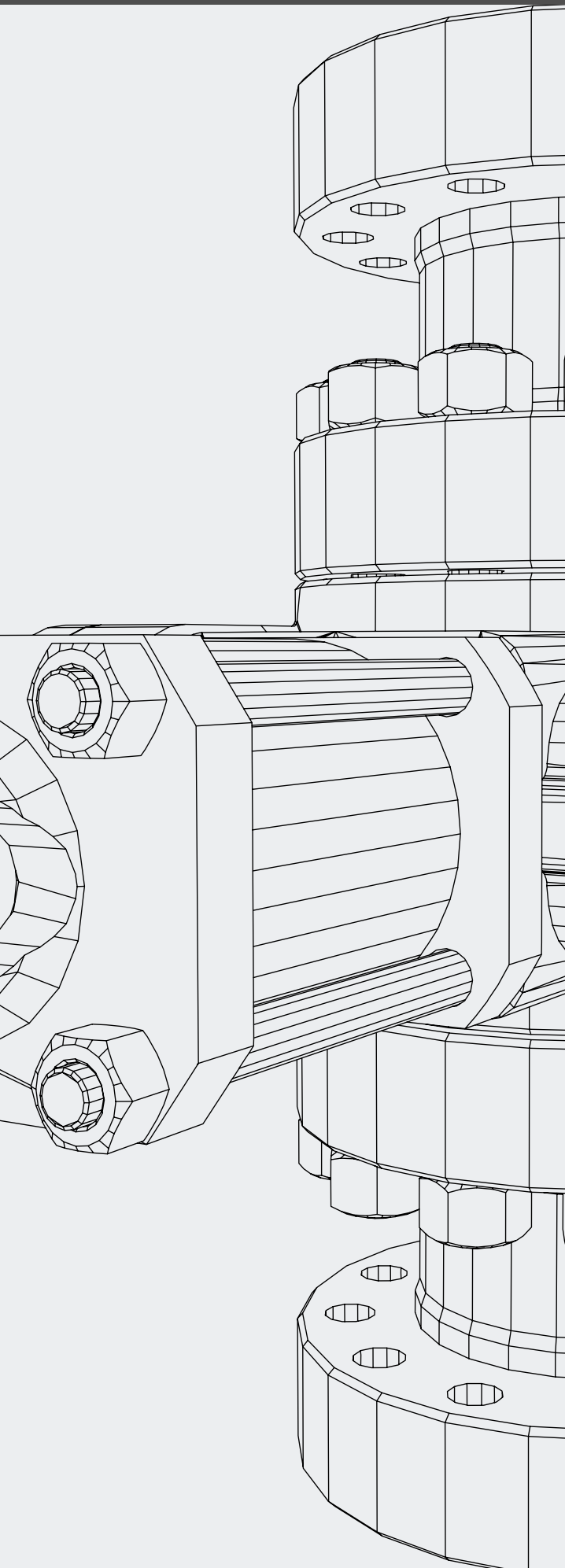
“By eliminating just one day of down-time, it saves more than \$50K. Every week of downtime prevented, represents more than \$400K in savings.”

## Fortune 500 Company Saves Millions in Corrosion Management

A Fortune 500 midstream operator adopted corrosion solutions from Technical Toolboxes as company-wide SOP. The engineering team is enabled to make quick, accurate decisions for the integrity of pipelines all in one, customizable workspace. It routinely reduces project timelines for the company by weeks.

So, they get pipelines back online quickly and deliver much-needed gases and liquids to refineries. By eliminating just one day of down-time, it saves more than \$50K. Every week of downtime prevented, represents more than \$400K in savings. It stems from using an integrated data environment and workflow automation to make quicker, more accurate decisions.





## Technical Toolboxes Supports Knowledge Management

Technical Toolboxes is the industry standard because we are focused on facilitating knowledge transfer through software and technical training in a way that effectively supports the industry's needs arising from churn and rotations. We deliver a one-stop-shop to the industry for best practices and analysis solutions from a combination of IP sources, including PRCI, EWI, AWS, API, NACE, ASME, and others. The HUB<sup>PL</sup> was designed to aid customers in the ever-present need to transition knowledge of personnel into corporate memory, thereby improving ROIs and sustainability of our customers.

We support professional development with comprehensive webinars, live course events, stakeholder performance reviews, and onsite training support. All of our trainers are subject matter experts, with backgrounds and experience in the midstream oil and gas industry. They also answer technical questions that go far beyond the engineering software.

**"...to make quick, accurate decisions for the integrity of pipelines all in one, customizable workspace."**





“PLTB on the HUB<sup>PL</sup> holds all of the necessary pipeline engineering tools, from design to operations to integrity.”

## Conclusions

PLTB on the HUB<sup>PL</sup> holds all of the necessary pipeline engineering tools, from design to operations to integrity. It lowers costs and cuts work times through efficiency. It gives all of the users in your company a shared, standardized playbook, which reduces errors and omissions, from the central office down to the field offices.

The cases and examples above demonstrate how PLTB on the HUB<sup>PL</sup> produces ROI growth, both directly and indirectly. For busy pipeline engineering teams, the payback period can be as short as a few weeks. As we have shown, the Pipeline Toolbox gives pipeline engineers and operators the critical information systems and capabilities to increase return on investment.

## Endnotes

[1] [https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2F%20Public%20Website%2F\\_portal%2FExcavation%20Damage](https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2F%20Public%20Website%2F_portal%2FExcavation%20Damage)

[2] Zero TRIR <http://safetymanualtoday.com/what-is-a-trir-and-how-does-it-affect-your-isnetworld-account/>

[3] Latent Cause Analysis [https://reliabilityweb.com/articles/entry/where\\_do\\_we\\_end\\_our\\_probe\\_in\\_root\\_cause\\_analysis](https://reliabilityweb.com/articles/entry/where_do_we_end_our_probe_in_root_cause_analysis)

[4] 90% of all spreadsheets have errors <https://blogs.oracle.com/smb/10-of-the-costliest-spreadsheet-boo-boos-in-history> &/OR <https://www.forbes.com/sites/sales-force/2014/09/13/sorry-spreadsheet-errors/#e6a6c1d56ab2>

[5] How Are Engineers Spending Their Time? <https://www.engineering.com/PLMERP/ArticleID/9937/How-Are-Engineers-Spending-Their-Time.aspx>

[6] <https://www.cioreview.com/news/importance-of-adopting-workflow-automation-nid-25246-cid-144.html>

[7] Heinrich's Triangle <https://risk-engineering.org/concept/Heinrich-Bird-accident-pyramid>

[7] <https://insight.kellogg.northwestern.edu/article/the-science-behind-the-growing-importance-of-collaboration>

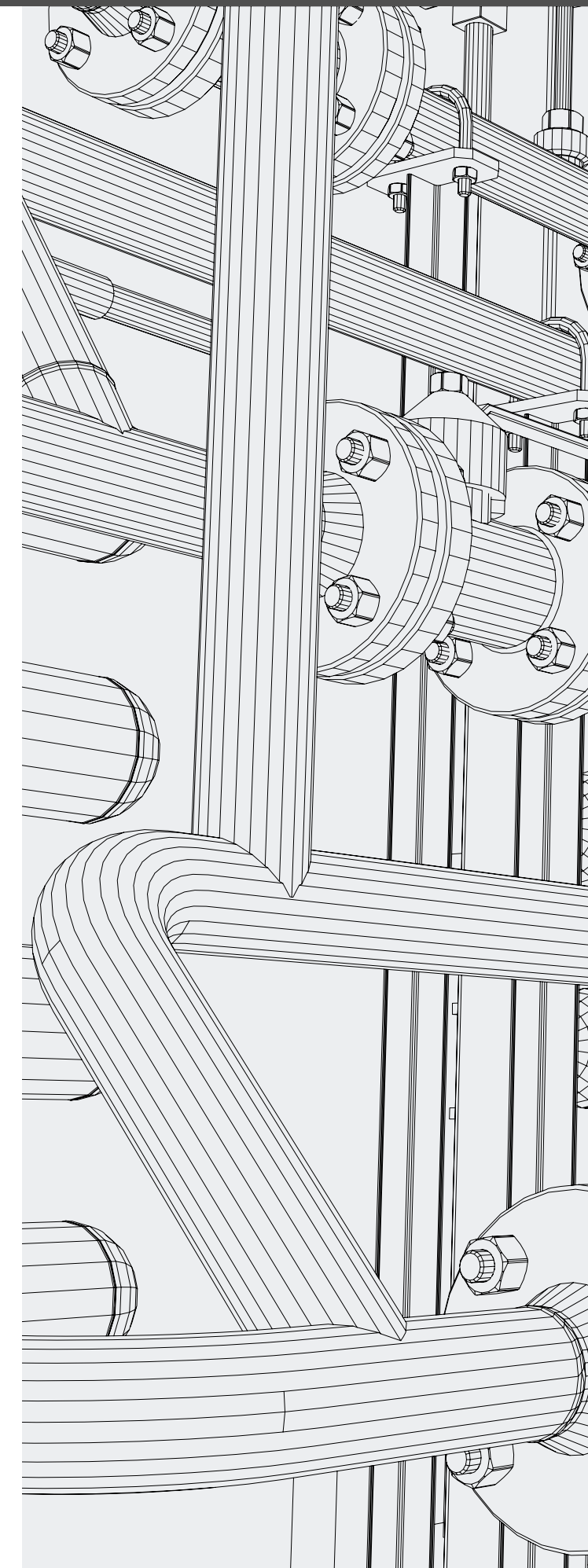
[8] <http://www.constructionexec.com/article/reduce-risk-through-planning-collaboration-and-brainstorming>

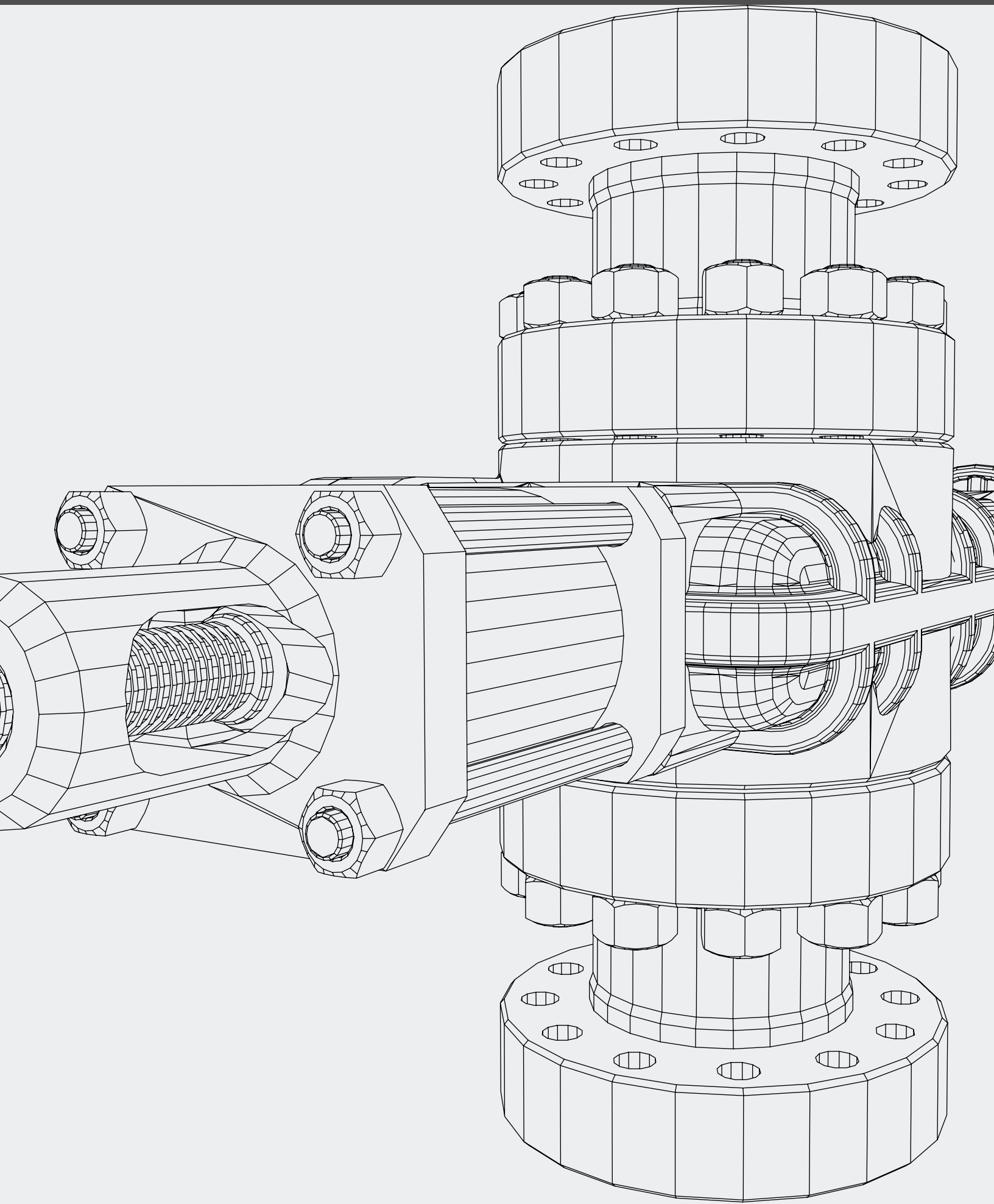
[9] The 12 Habits of Highly Collaborative Organizations <https://www.forbes.com/sites/jacobmorgan/2013/07/30/the-12-habits-of-highly-collaborative-organizations/#70067d5c3683>

[10] <https://erm.ncsu.edu/library/article/collaborative-risk-management-fundamentals>

[12] <https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-20-year-trends>

[13] <https://hbr.org/2016/09/bad-data-costs-the-u-s-3-trillion-per-year>







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AC Mitigation PowerTool  
ECDA & Remaining Life

## About Technical Toolboxes

Technical Toolboxes leads the mid-stream oil and gas industry with knowledge-based solutions. Our integrated desktop and cloud-based solutions foster engineering productivity and standardization. Professionals around the world look to our industry-recognized instructors for training and development. To improve efficiency, compliance, and productivity, pipeline engineers look to Technical Toolboxes.