

WHITEPAPER

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# Unified Engineering: A new proposition to break down the silos between FEED and Detailed Design to minimize risk and maximize return on Capital Investment

Authored by:

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## Executive summary:

Never have the stakes been higher for companies when it comes to making improvements to their engineering work processes to maximize ROI on Capital Projects. Productivity has not developed in decades – the average Capital Project schedule lags by 20 months and goes over budget by 80%<sup>1</sup>.

In many of today's Capital Projects, there is a disconnect between FEED and Detailed Design. In response, AVEVA is the first industrial software provider to pioneer a new solution to break down the silos between these engineering disciplines.

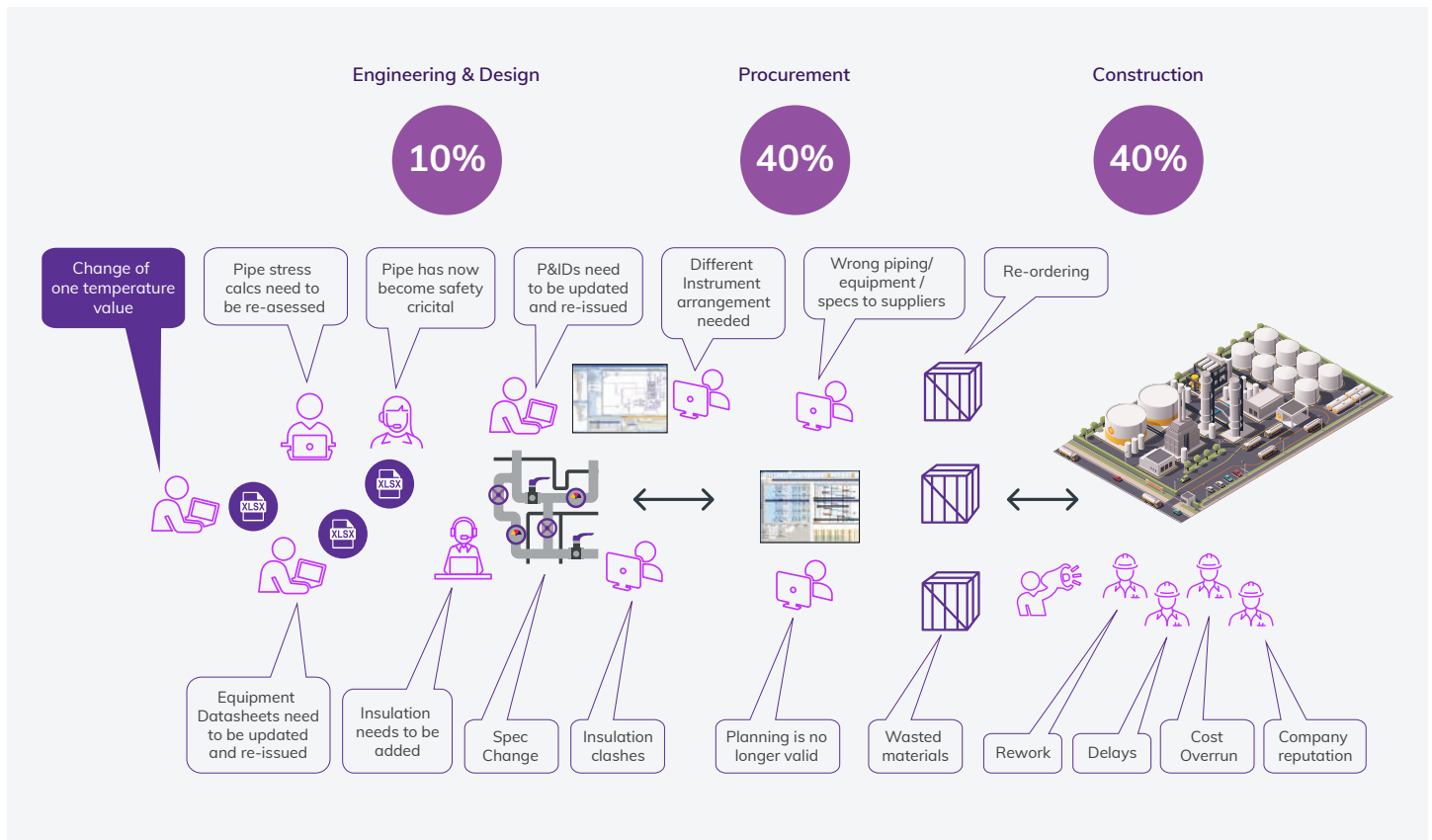
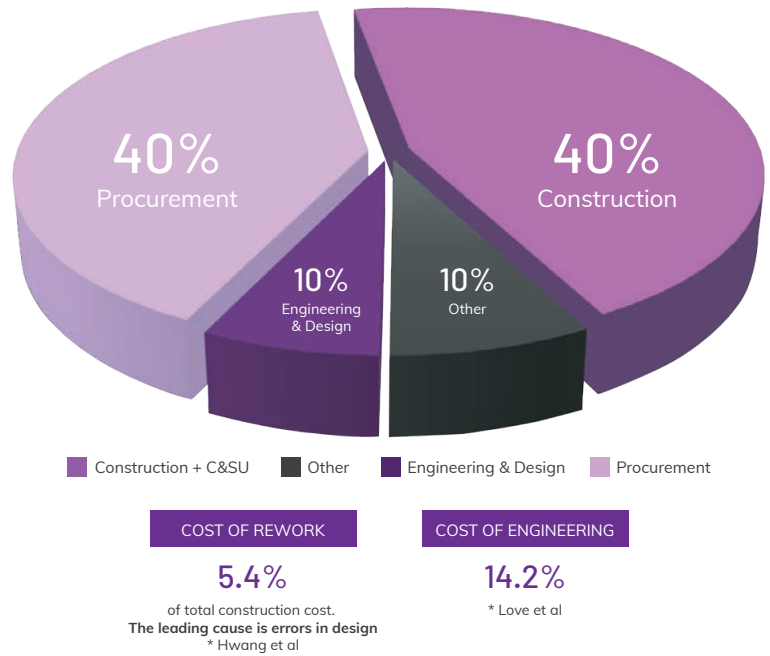
**Unified Engineering** enables global multi-discipline teams to work concurrently in a common data-centric environment, controlling and managing change across the entire project. This breaks down the silos between FEED and detailed design. The simulation data created in FEED is readily available for use in detailed design and is checked and validated in real-time, increasing efficiency, minimizing risk, and maximizing return on investment on your Capital Projects.

# The real cost of Engineering and Design

While the cost of engineering and design typically amounts to just 10% of the overall project cost, the work being carried out here heavily influences what happens in procurement and construction.

The leading cause of rework in project execution is design errors and omissions, and according to research, they contribute to over 5.4% of the total construction cost<sup>2</sup>. Engineering errors alone make up 14.2% of the total contract value<sup>3</sup>.

Reducing engineering and design errors is therefore an essential factor in lowering project cost and minimizing risk of overruns and delays. Action must be taken within the engineering phase to ensure these figures are minimized, and to lower total installed costs (TIC).



Changes that take place in the engineering phase can heavily impact what happens in procurement and construction.

## Start leveraging your EPC 4.0 strategy

Companies are beginning to make progress on their digitalization journey, finding the right applications for digital transformation and seeing increasingly better returns on their investment. While the age-old market environment challenges (such as supply and demand, cost and price) haven't gone away, competitive pressures are making the digital transformation opportunity more pressing than ever.

Many have already started to leverage the latest data-centric technology and work processes for their workforce to collaborate and take control of their data, reducing the risk for errors, delays and increased project cost throughout the asset lifecycle. By doing so they are in a stronger position to become more competitive, increase their margins and win new business.

This phase of the digitalization journey is what we call [EPC 4.0](#)



## Big gains with EPC 4.0

Imagine a project where all your engineering departments are working together in a more seamless way, where the latest validated information is available to all project disciplines instantaneously.

**Now is the time to discard tools such as MS Excel and move towards a data-centric approach.**

This will become reality with Unified Engineering - a new way to leverage your EPC 4.0 strategy and support the project lifecycle every step of the way. Doing so removes the need to re-enter and re-check data and saves time when producing deliverables; time which can then be invested on further innovation within your business.

## Missed opportunity connecting FEED and Detailed Design

Construction Industry Institute™ (CII) reports:

“More mature and accurate FEED in the early stages of industrial projects improves cost and change performance, while helping meet financial performance and customer satisfaction expectations.”<sup>4</sup>

To reduce the number of iterations in FEED, process engineers must work concurrently with other disciplines. All information must be stored and exchanged as data to ensure there is always clear visibility of progress across the entire project. **Unified Engineering** manages and drives positive change within your business to ensure risk is minimized during the early project phase right up to the Digital Twin deliverable to the Owner.

## The AVEVA™ Unified Engineering Model

Unified Engineering consists of two main components, the Unified Lifecycle Simulation Platform (one model), and Integrated Engineering and Design (one database). The two are combined to form a robust process model and an engineering database that is able to synchronize through bi-directional flow of all 1D, 2D and 3D data on one platform. The bi-directional integration of a steady-state and dynamic process model with an engineering database makes the process seamless and eliminates the need for MS Excel or other intermediate steps to transfer information between tools.

With the Unified Engineering model you can have:

- Verification the plant will operate as expected, and that controls are properly configured
- Verification that equipment and piping are properly sized
- One single version of the truth that remains up-to-date

[Book a demonstration](#) today to see how you can benefit from Unified Engineering.

### Simulation Platform

One single platform instead of multiple point solutions with and interactive Process and Control Engineering



### Integrated Engineering & Design

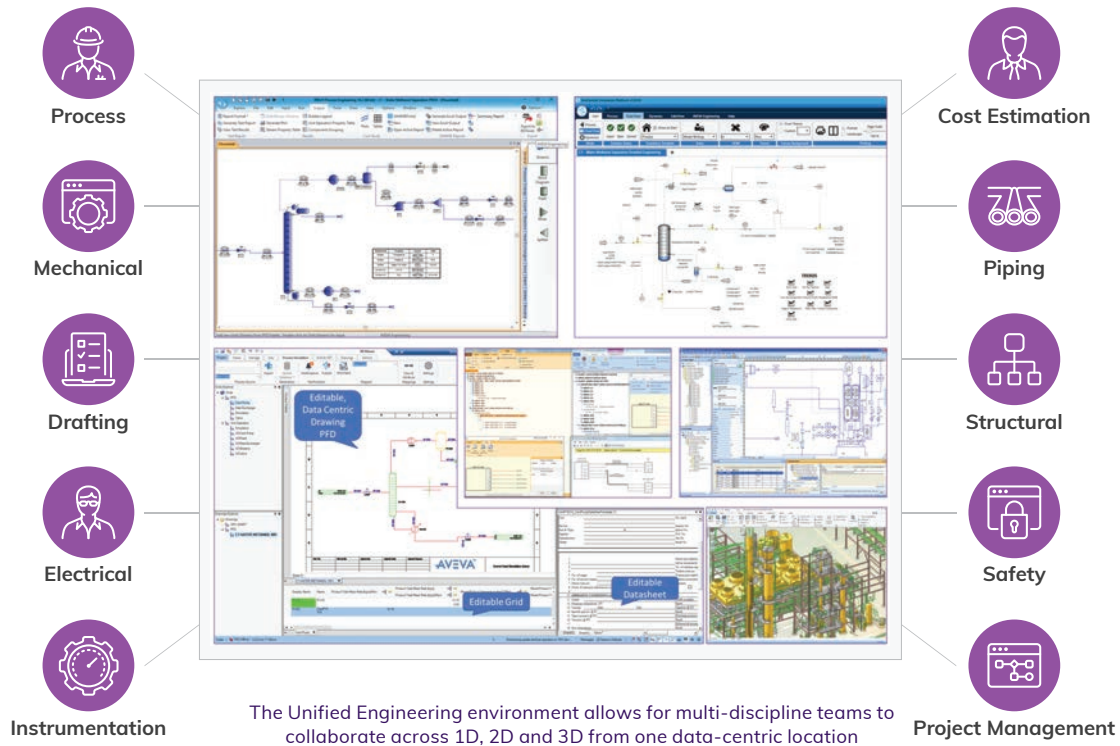
A single, data-centric platform for discipline engineers to work together on, keeping all 1D, 2D and 3D engineering data in one place

- Accurate and mature design deliverables
- Efficient collaboration and automated updates
- Bi-directional data flow
- Digital Twin Data Model

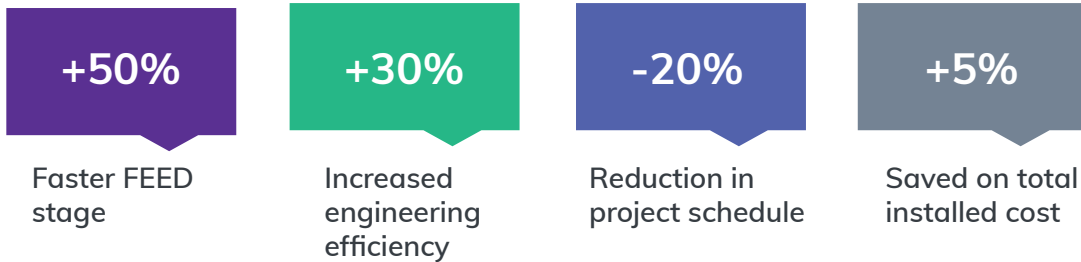
The process model and the engineering database synchronizes through bi-directional flow from a single platform



# Unified Engineering: from Concept to Digital Twin



## What AVEVA Unified Engineering can do for you



### Breaks down the silos

AVEVA Unified Engineering breaks down the silos between process and engineering design and ensures each discipline has ownership of their data and the reassurance that it is always correct. Early FEED is a highly iterative process but with Unified Engineering data is entered only once. The simulation data created in FEED is readily available for use in Detailed Design, increasing efficiency across projects. Procurement errors and delays are avoided, and rework caused by poor quality deliverables is eliminated.

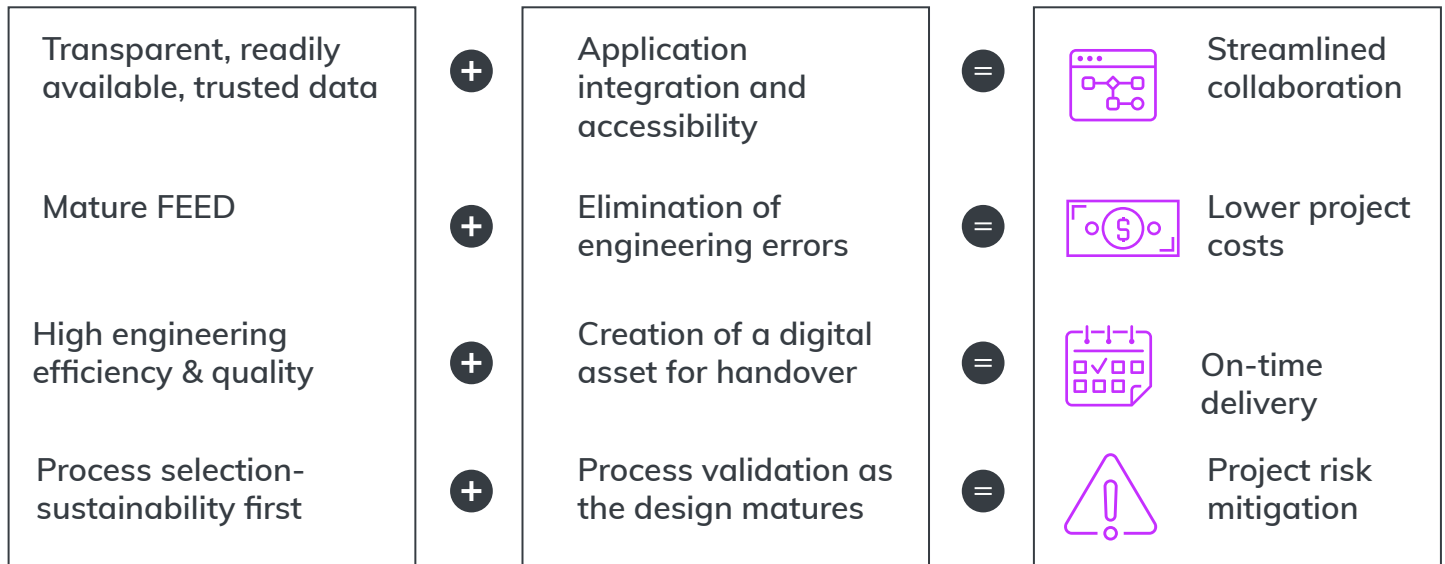
### Seamless transfer of the process model into detailed Engineering and Design

Unified Engineering is not just about collecting simulation data into a database. It is about empowering your people to take full control, to manage the data effectively. Even when big changes have been made, Unified Engineering ensures they can be easily validated.

The whole workflow is automated meaning less requirement for manual input. Further changes after the initial handover from FEED to detailed design will flag automatically. For example, a process engineer may need to change a temperature value which in turn changes materials from plastic to metal. This may be a small change in the process, but it has significant consequences in engineering and a considerable impact on cost.

Unified Engineering is designed to effectively manage such changes. This will help you to easily verify that your business remains compliant with new industry regulations such as new environmental or HSE regulations.

## The Unified Engineering Advantage



Using AVEVA's approach, data entry happens only once, and each discipline has ownership of their data and the reassurance that it is always correct.

### Automated process validation of change

If a significant change needs to be made in engineering design, it will automatically flag in process so that the process engineer can validate the process or make modifications as appropriate.

All these changes are critical to the outcome of the project. Unified Engineering helps you check and validate change in real-time. This increases efficiency and productivity during the engineering phase of the project and ultimately lowers the level of risk at start-up.





### Digital Twin deliverable to owner

Have your Digital Twin ready to handover to the Owner. Unified Engineering ensures your model is accurate and up-to-date throughout the project lifecycle.

The Digital Twin of your plant ensures scope for high margin for EPCs and ease of start-up and operations for the Owner.

### Integration with 3D Design

Unified Engineering uniquely integrates with 3D design to create high quality deliverables. This means that the full end-to-end suite of capabilities comes under one solution. Engineering data is managed together with the 3D and schematics data in the same project environment, alongside all object-centric information important to capital projects.

## Collaboration: The True Value of Unified Engineering

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**Once you have the tools in place, the true value of Unified Engineering is realized because of how effectively your teams can now collaborate together.**

Projects are started faster, process behavior is optimized, and time is saved – time that can be invested in new innovation for your business.

By adopting Unified Engineering, costs are reduced across the project lifecycle, especially from commissioning and start-up and into operations. With the improved profit margins, you can ensure your business is in a stronger position than ever to compete for, and win, new projects and new contracts.

# Why cloud, why now?

AVEVA Unified Engineering when hosted on AVEVA's secure cloud platform, AVEVA Connect, is an always-on, managed service. It drives speed to value by removing dependencies on IT, leveraging Out-of-the Box configurations and in a universally accessible, scalable environment

## Fast & efficient

### Increased Engineering efficiency

- Align all teams around a single source of trusted, standardized data in the cloud to enables collaboration and plummet the risk of error and delay
- Eliminate time wasted searching for and verifying data

### Rapid, no-touch Deployment

- Be up and running in 5 days. Proven, repeatable remote deployment capabilities mean there is no need for service personnel to visit site

## Flexible & scalable

### Flexible scale up and down

- Centralized user and usage management create transparency between EPC and the Owner and enables ability to shift access easily from EPC to EPC and project to project

### New digital business models

- AVEVA UE on the cloud is enabling EPCs developing new digital services and deliverables and enables Owner-Operators transferring data to Digital Twins and new Capital Projects

## Remote collaboration

### Digital Twin creation

- Aggregated project data contributes to the creation of an asset Digital Twin and is easily transferred in the cloud to ramp up operational optimization programs quickly
- Create instantaneous engineering visibility across all partners and shared data collaboration for remotely located staff

### Streamlined handover

- Shared data on the cloud reduces handover flashpoints through continuous collaboration between the EPC and Owner-Operator
- Project standardization cuts time and cost, to ultimately reduce time to safe start-up

## Secure & available

### Reduce IT costs and footprint

- Cloud hosting shifts implementation, support, and maintenance responsibility to AVEVA to reduce pressure on your IT department
- Zero hardware requirements
- Work securely from anywhere to improve productivity and empower your workforce

### Expedited ROI

- Achieve rapid speed to value with instant ability to make agile decisions and ensure sustainable growth



# Case Study: Veolia Water Technologies

## How Veolia Water Technologies is driving innovation and sustainable operational improvements in the Cloud?

Veolia group is the global leader in optimized resource management and aims to be the benchmark company for ecological transformation. With nearly 179,000 employees worldwide, the group provides water, waste and energy management solutions and is focused on the sustainable development of communities and industries around the world. Through its three complementary business activities, Veolia helps to develop access to resources, preserve available resources, and to replenish them.

Veolia Water Technologies is a Veolia subsidiary which provides the complete range of services required to design, deliver, maintain, and upgrade water and wastewater treatment facilities and systems for industrial clients and public authorities. The company's extensive portfolio of technologies features solutions such as online diagnostics, evaporation and crystallization solutions, energy-producing sludge treatment, state-of-the-art desalination, laboratory-grade water and mobile water services. By optimizing both processes and monitoring, Veolia Water Technologies helps clients reduce their water footprint while generating considerable savings in energy and chemical consumption.

“AVEVA’s cloud-based and data-centric engineering enables our teams all around the world to work remotely, yet together, on one platform that spans all of our engineering data. It is fundamental for our staff to work in a collaborative way, in real-time, all along the design and build phases. Efficient access to data is key to boost operational performance and achieve our strategic objectives.”

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**Thomas Cheylan,**  
Projects Performance Director, Veolia Water Technologies

[Read the full Case Study](#)





## Final thoughts

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**To minimize the risk of cost overruns and delays, you need an integrated, data-centric solution to manage all engineering information in one place. This enables engineers from all disciplines to collaborate effectively, detect and identify changes as soon as they occur and compare and update them efficiently.**

Organizations who rapidly and accurately communicate change in the FEED and detailed design phase will be the most effective during procurement and construction to capitalize on project execution.

AVEVA is a global provider of Industrial software. We have 50 years of proven experience delivering plant and process modelling technologies. We are trusted by 19 of the top 20 petroleum companies; 22 of the top 40 chemical companies; and all 15 of the largest EPCs as our customers.

Our **Unified Engineering** solution enables you to leverage your EPC 4.0 strategy with data-centric collaboration on a global scale, digitally through one platform, so the entire process can be traced, tracked, and linked – from FEED engineering and detailed design, all the way up to day-to-day operations and maintenance of your asset.

### **Learn more about AVEVA Unified Engineering**

Book a demonstration today to learn how Unified Engineering will maximize your return on investment

**[Click here to book a demonstration](#)**

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## About the author

**Vanessa Erickson** is the Global Marketing Lead for Capital Projects Portfolio at AVEVA. She is primarily responsible for thought leadership and customer engagement to enable reduced risk and drive greater efficiency and profitability for AVEVA's Owner Operator and EPC customers involved in CAPEX engineering and execution.

Vanessa previously worked for Hexagon PP&M (previously Intergraph), and Acklands-Grainger where she held regional and global sales and marketing roles delivering transformational technology, construction & fabrication solutions to asset-intensive industries including Oil & Gas, Power, Petrochemical, and Marine. Vanessa holds a Bachelors of Commerce in Marketing from the University of Saskatchewan.