



Plant engineering companies are asking themselves how they can put artificial intelligence to profitable use – and it doesn't make sense everywhere.

Image: AI-generated with Ideogram

Which processes are worth it?

Where AI in engineering fails – and where it doesn't

Most AI pilot projects in plant engineering fail. Why has the industry so far often built past the value chain, and how can „atomic processes“ deliver the turnaround towards a measurable ROI?

A recent study by MIT arrives at a sobering result: 95 % of all AI pilot projects fail. Here, „fail“ specifically means that six months after implementation a negative or unclear return on investment (ROI) is recorded. This figure reflects the reality of many operations and raises the question of why the industry has so far not managed to harness the enormous potential of the technology for itself.

Convenience features instead of value creation

At present, plant engineering companies too deploy AI primarily where the risk is low and the benefit is quickly visible. Typical examples are the rollout of Microsoft Copilot, AI-assisted knowledge databases or administrative support such as the transcription of meetings.

These applications are certainly useful, but they do not reach into the actual value chain. What is decisive is that AI has so far barely taken hold in the areas of engineering, procurement and construction (EPC) as well as in construction management. As long as AI is regarded merely as an efficiency booster for sideshows, a sustainable return will fail to materialise.

The three main barriers

Three central reasons currently prevent the breakthrough:

Risk and safety concerns: EPC companies work with high-risk materials and safety-critical processes. The fear of errors in the design or of unclear data bases leads to an understandable, but often paralysing, restraint.

The illusion of „one-size-fits-all“: AI is often mistakenly understood as a universal tool. In reality, every discipline and every process requires individual solutions; what works in documentation cannot be blindly transferred to construction management.

The wrong focus: Many initiatives are technology-driven rather than problem-driven. Something is implemented because a tool exists, not because a concrete problem is to be solved.

The lever: identifying the right processes

Real value arises when AI is applied where human work is inefficient today. An ideal starting point for an AI

implementation are processes that meet three criteria. They must

- be resource-intensive (high input of skilled specialists),
- involve a high volume of information (manual, error-prone processing), and
- be „atomic“, i.e. have clearly defined inputs and outputs.

A typical example where these criteria come together is found at the end of the engineering phase, when supplier data such as valve and instrument data or equipment drawings arrive in bulk. Under severe time pressure these have to be checked manually and worked into the design.

This is exactly where AI can step in immediately, through automatic data capture and consistency checks – fully automated and scalable across the entire project. The ROI can be calculated concretely: for a project with 500 documents and a time saving of two hours per document at an hourly rate of 120 euros, the result is a saving of 120,000 euros per project. That is a result which also makes an impression in board-level meetings.

This shows that in plant engineering AI does not fail because of the technology, but because of the wrong application. Companies should not ask where they can deploy AI, but where they are losing time and money today. Those who proceed in a problem-oriented way and specifically remove bottlenecks can achieve genuine competitive advantages.

Decision-Maker Facts

- According to the MIT study, 95 % of all AI pilot projects achieve no clearly positive ROI within six months.
- The greatest lever for AI in plant engineering lies in data-intensive EPC processes such as the automated processing of supplier data.
- Successful AI projects start problem-oriented: what is decisive are concrete bottlenecks with high manual effort and clearly measurable savings potential.



Author: Celso Rangel, co-founder and CTO, Tiger Solutions

AI in plant engineering: a focus topic at the Engineering Summit

The use of artificial intelligence in plant engineering will also be a central topic at the 12th Engineering Summit in Darmstadt. The most important networking meeting of European plant engineering takes place this year on 15 and 16 September 2026. In the new workshop format, plant builders and their customers jointly clarify, among other things, the question: which common foundations must operators, owners' engineers and EPCs create so that AI can

actually become productivity-effective in engineering? On the afternoon of the second day the technologies also move into focus in the on-stage presentations: in the theme block „AI, automation and autonomous plants – where does the future of plant engineering lie?“ we discuss, using practical examples, how digital tools can actually contribute to productivity – and where the hurdles still lie today.

All information on the programme and registration at:
www.engineering-summit.de



The poster for the Engineering Summit 2026 features a dark blue background with white text and graphics. At the top, there is a stylized illustration of industrial structures including a distillation column, a storage tank, and a wind turbine. Below this, the text 'ENGINEERING SUMMIT' is prominently displayed in a bold, sans-serif font. Underneath, the dates '15 & 16.09.2026, Darmstadt' are listed. A white rectangular button with the text 'REGISTER NOW' is positioned below the dates. In the bottom left corner, a circular badge contains the text '10% discount with code PM2026'. To the right of the badge is a QR code. At the very bottom, the website 'www.engineering-summit.de' is printed.

Interview with Tobias Kühnlein, Tiger Solutions

„AI has now earned its master craftsman's certificate“

Tobias Kühnlein co-founded the company Tiger Solutions in 2025. The goal: to make engineering processes considerably more efficient in future through digital solutions such as AI. In the interview he explains where we currently stand on the subject of AI in plant engineering.



About the person

Tobias Kühnlein is co-founder and managing director of Tiger Solutions, where together with Celso Rangel Thomaz Jr. he is building TAI – an overarching AI layer intended to help EPCs make the flood of engineering data manageable across systems and in real time. Kühnlein brings many years of experience from plant engineering and the international project business. Most recently, until 2022, he worked at Thyssenkrupp Industrial Solutions (Uhde).

CT: Plant engineering is considered a rather conservative industry. How do you see that in the context of AI?

Tobias Kühnlein: The fundamental restraint has good reasons. In plant engineering we operate in an environment with safety-critical projects and processes. Here you cannot simply „experiment“. The concern about hallucinations of the AI or about errors in the project is entirely justified. Nevertheless, we have to take care that caution does not turn into standstill.

CT: How can it be ensured that the use of AI does not lead to unforeseeable risks?

Kühnlein: The decisive point is: in the end AI guarantees nothing at all – that is done by the human behind it. We see AI as support to shift the engineer's focus. Instead of laboriously checking huge volumes of data manually, the human concentrates on the error sources identified by the AI. We use the AI as a kind of early-warning system. Transparency is the key here: our AI does not only deliver results, it makes its entire decision-making process auditable. Via an integrated reliability barometer the engineer can see at a glance how robust a result is. At the same time TAI points directly to the underlying sources in the document or 3D model, so that every decision can be traced and checked.

CT: How far do the capabilities of today's AI systems in engineering reach?

Kühnlein: In the beginning the AI was like an apprentice: it could analyse data but had no engineering knowledge. In the meantime the AI has earned its master craftsman's certificate. It possesses sufficient expertise to carry out qualified work independently. The AI helps to weed out careless mistakes, while the human keeps their mental energy for the complex reviews. This is particularly important because, with the baby boomers entering retirement, we are facing an enormous gap in skilled personnel that we can only close through a technological enabler.

CT: Where in day-to-day practice do you see the clearest efficiency gains from this „AI master“?

Kühnlein: Let me give a concrete example: where perhaps 10 engineers previously needed a whole day to check a large number of P&I diagrams, with AI support a single engineer manages this in the same time. It is about speed and data quality. An error that we can correct in basic engineering for 1,000 euros costs us 100,000 euros on the construction site. The AI helps us to eliminate these errors early on.

CT: What does the internal organisation have to look like in order to implement such projects successfully?

Kühnlein: It does not necessarily take huge new departments, but a central AI team can make the decisive difference. This way the threads come together at one point. This team acts as a multiplier. It is important that the people sitting there can think „outside the box“ and have a certain standing in the company. You need „AI champions“ from the specialist disciplines who have an appetite for change – and, of course, the support of top management as well.

CT: Which first steps do you recommend concretely, in order to get started with AI as a company?

Kühnlein: You should start with what we call „atomic processes“ – that is, small, clearly delimited process steps with a high data load and firm rules. In practice, many companies initially head in the wrong direction at first, because the experience is lacking. It usually takes three to four weeks until the knot bursts and the truly valuable use cases are identified.

CT: Let us dare a look into the future: where will engineering stand in two years?

Kühnlein: That is the most difficult question, since the development is running exponentially. I believe that data quality will increase significantly and that project lead times will fall. AI will help us to understand our own processes better and to uncover optimisation potential that we cannot grasp by pure intellect at all. For every problem we will have a „special key“ instead of a pipe wrench.

CT: Do you have a message for the industry?

Kühnlein: We slept on this topic for a long time and are currently heavily dependent on US-American models. My appeal is: we have to release the handbrake. Whoever does not now engage intensively with AI will lose the race. We must invest in Europe – and substantially, not with alibi programmes. Beyond that we continue to need people; without the „human in the loop“ it does not work. Above all, though, we need the courage to use the technology to its full extent.

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The interview was conducted by Jona Göbelbecker, editor-in-chief of CHEMIE TECHNIK