



WHAT DOES THE TANK TERMINAL WORLD OF THE FUTURE LOOK LIKE?

Digital tank farms and terminals

SIEMENS

Around the world, industries are grappling with issues such as digitalization, sustainability and safety. The tank terminal industry, as a key part of the global supply network, is being transformed by a range of innovative developments. While these changes ultimately promise great benefits, the transition itself is disruptive, as the playing field is remapped by Industry 4.0.

For the tank terminal industry, the days of merely storing oil and gas are over. In the face of increasing competition, as well as growing complexity and ambiguity, the industry is looking for ways to achieve greater flexibility and higher efficiency. This is certainly not unique to this industry, and the same questions are being asked throughout the global supply chain.

Challenges arise from multiple, sometimes unexpected sources – whether due to climate change, shifts in the political climate of certain regions, or because a critical trade route is blocked. In March 2021, the blockage of the Suez Canal, through which some 12% of annual global trade passes, made clear how integrated and vulnerable global supply chains are.

Far from a geopolitical agenda, what's needed are standards that work. Open standards, to be precise. It's about finding new business models, being flexible to utilize them very quickly, and setting new norms when it comes to safety. There's also the question of ownership: Will we have data-driven terminals in the future? Can transparency across the entire value chain be leveraged to

increase efficiency and competitiveness? Or is it possible that the tank terminal company of tomorrow might not even own terminals anymore?

Flexibility to deal with diversity

Comparing the industry today to what it was 30 years ago, a couple of things stand out right away. One is the broad diversity of goods stored and the quantities being processed. The volatility of oil prices has played a role, so too the rapid expansion in the variety of products in the market. The second, even more notable part is the increased focus on (and improvements in) worker safety and operational excellence. Thanks to the emergence of advanced automation technology, the need for a human presence in hazardous zones can now be greatly reduced or even eliminated entirely.

In other industries, 30 years ago might seem like centuries, but the tank terminal industry tends to be a conservative world where change occurs at a slower pace. That's not surprising given the decades-long return periods on large-scale capital expenditures (CAPEX) – such as the terminal locations based in many of the world's ports. A good deal of instrumentation is still deployed on 4-20mA analog cables or based on the HART protocol. Does this infrastructure offer the capabilities to get large data sets to where they need to? The answer is not a definitive yes – but the equipment is also too good to throw out immediately, and a lot of operations still depend on it to this day.





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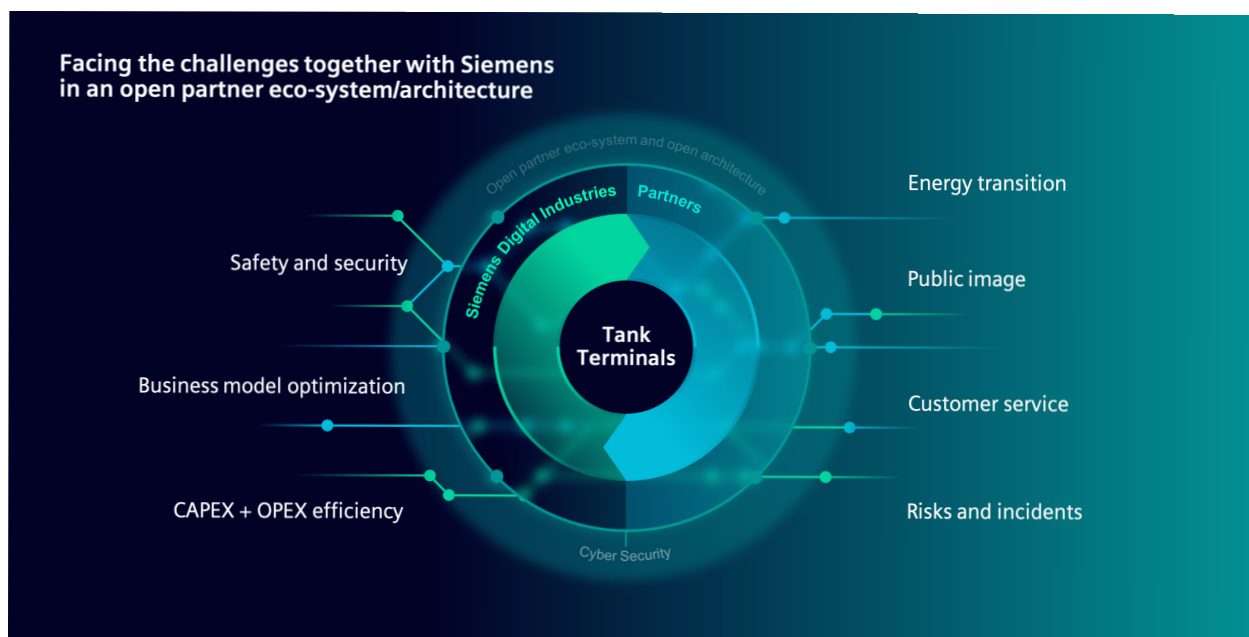
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In recent decades, large corporations have started to aim for the vendor lock-in principle from the perspective of competitive protection and “supporting” the end customer. Without undermining the accomplishments that have been made, this not a foundation for sustainable growth. Only a level playing field, based on open standards, will be resilient to the disruption caused by continuous technological change. This is something both customer and supplier should aim for, in order to keep up with rapid change and uncertainty.

Who knows what the next 30 years will bring? But the matter is clear: the pace of innovation and the need for adaption is increasing fast. That’s why Siemens follows a vision in which the customer has a choice, thanks to a platform based on solid industrial standards. It offers the freedom to build and includes topics ranging from architecture to cyber security.

Before talking about the big trends, such as Industrial IoT, smart asset- and plant management, or X-as-a-Service models, the architecture must be set on a solid foundation – to get (all) required data from the field into the IT layers to fulfill the promise of digitalization. The data is the first step in getting real insight in operations, the second would be analysis, and the third will be pinpointing the areas where improvement can be met or enable drastic change in the operations – which in turn can lead to a strategic innovation for the entire business.

At Siemens, we believe in embracing openness and setting industry standards. Both hardware and software products should be able to work with industry standards to get actionable data to the relevant places. This can also be done with business partners within the same open eco-system.



Standardization is the first step in the automation quest up to the level of "black sites" or so-called autonomous terminals – terminals that leverage data, rather than relying solely on human intuition. Data-driven decision making should lead to a zero-incident environment, or at least very close to it, while also amplifying CAPEX / OPEX efficiency in order to produce higher returns.

Digital Enterprise

Combining the real and the digital worlds makes it possible to seamlessly integrate the entire value chain from design to realization, while optimizing with a continuous flow of data. A true Digital Enterprise is able to harness the unlimited power of data by gaining valuable insights to make fast and confident decisions – and to create best-in-class supply chains and tank terminals.



Managing complexity

There is still a considerable amount of untapped "dark data" from field assets throughout the industry, and that makes it impossible to do everything at once with the goal of a digital twin in mind. Many terminals require a retrofit with intelligent devices, which can be done in several ways – e.g., from full replacement to the use of Industrial IoT sensors, cloud or edge computing.

Getting dark data out of countless field assets and into management systems can create new operational opportunities – digital worker concepts, for example. The digital twin, predictive maintenance and real-time asset monitoring all become possible, which in its turn increases the business performance. Siemens' automation systems leverage data points from OT / IoT from various vendors if needed to execute one of its core functionalities, which is route control. This results in more real time trading flexibility, saving costs in the entire value chain.

It may seem obvious, but this couldn't be done without real-time input from field assets. This higher level of asset utilization contributes to better reliability, as well as less spillage and contamination, which saves costs and improves safety. It is also one of our innovations that demonstrates an increase in stability and reliability because it can be run directly on the OT level in conjunction with IT, instead of merely one of the two.

Managing the complexity of data sources, verifying accuracy and gathering the input of I-IoT requires all parties involved to work together. With over 170 years of experience in operational technology (OT), and as a leading player in IT technology, Siemens looks to go the extra mile for customers: from SaaS-based models to IT/OT integration on a fundamental level combined with market specific knowledge and experience.

Begin the journey together

Knowledge is key. Start standardization as soon as possible and begin capturing OT data. Work together with an experienced partner who understands both OT and IT. Set strategic goals and aim not only for individual business differentiation. It's important to consider how the entire supply chain can benefit, to think about the customer of the customer or the supplier of the supplier. It's about an entire value chain, hence its complexity as stated above. Improving the supply chain and aiming for operational excellence and connecting it to the value chain of the end customer allows them to be more flexible too.

The Paris Agreement, the adoption of emerging alternative fuels, such as hydrogen and biofuels, and new developments in carbon storage – all of this will change the entire hydrocarbon supply chain. Storing more, and more diverse, products can be a business opportunity but might also increase operational risk. The (future) requirements for customers will require a more flexible, diverse and efficient terminal.

This transition poses a challenge from an operational perspective, due to legacy equipment or terminal set-up. Legacy terminals may lead to a higher risk of contaminations, a lack of sufficiently diverse storage capacity, and inefficiencies in jetty. All these issues are obstacles to meeting customers' requirements. What if simulations can be run for de-bottlenecking and terminal optimization in order to guarantee your investments and maximize returns? What would it be worth if digitalization could reduce contaminations by 90% or even more? These questions are getting more relevant, as AI-driven technology such as machine learning is getting better by the day.

Change is inevitable, and the tank terminal industry is heading into a new era. At Siemens, we take a holistic approach to the challenge making use of our multifaceted portfolio – ranging from low code platform up to our leading portfolio of industrial automation hardware and software solutions. The question we put to the industry is simple: Can we think ahead and partner together to embrace this long-term vision? Can our technology support your in-depth industry knowledge? We're here to help.

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