# SPEAKER INTERVIEWS

## INSIGHTS FROM A SELECTION OF STOCEXPO EUROPE INDUSTRY EXPERTS

*Interviews with some of the speakers at this year's conference at the Ahoy, Rotterdam on March 20-22*

## PGS 29: New risk-based Dutch regulations for storage terminals

**Alwin van Aggelen, CEO of A-Rise, explains how terminals can deal with new scenario analyses and risk assessment requirements for PGS 29**

Storage terminals in the Netherlands must comply with the PGS 29 requirements for the storage of flammable liquids in above ground cylindrical tanks.

Like all Dutch guidelines for hazardous substances, the PGS 29 is currently in the process of being updated using a standardised risk-based approach.

One of the reasons for this risk-based approach has been to create a structure where it is clear why a requirement is there, what the objective of the requirement is and if sufficient risk reduction is provided by the requirements.

It also provides a good foundation to support the review and acceptance of alternatives that might be equivalent in terms of function and level of risk reduction. And, not restricting opportunities for innovation and technology development.

### UNDERSTANDING THE RISK

The core of the new approach is the use of scenarios describing all potential incidents that can occur when storing flammable liquids in tanks. Utilising the BowTie methodology, scenarios are described from cause to consequence, including the impact of the consequence.

For example; overfilling leading to a loss of containment, followed by the formation of a vapour cloud and, when ignited, a vapour cloud explosion with potential for multiple fatalities/injuries, extensive damage and escalation to nearby installations.

To ensure all credible scenarios are covered, the causes are categorised by category based on the PGS 6, e.g. over pressure, under pressure, internal corrosion, external corrosion, external impact, environmental conditions, human actions, etc. These are validated against tank incidents where available.

Each of the scenarios is assessed using a standardised risk matrix to determine the risk of a scenario and to determine if it should be included in the PGS standard. The scope of all the PGS standards, and thus also the PGS 29, is limited to the medium and high-risk scenarios.

To ensure the PGS 29 covers most of the installations, the scenario analyses has been done based on predefined tank typicals (cone roof tank, cone roof tank with inner float, tank with outer float and tank with outer float and dome), typicals for water- and landside loading and unloading (barge/sea-going vessels, railcars and trucks) and for terminal piping.

Besides scenarios for these typicals, specific scenarios are developed in relation to activities that can be performed within a tank such as mixing, adding additives and butanising.

### HOW THE RISK SHOULD BE MANAGED

A second new element for the PGS new style, besides the use of scenarios, is the way the requirements are structured through a combination of goal-based requirements and prescriptive requirements.

First level of requirements are the goal based requirements, the so-called 'Doelen' (objectives). Per scenario, the different objectives for managing that scenario are formulated. When translated to the BowTie methodology, the objectives are synonym with the barriers.

**Example – Overfilling scenario:**

*Objective 1 – Ullage control*
Ensure remaining capacity within tank is sufficient for the planned manipulation, includes the plan for switching to another tank during manipulation when required.

*Objective 2 – Alarms and operator action*
Operational level control during filling of the tank to prevent the filling of the tank above the high level.

*Objective 3 – Independent overfill protection*
Independent overfill protection on high-high level to prevent the overflowing of the tank.

These objectives describe the different barrier functions that should be in place to prevent a scenario from happening or to mitigate the consequences of the scenario when it happens.

The second level of requirements are the so-called 'maatregelvoorschriften' (prescriptive requirements). Where the objectives describe the 'what', prescriptive requirements are describing the 'how'. Or in BowTie terms, the barrier elements. Distinction is made between primary requirements describing required items or equipment, and secondary requirements that support the primary requirements.

For example, a primary requirement to prevent escalation of a fire is to have a stationary tank cooling system for certain type of tank/product combinations. Secondary requirements supporting this are requirements for the capacity of the tank cooling system and for testing and maintenance of the tank cooling system.

This structure also provides a framework where alternatives for the (prescriptive) requirements can be acceptable, as long as the objectives for each of the scenarios are met.

## OPERATIONAL RELEVANCE

Although the PGS 29 new style is still under development, it is already possible to draw the conclusion that the PGS 29 wile become much more relevant for storage terminals.

All requirements within the current PGS 29 are really challenged in relation to the scenario they belong to. It looks like certain requirements will be removed because they are not managing a risk that is relevant for the PGS 29.

Other requirements are going to be rewritten because the scenario was not properly addressed by the requirement, e.g. it is too limited in respect to the scenario, or it needs to be re-worded to obtain a proper linkage from scenario to objective to requirement.
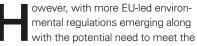
But also, most likely new requirements will be defined for scenarios currently not sufficiently addressed or are not addressed at all.

And finally, the PGS 29 new style will have a much better alignment with current operational risk management practices within storage terminals. Instead of a set of disconnected requirements the PGS 29 new style provides a structured approach for managing the risks. It can be used as starting point for describing the storage terminal specific scenario's and how these are managed.

*van Aggelen will be speaking more about the new structures for PGS 29 on the third day of the conference.*

# Diversifying storage trends for Europe

**Retaining its premium position at the world's largest oil trading hub, the ARA has recently welcomed an influx of storage capital as the imports of certain products increases.**

However, with more EU-led environmental regulations emerging along with the potential need to meet the demand for a broader spectrum of product specifications, the region's storage offering will need to diversify to meet these future challenges.

In an interview with *Tank Storage Magazine,* Paulo Nery, senior director, EMEA Oil, at Genscape says that while the ARA receives all types of refined products, its supply from the Baltics is slowly diminishing.

'The largest import flows are fuel oil and diesel, however fuel oil imports declined slightly in the second half of 2017, primarily from the Baltics. Baltic supply to the ARA has been decreasing despite increased output from the region, which has been diversifying to more and new destinations.

'Distillate imports increased overall in the past several months, thanks to increased supply from east of Suez.'

As a result of this demand, significant storage expansion projects are taking place at the Port of Antwerp thanks to a wave of multimillion euro investments.

## FUTURE CHALLENGES

Europe has already experienced a round of refinery consolidations as a result of shrinking demand and rising competitive pressures. As a result, imports to the region have increase.

Nery says that if there are further refinery consolidations in the future, increased imports are inevitable for Europe.

'Diesel will continue to be supplied from the Baltics, US, Middle East

and India but in increasing quantities as refining in those regions continues to strengthen and upgrade,' he says.

'This could also diminish Europe's position as a key exporter of petrol to West Africa and the Americas.'

Nery identifies two key challenges facing the ARA in the future, namely increasing environmental regulations and growing blending requirements.

'For both suppliers and producers, a future challenge will be increasing environmental regulations specifically regarding diesel. With the push to clean up emissions in major cities, it will be interesting to see how they handle the shift at storage terminals and refineries.

'There may well also be increased need for blending operations to meet more diverse and changing specifications. For instance, we see less petrol going to West Africa and the US recently while more goes to the Middle East and Asia.'

*Nery will be providing detailed market analysis across the ARA region in the morning of the first day of the conference.*

# Tank terminal cyber security risks

**Marcel Jutte, managing director of Hudson Cybertec, outlines the cyber security risks operators can face and why cyber security in operational technology is just as important as safety**

Tank terminals use integrated systems in the operational technology (OT) domain to manage, control and maintain their installations. Integration of legacy systems and infrastructure with new systems and infrastructure increases the complexity of the OT-domain. To increase efficiency, operators have the option to do their work from a variety of (remote) locations. Their continuous physical presence is no longer required in cases like on- and offloading barges. Tank terminal operations are increasingly dependent on its systems to operate the terminal in a safe manner due to the increased complexity of OT infrastructure and its networks.

This increased level of complexity in combination with increased dependency on integrated systems and centralised control of plant operations in the OT-domain increases the cyber security risks to terminals. The difference between the IT-domain and OT-domain implies that standards and best practices developed for systems in the IT-domain cannot be applied directly to systems in the OT-domain, since these standards do not take the specific OT-domain environment into account. Marcel Jutte, managing director of Hudson Cybertec, says: 'Often IT cyber security standards are applied to the OT-domain resulting in an improper sense of security and introducing additional risk.'

## CYBER SECURITY RISKS

Cyber security risks for tank terminals are present in all forms. Threats can originate from inside and outside an organisation and are continuously evolving. A company's OT-domain cyber security needs to evolve as well. The organisation should be prepared, up-to-date with the latest threats and perform cyber security checks regularly.

External actors include activists, competition, and organised crime groups, all with their own agenda, from disruption in operations (loading/unloading from barges), financial gain (stock manipulation) or industrial espionage (access to confidential data). Internal actors include disgruntled employees and third-party personnel that wittingly or unwittingly cause a cyber security incident. Caused by inadequate cyber security controls or lack of awareness due to lack of training. Other cyber security risks are related to the complex infrastructure where legacy equipment and networks are an integral part of the OT-infrastructure. Such equipment and networks were designed according to the standards, knowledge and best practices at the time. This causes cyber security risks since cyber security was not part of the original design. Jutte says: 'Legacy infrastructure cyber security risks need to be identified by performing an independent cyber security review of the OT-domain.'

### THE IMPORTANCE OF PEOPLE

The three pillars of cyber security are: people, process and technology. For security to work these pillars need to be in balance. Ideally cyber security should be an integral part of daily operations within an organisation, supported by the appropriate management systems, policies and procedures. Cyber security related technology is already used within organisations, most common in the IT-domain and less in the OT-domain. Often the cyber security gap between these two different domains is more than five years. The human factor of cyber security is often overlooked. Controls are in place for safety but are lacking in cyber security and this introduces cyber security threats. Users, including management, can unintentionally activate espionage malware by clicking on a link on a webpage or email or can introduce ransomware that encrypts data by connecting an infected device.

Recovery from such attacks is often difficult, time consuming and has significant financial impact. Third parties working onsite often use their own equipment, tools and computers to perform specific support and maintenance tasks. In some cases, these tasks are unsupervised. These threats are insufficiently controlled since they are not seen as a threat and can pose an elevated risk since it is not clear who is responsible for the cyber security of those introduced systems. Other threats include lack of policies and procedures to ensure proper access to systems with elevated functionality that allows third party personnel direct access to support sources outside what should be allowed.

For example, retrieving security patches from the internet from a workstation located in the OT-domain for which insufficient security measures were applied. Jutte adds: 'People should be given the same emphasis in cyber security as in safety.'

### IMPROVING CYBER SECURITY IN THE OT-DOMAIN

Security policies are the foundation for security measures and employee behavior while security procedures allow employees to act swiftly and correctly ensuring that no steps in the security process are skipped. These policies and procedures should emphasise the specific needs of OT-domain and the OT-organisation.

'A cyber security training programme ensures that cyber security awareness with your employees is increased thereby diminishing the chance of a cyber security incident caused by human error. Threats are continuously evolving therefore training should be an integral part of an existing training programme,' says Jutte.

Due to the nature of the OT-domain, security standards like the ISO27001/2 that were developed for the IT domain cannot directly be applied to the OT-domain. For industrial control systems specifically, an international standard was developed: the IEC 62443. This standard takes all the specifics of the OT domain into account.

### PERIODIC CYBER SECURITY REVIEW

Taking the right security measures is only possible if companies know which measures really help. These decisions can only be made if companies know where they are today with the cyber security of their terminal. An up-to-date independent review of an OT-domain against the IEC 62443 standard gives insight in the cyber security situation of the OT-domain of a terminal.

This can be used to develop or enhance cyber security within the OT-organisation, identify and mitigate risks. Jutte explains: 'Experience shows that only if you know your current situation, you can take the appropriate action in case of an incident.'

Cyber security in the OT-domain is not a one-off exercise, it is an ongoing process due to the ever-evolving nature of the threats. A regular independent review or audit of an OT-domain against the IEC 62443 standard should become part of normal tank terminal operations just like safety is now.

Jutte adds: 'Tank terminals need to manage the cyber security of their operational technology, just like they manage safety. I would say start now, before it is too late.'

*Jutte will be speaking more about cyber security and how to protect terminals from cyber attacks on the second day of the conference.*

# A STORAGE INNOVATION TRANSITION

Challenging cautious attitudes and stimulating a more innovative spirit is a core philosophy for iTanks. In an interview with *Tank Storage Magazine* ahead of its Innovations in Storage showcase day at StocExpo Europe on March 21, **Cor van de Linde** explains more about the importance of innovation

'Innovation – whether it is innovation in port-related industries or elsewhere – is extremely important,' says Cor van de Linde, managing director of Rotterdam innovation engine iTanks.

'Especially now that we are on the verge of a transition. Those who do not innovate stand still while their competitors catch up with them and this is the case for the oil & gas and tank storage industries. Not everyone in this sector is fully aware of this yet and a cautious, conservative attitude is still very often adopted.'

iTanks, as a knowledge and innovation platform, aims to challenge this attitude and stimulate innovations. It connects companies, knowledge institutes and industry experts, introduces them to new technologies and innovations and initiates various innovative processes.

'It is difficult to estimate when the transition will take place – in five or 20 years – and to what extent this will have an impact on our industry, but there will be a lot of changes in the foreseeable future,' van de Linde says.

'You can already see that with emerging trends and technologies that are increasingly being used more and more in the industry.

'For example, there is a strong movement towards digitisation and robotics. With more computing power, speed and artificial intelligence, all sorts of algorithms are created, making it possible to deal with data much more intelligently.

'Think for example of predictive maintenance with which more and more companies are experimenting. With the emergence of 3D printers, sustainable materials are coming more onto the market. What you hear less about, but also has a lot of potential, is nanotechnology. This can play an important role in cleaning and applying special coatings. These technologies are gaining more traction in our sector.'

## OTHER STORAGE PURPOSES
Van den Linde suspects that with more focus on sustainable energy, crude oil will be treated differently in the future. 'Through a transition to a more sustainable energy-intensive industry, oil becomes a valuable asset that is used more sustainably and intelligently.

'Refineries are likely to gradually lose ground, which also has consequences for storage companies. The tanks that now store crude oil may become superfluous or will have to be converted for other purposes. I can imagine that in such a transitional phase, in which margins become smaller and everything comes under pressure, you try to stay around as long as possible until you have something new.

'Smart innovations can help to keep ahead of the competition during this period with the use of smart technologies.'

## COLLABORATE
However, implementing pioneering innovations takes time and co-operation is a key part of a successful implementation phase.

'That is why it is so important to think about innovation, new business models and already taking the first steps as a company.'

iTanks wants to stimulate innovation as a knowledge and innovation platform. It does this by connecting companies and bringing new technologies to their attention through events, conferences, brainstorming sessions and breakfast seminars.

Through this knowledge exchange, new ideas are created that lead to new concepts, which then grow into innovations.

'We also try to solve problems and challenges from the industry and to find concrete solutions,' van de Linde explains.



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01 Sam Safety digital learning environment

02 The 7XE Extractor extracts welding fums directly at the source

03 One of the networking events hosted by iTanks

04 iTanks aim to stimulate and encourage innovation

The brainstorm challenges concept involves taking a problem that a company has raised, mapping it out and then offering solutions from different perspectives.

'For example, one of our partners was looking for a solution for a challenge in maintaining an important traffic bridge. The mix of their employees and external professionals, including a lawyer, a sensor designer and an offshore installation technician, resulted in surprising technical solutions from which one was chosen in a short amount of time.

'In a mottled group, valuable solutions and lively ideas often come about.' In less than six months, all steps – from problem definition, concept, prototype, demonstration to implementation – were successfully completed.

### ARTIFICIAL INTELLIGENCE

Van de Linde explains that Innovations do not have to be immediately disruptive or involve significant changes to business models.

'Innovation can be done in many ways. For example, we also contributed to the Sam Safety digital learning environment.

'The link to innovation may not be immediately crystal clear, but artificial learning is applied in this learning environment, for example by applying adaptive technology by continuously varying questions and by measuring retention value.

'It measures what knowledge remains, for how long and when further training is needed. In this way, knowledge is better secured than before. That too is innovation.'

So, what should companies do if they do not know where or how to start?

'Clearly formulating wishes and goals is sometimes difficult. That is why it is important to look for cooperation and start small projects step by step. In doing so, one learns and small steps forward can lead to great innovations.

'Watching and waiting from the sidelines is no longer an option – not even in this sector.'

### STOCEXPO EUROPE INNOVATION THEATRE

ITanks will be hosting an Innovations in Storage showcase day on Wednesday, March 21 on the show floor. Innovations in maintenance will be extensively discussed by speakers from its network. The programme includes:
- Innovation & maintenance by Angela Hulst, CFO of iTanks
- Debate about game changers by Wim Raaijen, CEO/editor-in-chief of Industrielinqs
- Artificial intelligence & maintenance by Simon Jagers, technology enthusiast & founder of Semiotic Labs
- RoboHouse, fieldlab cognitive robotics by Arthur de Crook & Jaimy Siebel, managing director & manager, RoboHouse RoboValley
- Working with exoskeleton by Ruud van Doorn, CEO, Bilfinger

For more information and to register for free to attend, visit www.easyfairs.com/stocexpo-europe-2018/stocexpo-europe-2018/visiting/seminars/ or libby@stocexpo.com.

'We do this first by examining what already exists and connecting parties. This essentially prevents the wheel from being reinvented. If there are no solutions yet, we will initiate a project team with, among other things, an end user, knowledge institute and supplier. They will then work together with a problem or idea to try and find a solution that can actually be implemented.'

### INNOVATION IN PRACTICE

A number of projects that iTanks has initiated are the Extractor, Cyclone and iWeld. The 7XE Extractor is the first welding torch to extract welding fumes directly at the source without sacrificing weld quality.

Welding smoke contains harmful substances and gases. The welding torch was developed in collaboration with Translas and TNO and sucks 90% to 95% of all welding fumes at the source. This innovation was put on the market in 2014 and is now sold worldwide.

Due to the success of this welding torch, iTanks are currently developing a compact filtration system – the Cyclone – together with TNO and Translas.

This system uses an old filtering principle. During welding, poisonous smoke is released that is absorbed by 200 cyclones and then rotated in such a way that an internal cyclone is created. The cyclone ensures that forces are released that pull down the tiny, toxic particles of the welding fumes and collects them in a container.

Because these particles are extracted from the source, clean air is created that is

immediately blown into the atmosphere. 'The design originated from a combination of old techniques. The disadvantage of these techniques was that they were often too large and inefficient while the extraction was too far from the source, causing the welder to inhale a lot of toxic welding fumes. Thanks to the Extractor this is now a thing of the past.

'The welding torch sucks the welding fumes at the source and immediately pumps them to the Cyclone which, unlike its predecessors, is small and compact. The development of the Cyclone is currently in full swing. The system is extensively tested in the production hall of Heerema Fabrication Zwijndrecht.'

### MORE INNOVATIVE PROJECTS

Other projects that iTanks have been, and continue to be, involved in is a cleaning robot that is suitable for cleaning multiple piles and scaffolding poles and then coating them; a welding robot (iWeld) with allows the laser welding of tank bottoms to be done faster, cheaper and more safely, as well as solutions that have been created thanks to brainstorm challenges.

> ## Those who do not innovate stand still while their competitors catch up