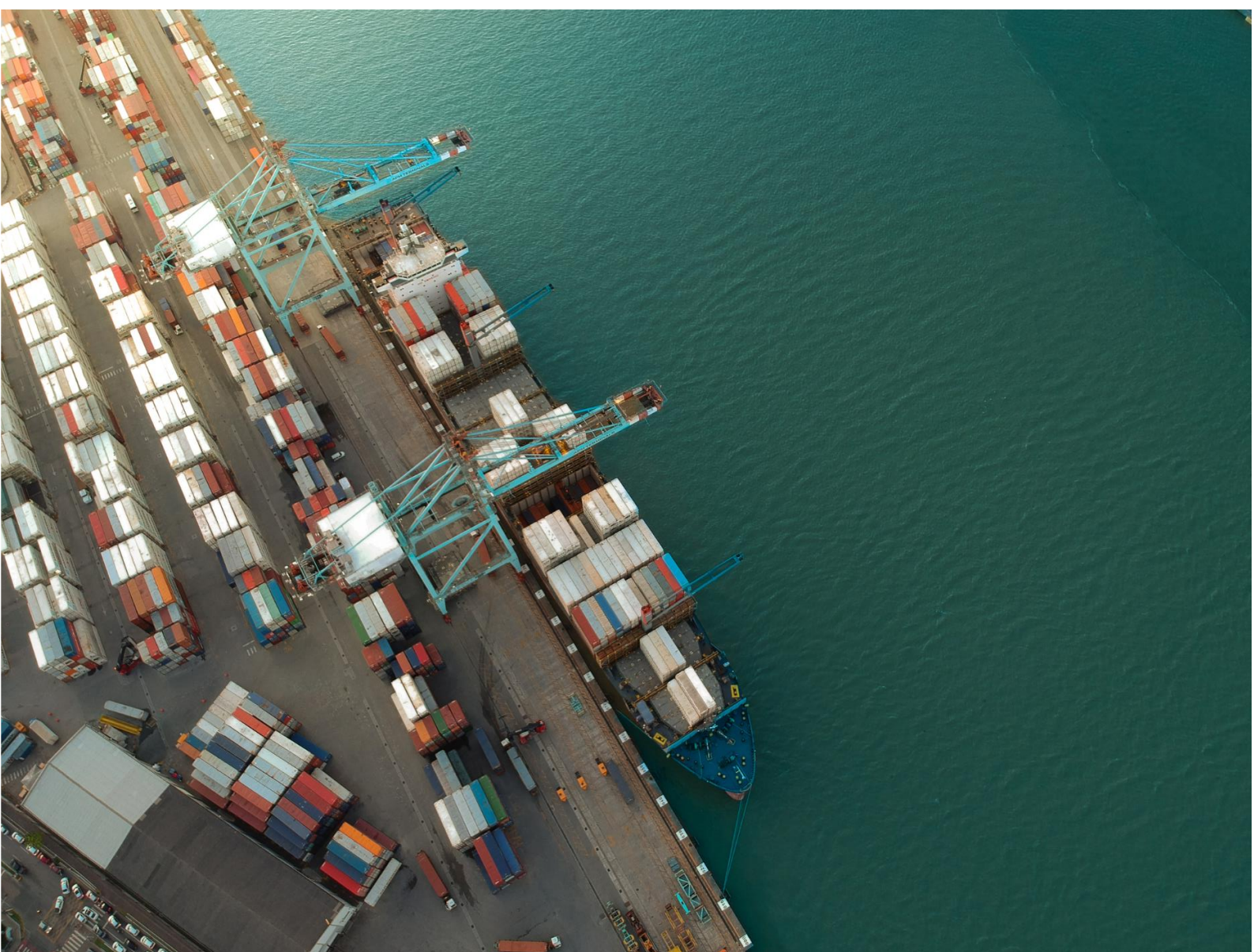# ICHCA INTERNATIONAL PRESENTS

TT CLUB INNOVATION IN SAFETY AWARDS 2022

A digest of entries received & winners announced
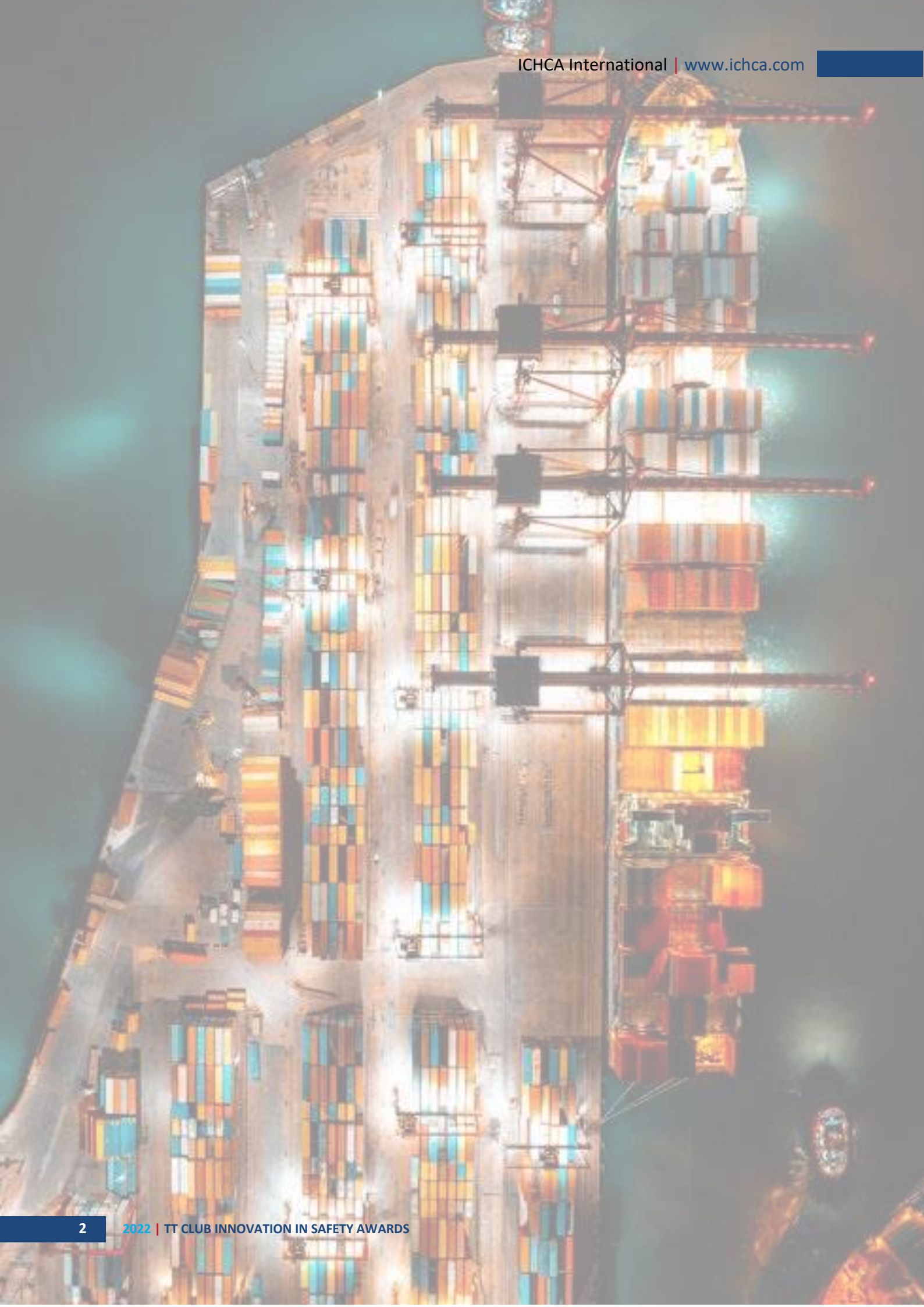
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TT Club Innovation in Safety Award Foreword

In the global freight supply chain environment, whenever something challenges or undermines safety, security or sustainability, a key tool in preventing incidents or deficiencies recurring is innovation, a change to the existing paradigm or parameters.

TT Club is privileged to work closely with this industry; every interaction considering problems is in equal measure an opportunity to mitigate risk further. TT's industry awareness and solution orientation results in broad networking and collaboration, amongst the industry and beyond, frequently 'joining the dots' and thinking 'outside the box'.

It is in this context – and core to TT's mission – that the TT Club Innovation in Safety Awards were conceived, seeking to clarify problem statements, affirm or challenge assumptions, value and nurture concepts, and provide opportunity to network, profiling innovation that works.

Both ICHCA International and TT Club have made this fundamental commitment to risk reduction throughout the freight supply chain. The 2022 Award has again attracted substantial interest around the globe and across the industry, demonstrating continued passion to enhance safety and dynamic action to make this reality. The range of entries displayed the diversity and complexity of this industry, spanning entirely physical safety issues looking at machinery or operations, inevitable focus on digital opportunities for process improvement or providing insights, through to learning tools and strengthening management and workforce engagement. It was also pleasing to see some submissions engaging with environmental protection and monitoring.

In presenting this Digest, it is possible to celebrate and profile the efforts of each organisation that made a submission to the 2022 Award; while the robust judging process ultimately led to one innovation receiving the award, each deserve recognition for the pursuit of safety in our industry.

In commending this Digest to the entire industry, it is important to remember that any innovation could be transformative for the risk profile or outcomes, as much for an individual operation as across the entire industry.

Peregrine Storrs-Fox,

Risk Management Director, TT Club

1. || WINNER - AP MOLLER MAERSK - APMT Vessel Inspection App

the challenge

In a container terminal, stevedoring activity is considered one of the riskiest operations. Stevedores are constantly exposed to unsafe working conditions on the vessels during lashing and unlashing operation. The unsafe working condition on the vessels have led to several fatalities and life altering injuries, involving stevedores and other terminal operation personnel. The manner in which terminals carried out inspections on the vessels were inconsistent and mostly ineffective.

Every terminal had different ways of approaching vessel inspection; as there was no standardized vessel inspection program to identify non conformities and escalate critical defects / risks in their temporary work place (vessel). The vessels/ shipping lines were also impacted, as the quality of inspections reports were not up to par and left them with additional work in finding or understanding the issues, locations of nonconformity, etc. leading them to be less responsive to escalations from terminals.

the innovation

A mobile app called "APMT Vessel Inspection" was developed in-house to provide a standardised digital platform for our terminals to carry out vessel inspection based on a standard set of questions highlighting the critical risk areas of work on a vessel. This app is a user friendly tool, which has set of questionnaires covering different sections of the vessel where stevedores or terminal staff could be working. The inspection is carried out by a trained personnel before starting operation. To ensure quality of reporting and to support the inspectors to identify and correctly evaluate the risk, we introduced a rating/ scoring system according to level of criticality. In addition, to support this rating system further, there is also a visual guide in the app linked to each question displaying the distinct levels of ratings.

Once the inspection is submitted through the app, a standardised report is generated with necessary information highlighting all issues on the vessel, location of issue, criticality, photographs, etc. This can be directly shared with the vessel master/ chief officer. This inspection report also gets deposited into a repository where all our terminals can access submitted reports and obtain visibility of the vessels that will be calling at their terminal, enabling them to plan their operations taking into consideration the condition of the vessel. The data also gets fed into a dashboard that visualizes the trends of identified risks enabling terminals to build engagement and collaboration with shipping lines to address safety issues effectively.

how it was implemented

A working group was formed with participation from Terminals, Shipping Line and other subject matter experts to carry out a global Kaizen activity on the challenge. The outcome of the kaizen was to; (1) Develop an app for the vessel inspection program (2) Training materials/ guides for the terminal operation team on vessel inspection and how to use the app (3) Engagement criteria between vessels and terminals (4) Escalation process for critical issues.

Along with the development of the app, we created a training program to support the use of the 'APMT Vessel Inspection' app globally. As this app is based on a scoring system to report the different severity and frequency of occurrence of critical defects, the vessel inspectors undergo training to be familiarized with the app, the scoring system, visual guide and the escalation process should there be critical risks that are identified and impacts the flow of operations. There was a global roll out of the Vessel Inspection program along with the supporting materials like training materials, welcome guide for the vessel, visual guides on how to carry out an inspections and engagement criteria between vessel/ terminals, etc. After the global roll out, we held multiple sessions with the regional/ terminal teams to ensure effective implementations.

Photo (2) Kaizen exercise

Photo (3) Kaizen summary
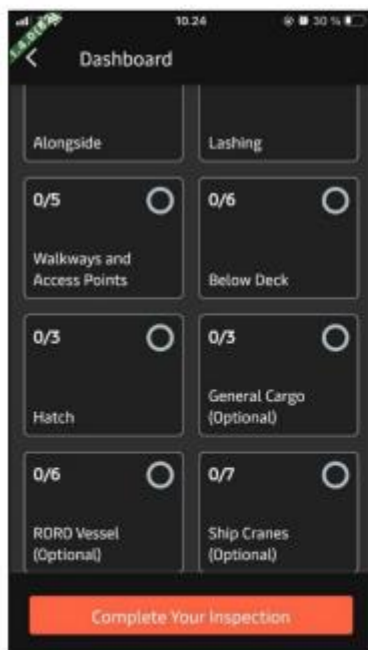
Photo (4) App: Dashboard

Photo (5) App: Questions

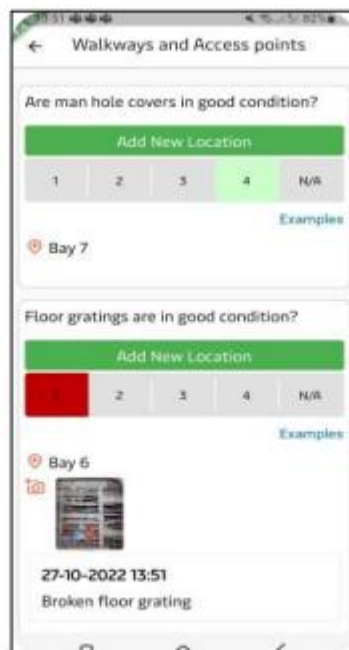

Photo (6) App: Visual guide

result

We are building on our safety culture by empowering our frontline by giving the right tools, training and engagement to make decisions when it comes to safety at workplace. The frontline has an avenue to raise safety concerns in a systematic and formalized manner through the use of technology. Now we also have a digital repository of standardized reports

adopted by APM terminals globally that has increased transparency and information sharing within the organization. This has increased the visibility of safety conditions of vessels prior to receiving them in our terminals and operations can be planned and adapted accordingly in a proactive manner. This also helped us engage and collaborate better with shipping lines to address safety issues identified on vessels and finding solutions together to rectify such issues with the aim of providing a safer work environment to our frontline workers, with minimal impact to operations and thus increasing operational efficiency at the same time.

conclusion

We have improved the effectiveness and quality of vessel inspections in our terminals using the APMT Vessel Inspection app. Using the right technology to aid safety inspections has helped us empower our frontline in making qualitative and efficient assessments of their working conditions, thereby reducing work related incidents causing harm to them. This drove the adoption of APMT Vessel Inspection app across our terminal portfolio. With value added through improvements and positive results achieved, this tool has become an integral part of the vessel operational process and not just a tick box exercise.

This mobile application/ tool has also helped the inspection process to go paperless, thereby contributing positively to the environment. The positive results we are seeing from adoption of the tool by APM Terminals globally and the improved engagement and collaboration with the shipping lines, outlines the achievement this digital tool has attained in driving a safer working culture integrated into our organizations' ways of working. Beyond an organizational standpoint, there is exciting potential to be shared with the rest of the industry if the same can be applied across all terminals globally, and not limited to APM Terminals.

2. || SHORTLISTED - EXIS TECHNOLOGIES - Hazcheck Detect

the challenge

Non-declaration and Misdeclaration of Dangerous Goods

In recent years there has been a steady rise of reported incidents of particularly container fires on ships, with an estimated sixty-day average occurrence of serious fires (www.cinsnet.com). These incidents occur for a variety of reasons and often a combination of factors, one recurring theme is misdeclared or undeclared dangerous goods cargo which can result in incorrect stowage onboard vessels. Stowage of dangerous goods incorrectly can have catastrophic consequences to life, infrastructure and the environment and incur huge costs.

With Hazcheck Detect, Exis Technologies Ltd. has established a real time Cargo Screening solution. A tool for Shipping lines to assist the identification of misdeclared and undeclared cargoes prior to loading. This early intervention allows DG teams to question shippers, obtain further information such as Safety Data Sheets and even arrange cargo inspections.

Once suspicious cargo is identified it becomes possible to better inform the shipper as to correct declaration and going forward ensure the correct and safe handling of the cargo, thereby reducing incidents.

the innovation

Hazcheck Detect is a SaaS solution offering powerful cargo screening which scans all booking details for keywords and phrases, validates against rules and highlights suspicious bookings to identify misdeclared and undeclared dangerous goods (DG) and other compliance cargo.

The tool uses around 10,000 keywords to find undeclared dangerous goods, working through 4,500 'rules'. Currently over 500,000 bookings are being screened each day.

Within Hazcheck Detect a Case Management tool supports the mobilisation of the inhouse Cargo Screening team, acting as an extension to the DG Team, who are better placed to investigate risky containers presented by the system on a daily basis.

• Undeclared DG – checks cargo that is not declared as DG; suspicious items are looked for that perhaps should be declared as DG.
• Misdeclared DG – checks cargo which is declared as DG, but not declared as the correct DG.

The rules have in-built complex logic, which has been designed so that it can be replicated and shared between shipping lines. This is vital, only when rules are applied consistently through industry can we hope to stop bad actors or ill-advised shippers from misdeclaring and undeclaring cargo.

All exchange of information is handled via a secure API The large amounts of anonymised data being generated by the system in the form of detailed analytics is being provided to both inform industry as to the scale of the issue of misdeclared and undeclared DG and to feed machine learning models with a view to continuously improve the quality of rules.
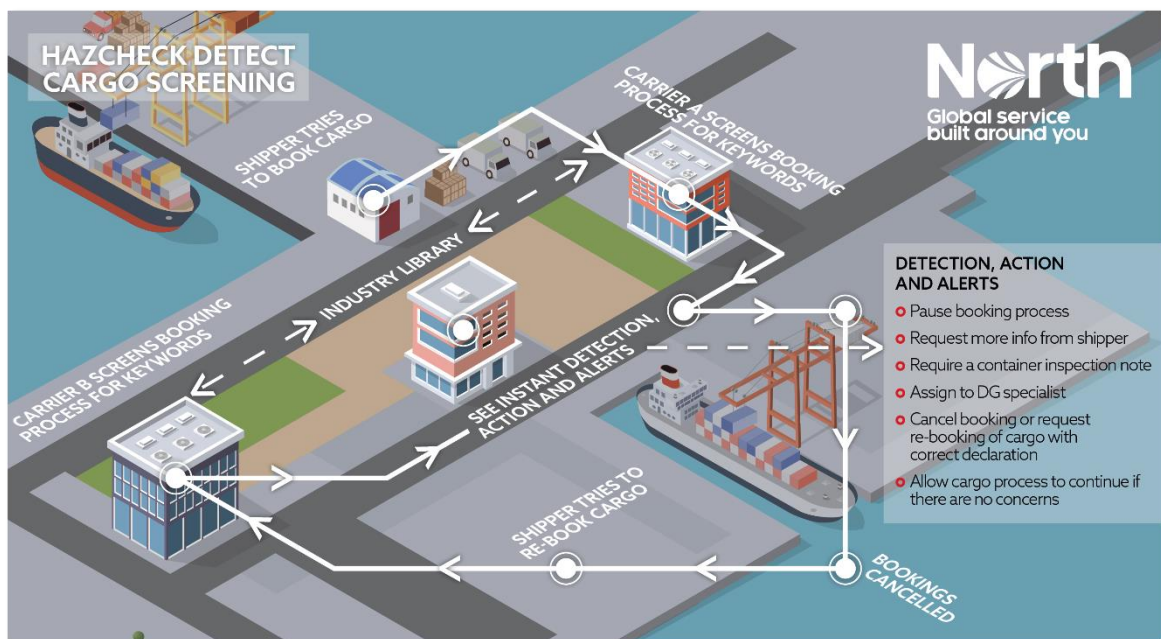
how it was implemented

Maersk was the first customer signed to the new tool. The technical challenge was to ensure that very large amounts of booking data, over 500,000 booking items per day, are screened quickly against 10,000 rules providing outcomes to the client within seconds.

Being developed with the cooperation of major shipping lines has allowed rules logic to be refined. Throughout 2022 we have been on-boarding and testing with many more shipping lines to the point where now 4 major carriers are using Hazcheck Detect. These carriers accounting for approximately 30% of the global container volumes carried.

Onboarding these new customers has ensured that the system has been developed to be highly configurable to other data sets, as clients data is not always presented in the same way. Organising the source data effectively allows for consistent screening against similar rules producung the same outcomes and also consistent analytics.

To ensure alignment between users and rule continuity we're actively engaged in regular Industry Library Discussions and workshops attended by Hazcheck Detect users, an initiative that has not previously taken place within the industry.

result
The solution is designed to significantly reduce the amount of misdeclared and undeclared DG cargo carried in Container vessels at sea.

Hazcheck Detect is currently screening more than 10 million requests per month. One customer has advised from their 500 'hits' a day around 40 or 50 containers a week are stopped from being loaded onto a ship. Typically Hazcheck Detect will flag between 1-2% of cargo as 'suspicious' of those we are typically finding 1-2% of the cargoes as Misdeclared or Undeclared, typically. 1,000-2,000 containers per month overall are being identified with the potential to cause harm or incident.

These 10 million screening requests generate a lot of analytical data. We are now exploring this data to understand those items considered to be most likely to be undeclared or misdeclared, and how machine learning may be used to improve and refine results moving forward.

We already use information on popular rules to steer our industry discussions to ensure the most frequently hit rules operate with greatest efficiency. Very clear patterns are emerging where shipping lines are consistently identifying similar cargo types which are commonly undeclared or misdeclared.

conclusion
Exis Technologies are absolutely delighted with the impact Hazcheck Detect is having on the identification of misdeclared and undeclared Dangerous Goods.

Our customers having implemented screening for dangerous goods as a priority are now exploring how the same technology may be used to identify illegal wildlife shipments, compliance cargo or any other cargo where there are additional checks or controls in place.

We are now looking to collaborate with other organisations to consider how new rules libraries can be introduced and what additional analytical data output adds value to both the industry and Hazcheck Detect. Therefore, the solution will not be stagnant it will continue to evolve, adapt and grow with the industry.

Pre-empting incidents on board ships or in and around port areas is not a perfect science. Implementing tools like Hazcheck Detect which offer prevention, rather than putting out fires after the fact, can help shipping lines to ship DG more safely without the risk of high costs associated with damaged goods and ships.

Further information can be found at https://existec.com/

3. || SHORTLISTED - INTERMODAL TELEMATICS BV – Tank container temperature monitoring

the challenge

Dangerous goods are being manufactured under the highest quality and safety standards. Products are loaded in ISO tanks and transported worldwide via road, rail and sea. Due to the multimodal way of transportation it is impossible to monitor the status of the goods when being transported. When the temperature of (certain) dangerous goods rises, for example Ethylene Oxide, polymerisation and risk of explosion may occur with huge physical damage and possible human consequences.

The challenge:

- Monitor the product status (in this case the temperature) accurately and continuously
- Transmit the product temperature in nearly real time to a central database
- Develop different business rules when the status/temperature of a product exceeds one or more thresholds
- Send automated notifications and alerts when the set thresholds are exceeded
- The hardware on the ISO tank needs to work autonomously (without external power) for several years
- The hardware of the tank needs to be ATEX certified and at the same time low cost
- The machine to machine communication needs to be future proof and capable of communicating via different networks

the innovation

The innovation is a multiple temperature alerting system that allows people to monitor the condition of the goods transported and to take preventive action before accidents may occur.

Therefore we developed both hardware - specifically for ISO tanks and Rail Tank Cars - and software.

The temperature sensor / WT22-Ex:

- is ATEX IIC certified
- has a life time of 10 years
- has an accuracy of 0,3°C
- sends temperature wirelessly to the main gateway (which requires minimum installation time)

The main gateway / CLT20-Ex:

- is ATEX IIC certified
- has a life time of 10 years
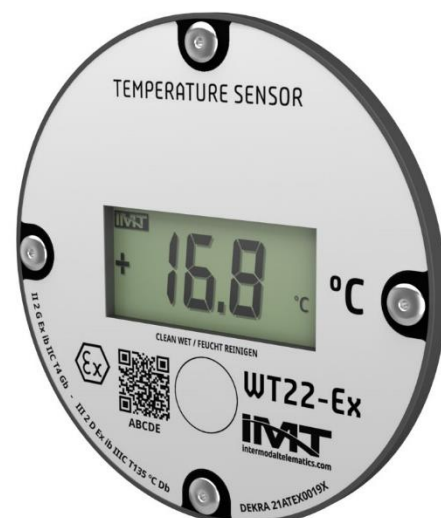
- sends temperature data of multiple sensors in nearly real time to the server via the network available at that moment.

On the software side different products can be created with corresponding thresholds. When implementing data integration of a customer's TMS and IMT's web application, the system knows which product is loaded in which ISO tank. From the moment an ISO tank or RTC is filled with a product; temperature, timestamp and location are sent at pre-set intervals to IMT's web application. Historical data of the condition of the products can be traced at all times. Business rules (soft temperature notification when a certain threshold has been exceeded, hard temperature alert when a next level of threshold has been exceeded, gradient temperature alerts) have been developed to create notifications and alerts that are automatically sent to the customer/people involved so that action can be taken quickly if necessary.

how it was implemented

Our telematics solution has been promoted directly to the tank container operators, tank container leasing companies, rail car leasing companies and shippers/chemical industry. The hardware (temperature sensor and main gateway) is now being installed worldwide by tank container manufacturers and depots. Users/customers use our system after a short training session. Many of the features in our system, for example temperature gradient alerts, have been developed as a result of feedback from customers to help solve the problems that they face and to make the transport of dangerous goods much safer.

result

More than 80.000 assets (ISO tanks and Rail Tank Cars) are equipped with IMT's telematics solution which has become the standard in monitoring the condition of dangerous goods during transport in ISO tanks. Besides the major tank container operators, many chemical companies also use IMT's telematic solution.

conclusion

IMT's telematics solution provides the perfect example that digitisation is an added value in the logistics chain. We are proud to be a game changer in the transport of ISO tanks. The industry should set the standards on how to remotely monitor the condition of dangerous goods during transportation, rather than governmental regulation. Prevention is better than to cure.

Further information can be found at https://www.intermodaltelematics.com/

4. || ADVEEZ - Localeez®

the challenge

Our client, a port terminal located in the Mediterranean area, had an accident in 2019 when a straddle carrier accidentally ran over a smaller vehicle working in the port area. As the straddle carriers are more than 15 metres high, the drivers do not have an optimal view of the ground. The equipment height induces lack of ground visibility for operators. Any emergency or failure of vehicle/straddle carrier segregation in the storage area raises the risk of accidents, particularly in the rush of high level operations. Therefore, the issue was to ensure safety of all persons and machines during container loading/unloading and in the storage area were provided with automatic alerts. Moreover safety needed to be enhanced to prevent incidents with emergency procedures on the field and in the control area.

the innovation

Developed in house from A to Z, the ADVEEZ solution allows terminal operations managers to enforce safety by real time monitoring the fleet of vehicles during operations. The FAMA V4 is an onboard unit designed, developed and assembled by ADVEEZ in France. The device collects real time data (geolocation, speed, fuel level, working status, shocks, driving behaviour, etc.) and displays them on Localeez®, the dedicated user-friendly web and smartphone platform. Via the Localeez® platform, the manager controls and operates all fleet equipment over the air, allowing the vehicles to be speed-limited or disabled in case of emergency. An access control system added to the device ensures that the operations manager knows that the authorized and appropriate user is driving the vehicle.

how it was implemented

Implemented at our client's premises, ADVEEZ innovative solution allows operations management to trigger, instantly and over the air, a speed limit zone (5km/h automatic speed limit) and/or a forbidden zone (reverse gear only if the vehicle enters the zone) in the event of an incident on the terminal. The alert is sent to the system instantly and the device installed on the equipment will automatically slow down the driver thanks to a real time geofencing technology. The driver of the failed vehicle can find solutions with no fear of the other vehicles, even with no visibility. The driving behaviour alert notifies when a shock or a failure is detected on the vehicle by the onboard unit. Moreover the solution implementation is easy to install and brand agnostic, suited to every type of handling equipment. As well it can interface fully with TOS systems. Thus, the implementation was a plug and play project as our web platform is able to show assets on bird view map instantly.

result

Short term: instantly increased safety and a better real time birds-eye view on operations. The user feels safer as the emergency procedure is backed up with a better supervision on the field and on the system. The management is able to know when an incident happens and help efficiently if necessary.

Middle/Long term: -45% cost reduction in maintenance & accident within 12 months. Safety feeling is increased as the speed is reduced around pedestrians and incidents areas.

Significant modification of driving behaviour with access control, less infrastructures and equipment accident with a better maintenance management.
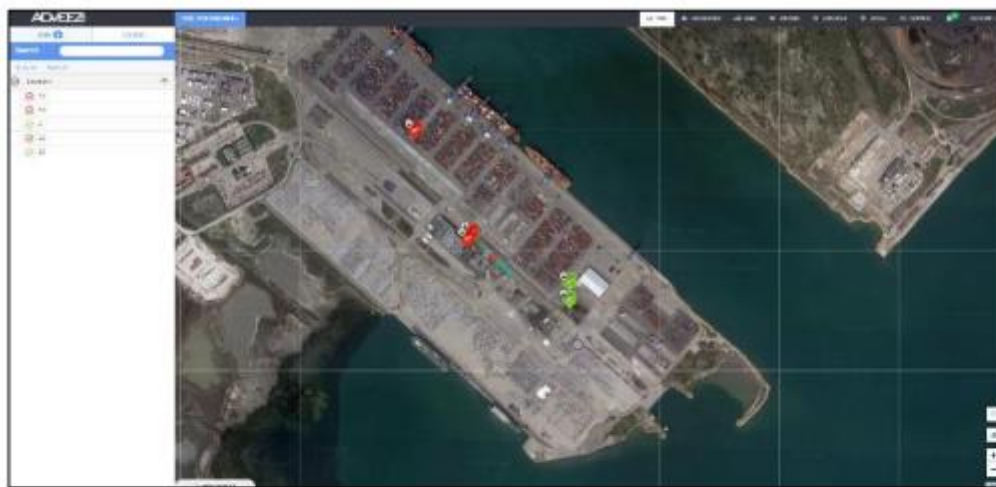
conclusion

At ADVEEZ, we design advanced and easy solutions to monitor and optimize operations in complex environment. This project is fully in line with this philosophy as its implementation did not require extensive work but a simple retrofit of the existing machines. Despite this simple implementation, the results have led to a clear enhancement of safety working conditions and procedures. As safety is not the only interest of port terminal operations, our solution allows our customer to track unnecessary CO_2 emissions when idle time is detected and to feedback mechanical information to the technical and maintenance teams. Therefore, ADVEEZ solutions improves operational efficiencies and turnaround management as well as reducing costs and accident rates.

Further information can be found at https://adveez.com/

## 5. || APM TERMINALS MEDPORT TANGIER & SEAPORTOPX - Wind Resilience Tool

the challenge

Wind-blown containers are becoming typical hazard in large container yards at some locations, and there are countless operation disruptions owing to uncertain wind forecasts and lack of yard stacking wind resilience, causing hundreds of wind related containers toppling events yearly basis. Recovery mode require extra deployment of resources, special handling and exposing people to different risk profiles as non-routine tasks.

While operating in one of the most technologically advanced, safest and efficient terminals, wind forces was and still a significant safety challenge. Things that created the burning need to look after innovative and unprecedented solutions, taking advantage of Terminal stacking knowledge and learnings, Weather advanced science, Artificial Intelligence, and some basic laws of physics.

Challenges to solve:

- Difficulty to identify containers in weak position, with elevated risk of toppling
- Wind sensors failures, lagging to detect real potential of wind gusts, which increased risk of containers toppling, with sometimes extreme consequences
- Wind sensors false alerts, causing unnecessary yard housekeeping and multiple operations disruptions.
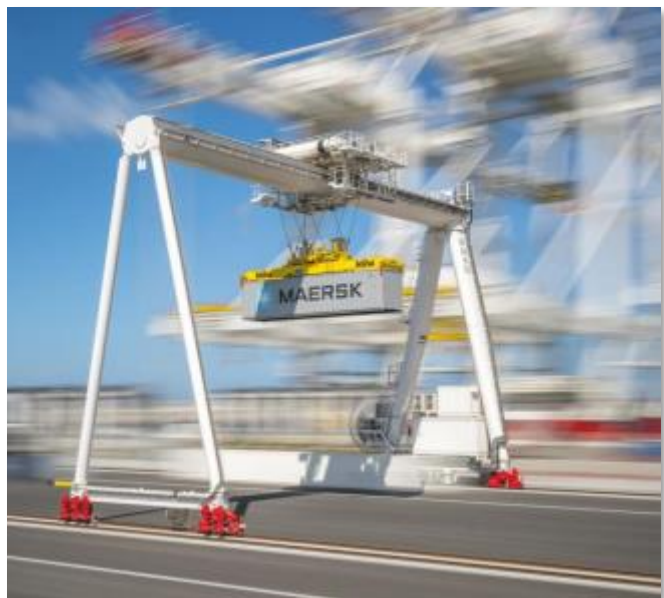
the innovation

Wind Resilience Tool is a wind decision support tool powered by a smart AI engine which provides much more accurate predictions of wind speed and direction at the terminal and automatically alerts users when pre-set wind speed criteria are forecast to be exceeded. And includes local real-time wind measurements within the terminal domain for full visibility of live conditions and model performance. The tool provides an eagle eye on a live 3D yard refined stacking, with a clear visual management system to detect specific containers that are unable to resist upcoming wind gusts. This tool is powered by a complex AI engine that provides high-resolution wind behaviour predictions as well as real-time advice on safe container stacking strategy. The tool considers multiple parameters in the model e.g. wind

speed, direction, wind tunnelling, container position, tier, weight and size to determine the safety margins for each container on yard.

Main outcomes:

- Provide terminal with timely and accurate information to shape micro decisions on live operations to reduce risk, protect assets and enable operations.
- Preventing proactively falling unit events, by performing prompt and targeted yard housekeeping moves only when needed and for specific containers. Reduce operations wind related downtime, caused by false wind alerts coming from nearby stations.
- Reduce latency to act when needed when nearby stations fail to predict potential threats.

how it was implemented

Designed, built and tailored based on APM Terminals MedPort Tangier 'TM2' terminal specifications and learnings, in partnership with field experts 'SeaportOPX'. Ground Study and Tool Development took six months, followed by a thorough quality and testing phase to measure effectiveness. It is now ready and deployed LIVE in TM2 Terminal enabling Safer Yard Operations.
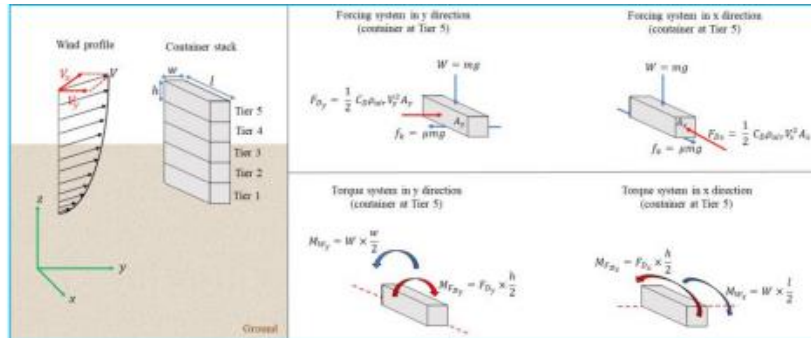

Wind Resilience Tool Interface

Configuration of the Status thresholds is based on the TM2 Environmental Baseline Study and local wind procedures considering multiple parameters, e.g. gust speed, taking into account sensitivity to winds from a certain direction when the wind hits the container sides making the impact heavier, for example / other parameter considered are the container position, tier, weight and size.
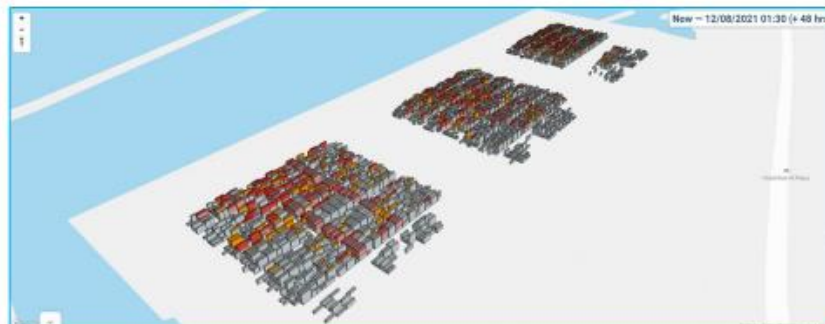
The variation in wind status triggers over time and space can be visualized through the map interface. The map interface captures the location of forecast high wind events to support proactive measures to avoid incidents.

In addition, the system followed quality assurance procedures including running automatic quality assurance checks to ensure the model results are constantly benchmarked against measured data. Wind Resilience Tool logic works based on the static balance of force and torque system in both x and y directions (in the horizontal plan) of containers at and above each tier. This logic is briefly described in the following figure for those interested to know more about AI engine physics.

In the figure above, parameters are defined as follows

Containers with high risk of toppling are proactively highlighted

Hovering over each container stack provides further information about containers at each tier

result

After introducing the tool the terminal took positive confidence to go through windy periods safely; deploying cutting edge technology and data science to eliminate the risk of exposure to falling containers, increasing safety capacity. When an upcoming high wind event is forecasted over the next 48 hrs, yard operations automatically receive notifications of any critical and/or warning containers over the yard. Yard operations then takes proactive safety measures accordingly knowing which containers are the most critical at the earliest time to move them around. The convention colouring for containers in alert from now to +48 hrs is orange, red, and faded red when the containers are in warning, critical, or conditional alert modes, respectively.

These alert modes are defined as follows:

- Warning Mode (Orange Colour): A container with 70% risk of toppling due to applied wind force in any directions (x or y directions in horizontal plan).
- Critical Mode (Red Colour): A container with 90% risk of toppling due to applied wind force in any directions (x or y directions in horizontal plan).
- Conditional Mode (Faded Red Colour): A container has 90% risk of toppling due to applied wind force in any directions (x or y directions in horizontal plan), if the container stack in front of it, which itself has 90% risk of toppling due to applied wind force in any directions (x or y directions in horizontal plan), is removed / domino effect.

Sharp positive results, terminal moved from frequent high wind related falling containers in2019 and 2020 to NONE during 2021. Awarded with total absence of toppling containers during one full year of deployment. An absolute success!

conclusion

With every challenge comes the opportunity to improve and discover hidden strengths, solving problems and leading change for better and safer Cargo Handling is key to safety excellence. At TM2 we believe that safety capacity and fail-safe systems based on breakthrough innovative solutions are critically important to keep ahead and boost safety performance.

Wind Resilience Tool was the fruit of a team of expert's hard work, dedication and passion to Lead with care. The idea matured in the lab moving from high-resolution prediction tool to 2D heat-map proposal and ending up exceeding expectations by deploying 3D flyover map with risk margin calculated down to every container. The Tool provided extra understanding and new learnings about the wind behaviours and how gust interact with the stacking containers, these insights fuelled Terminal procedures and stacking strategy to balance loads and figure out the best stacking shape possible, with minimal impact on operations flow and high impact on terminal safety resilience. Cause the only way to discover the limits of possible things is to actually to go beyond them setting the stage for new possible limits. Creativity is thinking up new things. Innovation is doing new things.

Link to demonstration video: https://www.youtube.com/watch?v=DZHUC2C04R8

6. || BRIDGE HILL AS - Fire Blanket

the challenge

In 2014 a fire in Lærdal, Norway damaged 60 buildings. 42 were totally destroyed. Of these buildings, four were of historical value and one was listed. The fire in Lærdal was the biggest city fire in Norway in seventy years and was particularly destructive due to strong winds that made the fire spread easily.

This fire initiated an idea that turned into the quest of making a fire blanket that could protect, prevent and stop fire. The fire blankets are today available under the brand name Bridgehill, and we serve a range of fire blankets.

As the numbers of electric vehicles are rapidly increasing, fire fighters are lacking methods for handling lithium-ion fires. A firefighter can use thousands of gallons of water trying to extinguish a fire in an electric vehicle without results. Also, with combustion engines there are challenges with traditional extinguishing methods. With the fire blanket you will deprive the object of oxygen within seconds and isolate the fire from spreading to the surrounding areas.

the innovation

Our fire blankets enable firefighters and non-firefighters to safely isolate and extinguish fires in combustion- and electric vehicles, e-scooters, parking garages, public buildings, car parks, ropax, warehouses, cargo- and RORO ships and other spaces before the fire spreads. The purpose of the fire blanket is to deprive oxygen, and then extinguishing all traditional fires without a drop of water. When using the Bridgehill fire blanket, the fire fighters, people in the area and the environment are less exposed to the smoke. The blanket prevents the fire from spreading, which is especially important in areas where cars are parked close. When used on shore, the fire blanket prevents the risk of extinguishing water seeping into the groundwater.

Bridgehill fire blankets come in different sizes, and are made for both single-use for the corporate market (e.g. RORO and warehouses), and multiple-use purpose for the professional market (e.g. firefighters).

how it was implemented

Bridgehill established its headquarters in Larvik, Nowray in after the fire in Lærdal. When entering a new market - the strategy is to target the main target group: the firefighters. With the firefighter's approval we found it is easier to target e.g. industrial protection deparments, the RoRo-industry, car manufactures, warehouses etc.

Since the Bridgehill fire blankets was -and still are - an innovation in the safety industry it is important to not only tell, but to show the product to potential customers and media. This is done by arranging demos and trainings where the Bridgehill fire blanket is used both for dry training and in real fire cases in real case scenarios.

Today Bridgehill sell mostly through a wide network of distributors around the world. Still headqueartered in Larvik, Norway.

result

This year alone Bridgehill has sold fire blankets to Over 40 countries worldwide. In total we have customers in more than 60 countries. Our safety innovation, the fire blankets, are starting to be a used fire extinguishing product, a new way of fighting fire in the market.

conclusion

A situation can easily get out of the control with cars parked close to each other. To be able to handle a car fire on board a vessel, or in a tight parking place, it is essential to be able to control the fire fast. The space between the floor and the ceiling is less in an *underground* park/car deck than in an open parking space. Therefore the room will be faster filled with toxic smoke. The smoke and fire will be quickly isolated after the fire blanket has been deployed. The fire blanket is probably the most efficient firefighting tool to isolate and extinguish fires on board vessels and in similar situations.

7. || DAFO - SafEV Vehicle Fire Protection

the challenge

The global shipping industry is evolving – and so are its fire risks.

As we move towards a more sustainable future, businesses in almost every sector are searching for sustainable alternatives to power vehicles and machinery. The port industry is no different – and in recent years it has seen a huge increase in electric vehicle (EV) and machinery use on site, as operators make the move from traditional combustion engines.

In 2019, there was a cargo-related fire incident every ten days at ports across the globe. As new electric technology comes into play, the risks – and fires – are only increasing, and when it comes to electric fires, the risks can be even more severe.

EVs at ports are often powered by lithium-ion (li-ion) batteries, which bring their own unique fire risks. Should li-ion batteries become damaged, experience mechanical failure or overheat, they can enter a state called thermal runaway. This is the result of rapid temperature increases, and can lead to dangerous fires, with toxic gas emissions, and potentially even large explosions.

In thermal runaway, a battery can also produce its own source of oxygen, propelling flames from within its cells. In an EV, a battery fire requires up to eight times more water than a traditional combustion engine vehicle fire, which needs to be applied for up to four times longer to reduce the likelihood of reignition. As such, suppression using traditional methods for EV fires was challenging; it needed a new solution to reduce risk to life and operations.

the innovation

Working with RISE (Research Institutes of Sweden) on an EU-funded initiative, Dafo Vehicle Fire Protection developed SafEV – the result of three years of research, data collection and extensive testing on li-ion batteries and EVs. The research found EV batteries need a unique fire detection system that identifies the early stage of thermal runaway. Low levels of carbon monoxide were emitted and measured prior to the battery entering thermal runaway. Detecting the level of carbon monoxide – before temperatures increase – maximises safety.
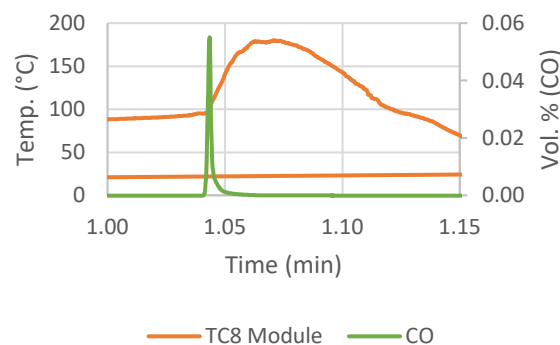
CO-detected at the beginning of the temperature increase.
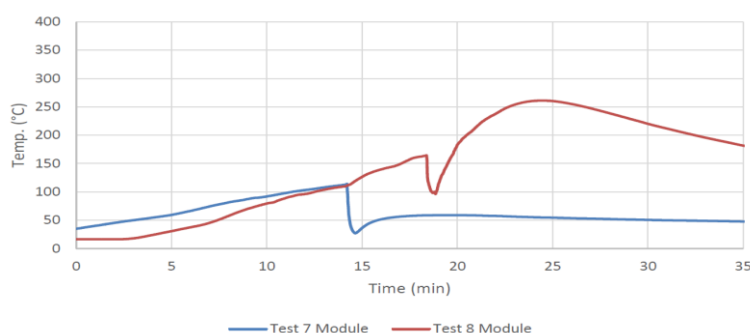***Tests conducted at RISE by Dafo VFP.***

This research found that, when tackling EV fires, aside from applying large quantities of water, you can also apply appropriate cooling in the venting stage, which occurs prior to thermal runaway. This will halt the process in its earliest stage, reversing the battery to a dormant stage.

SafEV applied exactly that concept – as a new system that focuses on prevention as well as suppression. SafEV consists of:

- CO sensors for li-ion batteries, which can detect CO particles at 10ppm with integrated temperature monitoring.
- Heat detection systems for conventional risks – detecting from 180 $^{\circ}$C.
- A CEV-3 control unit – to manage multiple zones and detection methods and to control the alarm, battery shutdown or activation.

Once CO is detected, the battery will be immediately shut down, and rapid cooling will take place using the suppression agent inside the battery module.

Temperature development with suppression system either at venting or thermal runaway. Tests conducted at RISE by Dafo VFP.

how it was implemented

Currently, Dafo Vehicle's SafEV is on the verge of entering the international shipping market as a new product, following successful testing with key port industry players. As part of this, sensors were installed on port equipment EVs for several large shipping companies (unable to name due to NDAs), and following the results, there are now plans in place for their imminent use to protect these companies' EVs around the world.

To adapt to the high-risk port operations environment, SafEV complies with extensive vigorous shock and vibration testing standards, as well as Low Voltage Directive Standards. This ensures its continued effective operation in the port environment, as vehicles are placed under intense pressures and long hours to meet busy work schedules.

SafEV can be installed during EV manufacture, as well as through retrofit to existing port EVs. To engage in best practice from the outset, Dafo Vehicle has partnered with various officials and vehicle manufacturers for the industry (again, unable to name due to NDAs), and once the testing phase is complete, there are plans to implement this solution globally.

Dafo Vehicle's SafEV system is easily installed to any EV – old or new. Once installed, it can be easily maintained as part of the EV's routine maintenance, requiring no additional service engineer visits.

SafEV is part of a whole fire protection system, which will provide an early stage alarm to the vehicle user should the battery malfunction.

result

There are currently several hundred SafEV systems in operation for on-road vehicles around the globe. For the port industry specifically, extensive testing is now nearing completion, which ensures the system is as effective as possible for this specific application. These tests have explored the difference in wind conditions and the impact of these on the functionality of the system. With a significant number of systems agreed for install at ports across the globe following the conclusion of this testing phase, the appetite from the market is clear.

SafEV will have a large-scale impact on port fire safety around the world. From initial research and testing, once implemented, the systems will result in:

- Cooling being implemented up to five minutes before thermal runaway takes hold
- Reduction in the temperature of the battery from 100 $^{\circ}$C to below 50 $^{\circ}$C in under a minute, which will then level at around 50 $^{\circ}$C.

In comparison, a conventional fire suppression system, which is activated after thermal runaway takes place – at just over 150 $^{\circ}$C – will reduce the temperature of the battery down to approximately 100 $^{\circ}$C for a few minutes. After this, the temperature will then increase to over 250 $^{\circ}$C, as the system fails to reverse the effects of thermal runaway.

SafEV is able to restabilise the battery to reduce the overall risk of fire, injury and damage to the port environment. This means that when an inevitable malfunction does occur, the risks to life, valuable equipment and the surrounding environment is minimised.

conclusion

Dafo Vehicle and SafEV are set to play a leading role in the cargo industry's EV fire safety. Once final testing is complete, and it is clear the system can effectively address port-specific conditions, and vehicle manufacturers and large shipping companies are already committed to implementing SafEV globally.

Looking forward, Dafo Vehicle is now focusing on how it can

spread its SafEV solution around the world, to ensure all ports understand and are able to mitigate the risks associated with these new, sustainable vehicles. It also plans to use similar technology to protect the cargo industry's transportation of EVs across the globe, as this is becoming an ever increasing hazard, which again needs a new solution.

Dafo Vehicle recognises the risks associated with the cargo industry's holistic operations – including both battery materials handling and transportation. It is positioned perfectly with SafEV to support companies large and small across the globe as the numbers of lithium-ion batteries increase.

Further information can be found at https://www.dafo-vehicle.com/
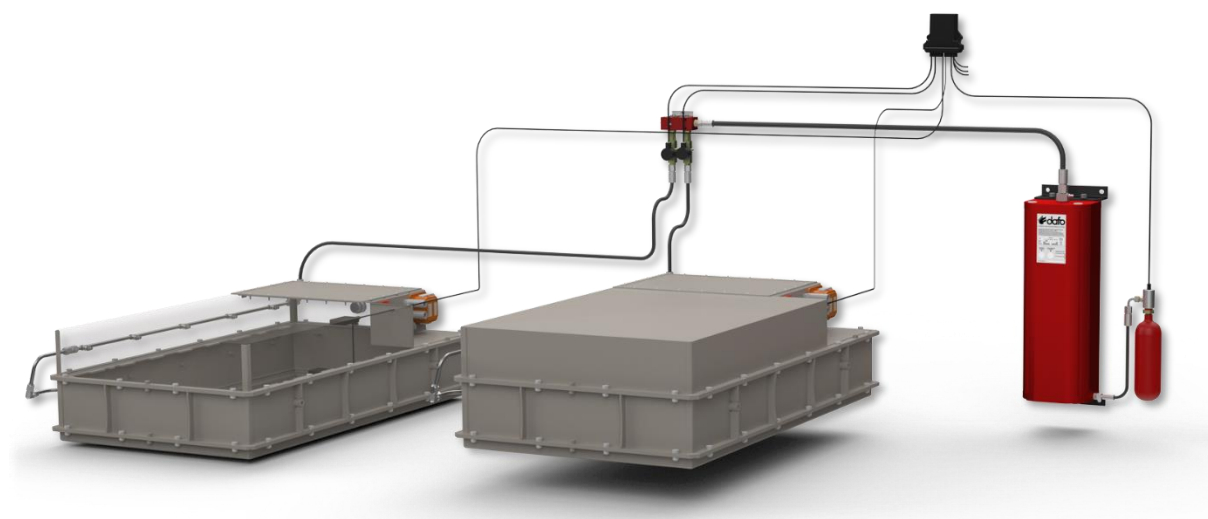
8. || DP WORLD - ITV Twist Lock Sensor Detection System

the challenge

Terminal Yard is handled by Auto Rail Mounted Gantry [ARMG] cranes and container receipt and delivery as well stacking is completely done in auto mode. One single unpinned twist lock could lead to stack collapse during auto handling of containers, leading to fatal or multiple property damage incidents.

Container Twistlock detection sensors are installed on all ITV's (Internal Transfer Vehicle). These alert drivers to any twistlocks attached to vessel discharged container corner castings prior delivering the container to container stacking yard, with alarm beep sound and red LED light indicators mounted on the trailer as well as a light inside the cabin.

Even after installing, there are cases of ITV drivers not responding to the alarms and light indicators, due to carelessness or being engrossed in their job or neglecting it as a fault indicator especially during foggy weather or while drizzling and even sometimes indicator lights might get fused.

This can lead to high possibility of Container twistlocks reaching the container stacks in Yards, where unpinned twist locks can get attached to underneath containers and be lifted together during ARMG crane Auto operations, that could fall from height causing multiple property damages, possible injuries and even fatalities, if it had dropped over the vehicles like ITV/third party trucks etc. which are waiting for container to deliver/receipt or even passing vehicles on the roadways whilst the stack collapses.

the innovation

To bulletproof the twist lock detection system and prevent errors, the twist lock detection system has been integrated with the VMT (Vehicle Mounted Terminal) which is inside the ITV's cabin (the VMT lets the driver know the container receipt and delivery locations).

On receiving the vessel discharged container this integration system will do the following:

1. Upon detecting unpinned twist lock on the container, VMT screen will block the appearance of yard location to ground the container.
2. ITV Driver will get yard location only upon removal of twist locks from the container corner casting at pinning station
3. Moreover, pop-up message on VMT screen is displayed, advising driver to "Go to Pinning Station" to unpin the twist lock.


Due the system enhancement, the issue of containers reaching the yard with unpinned locks has been resolved completely.

how it was implemented

A twist lock detection laser sensor, equipped on all ITV trailer beds, emits a laser beam which is reflected back by reflectors mounted on brackets. If any foreign object, such as twist locks or stacking cones are present in the laser beam path, communication is interrupted triggering the alarm for presence of twist locks to ITV driver. On its own however, this system was not fully effective. Many instances were encountered of containers reaching the stacking yard with unpinned twist locks. So, the twist lock detection system has been enhanced by incorporating the detection system into the VMT.

Linking it to the VMT as an added feature has reduced the probability of a container with twist locks being delivered to the yard to ZERO. The system is developed in such a way that it is activated only when the ITV receives vessel discharging container.
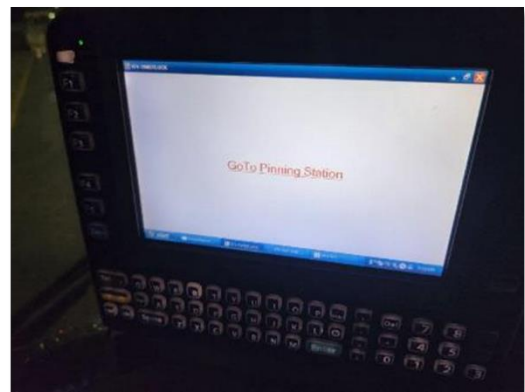
result

The system has been active since July 2022 and since installation there have been **NO** near-miss or incidents involving property damage reported. It has completely eliminated the

incidents related to containers with unpinned twistlocks reaching the stacking yard during auto handling of containers. There used to be major incidents involving multiple containers damage including the cargo as well near miss incidents due to containers delivered to yard with unpinned twist locks. Due to the system enhancement, there have been ZERO instances and a zero probability of containers with twist locks being delivering to yard has been achieved.

conclusion

The incident records declined drastically related to unpinned twist locks as well reduced claims of property damage. The enhancement is expected to reduce the accident related cost and insurance premiums for upcoming years and the return on investment is immense. Due to the enhanced system in the VMT which disables the grounding yard location if all twist locks are not removed, the ITV driver has only one option, namely, to clear the locks in order to see the grounding location in VMT.

9. || FIREFLY - Suppression Drones

the challenge

Shipboard fires (shipping container fires, petroleum fires, engine room fires...) are difficult to suppress due to factors such as isolated location, cargo containment, limited shipboard firefighting capabilities and limited trained firefighting personnel.

Suppressing shipboard fires is subject to weather conditions, pitching/rolling vessels. And confined spaces, and below deck firefighting is subject to intense smoke heat and flames.

the innovation

Our FireFly Drone is truly innovative, it flies with Hydrodynamic Vectored Thrust, (Water pressure) rather than propellers or batteries. It jets its flight thrust from water pressure supplied from a fire hose.

Our drone is small (1 cubic foot / .3 cubic M) in size and weighs 45 Lbs / 20 Kg.

The drone can fly directly to a fire and suppress a fire at very close range .5m and can be on station suppressing the fire as long as water is supplied to the drone via the fire hose,

The drone can supply a continuous water or foam suppression of up to 750 Gpm / 2800Lpm from the tethered 2.5' 64mm) fire hose.

The drone is fireproof with 5 layers of fireproofing including water cooling, and also waterproof with a positive buoyancy, The drone would have the ability to float. And the drone will have onboard colour cameras, thermal cameras, LIDAR and thermal temperature sensors, and two way verbal communications (speaker and microphone).

The drone has the ability to see its ongoing suppression of the fire, and react by moving and increasing its suppression as needed.

We have designed the drone for one purpose...to fight fires, either topside or below deck on a ship. This capability can be done remotely from the safety of the bridge or other safe remote location.

The drone is supplied from the ships fire suppression system, or an onboard diesel/electric skid pump.

- • Minimum pressure 200 Gpm (750Lpm) @ 30 Psi (2 Bar).
- • Hose size is either 2.5" (64mm) or 4" (102mm).

how it was implemented

Our FireFly "Maritime version" is currently being developed as a prototype pilot project. We are defining the role of our drone in shipboard fire suppression. We are consulting with various agency's to evaluate our preliminary capabilities, and further define the drones role in shipboard fire suppression.
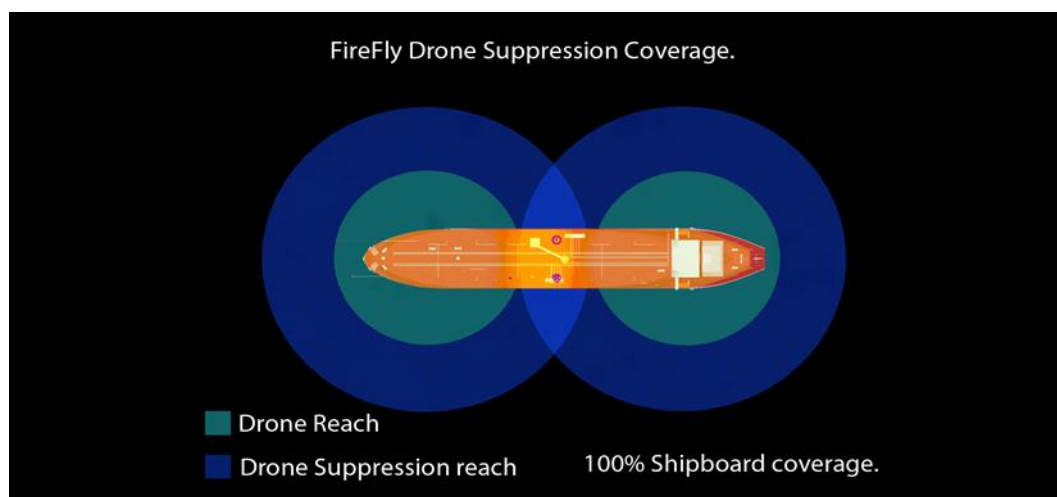
We are utilizing modern development and manufacturing tools, such as DDM (Direct to Digital Manufacturing) (CAD/3D Design/Modelling/Engineering/Simulation), and additive manufacturing, 3D printing. We also extensively use COTS/MOTS (Common/Modified off the shelf components).

We are currently seeking funding to produce a production ready prototype.

FireFly Drone suppression reach diagram.
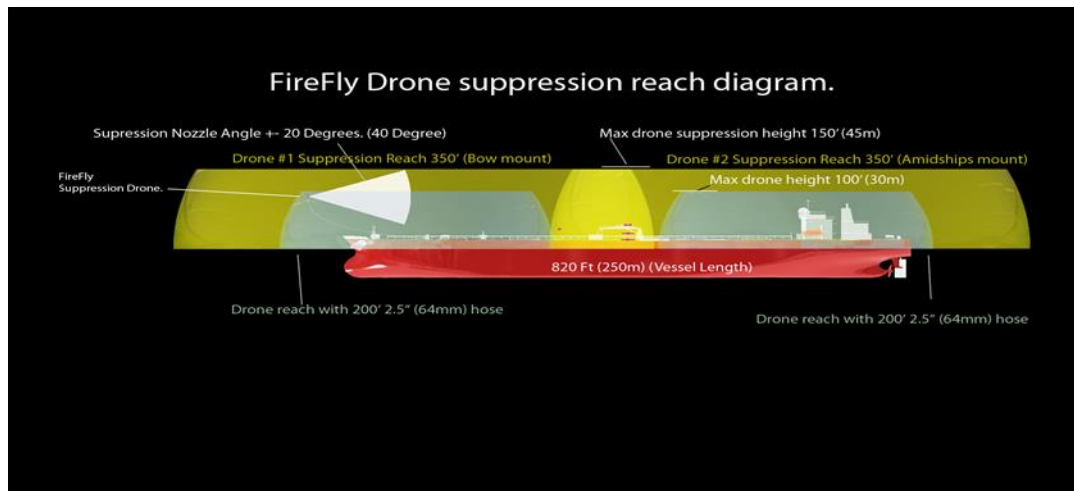
result

We have vetted our drone design, through engineering, extensive research of the core technology, and interviews with trained firefighting personnel. We believe our drone will be able to perform as a frontline firefighting apparatus for fire teams and companies on the fire line. We are producing "Digital Twins" of our different versions of our drones.

conclusion

Our fire suppression drone will change the way fires are fought. Our drone can save lives and assets by suppressing volatile & dangerous shipboard fires, and volatile involving dangerous toxic chemicals and volatile petroleum products.

Our drone is designed to directly replace firefighters in these situations, so firefighters are not exposed to hazardous situations which are inherently dangerous to life (IDTL).

...ing of FireFly Drone suppressing fire in multi-story building. (Note vertical downward facing thrust jets).

Further information can be found at https://paraparanft.wixsite.com/fireflydrones

10. || FREIGHTSAFE LTD – Secure Truck Parking

the challenge

Truck parking has long been an issue within the logistics world. Truck stops today are designed to prioritise the sale of fuel, not the truck parking experience. However, the industry is increasingly realising how much of a problem this can cause. A lack of focus on safe, secure parking has led to over $40bn in cargo stolen every year from the back of trucks, a number that continues to rise year-on-year.

There are many security shortfalls that result from this priority imbalance, such as a lack of suitable fencing, camera surveillance, or on-site guards, meaning that thieves can enter and exit the site in many cases without detection. On top of this, drivers are the ones who have to deal with these safety concerns, yet have no control of the quality of the parking area themselves. The result is an unsafe stay for the majority of a long-haul trucker's day-to-day life, especially with the potentially millions of pounds of cargo that they carry in their trailer, making them specific targets for armed thieves.

All of this can weigh on the mind of the trucker, causing long-term mental health issues due to stress and lack of sleep. Per a US DOT survey, 85% of drivers state finding truck parking as their No.1 cause of stress at work. In an industry where driver retention is already a huge problem for logistics companies, solving the problem of truck parking has to be one of the major priorities at this time.

the innovation

Freightsafe brings together multiple solutions to provide the most complete, unique, secure parking available. The primary aspect of the product is the modular bays in which the truck is parked securely overnight, or for any amount of time in the day, as the owner requires. This bay comes in the form of a steel sheet-cladded aluminium box, and has a full system of remotely-monitored CCTV cameras, with internal motion detection.

Our 10-bay site in Central Barcelona

Additionally, we have partnered with Bosch Secure Truck Parking to combine our security solution with the existing reservation platform that BSTP runs. This allows for trucks to be booked into specific bays ahead of time, to further enable the carriers' ability to co-ordinate logistics opportunities and increase accountability when it comes to potential cargo theft.

Each space is monitored individually to provide an elite level of security

Trucks are pre-booked into a certain bay so that when the driver arrives, they can let the dispatcher know they are at the location, and the access control door can be lifted, allowing the trailer to be parked inside the bay. The whole process is automatic and un-manned, reducing the level of human error and the increased risk of crime from direct human involvement.

Our site-locating process is designed to reduce carbon emissions as much as possible through upcycling existing sites, rather than building new greenfield locations. These suitable properties include sites such as depots, ports, malls and truck repair shops and therefore open up a whole network of new parking opportunities to solve the shortfall of secure truck parking spaces that we currently face.

how it was implemented

At Freightsafe, the absolute priority is the security of the bays, and in turn, the trucks inside them. To that end, there are multiple layers to the security of Freightsafe sites which can be put into 4 clear stages:

- Deter + Delay: Enclosed steel parking box
- Detect: Internal motion censoring
- Respond: 360⬜ live CCTV monitoring
- Recover: Intervention escalation

Potential thieves are initially deterred by the structure itself, reducing visibility of the trucks as they are hidden within the Freightsafe box, and making it harder for thieves to target specific cargo/companies. Secondly, the 5m high walls are made from 0.7mm thick steel, delaying any attempt to break in and have any access to the trucks at all.

Should one be able to make it so far, both the detect and respond stages are managed by Bosch Security Solutions, which has a sophisticated camera surveillance system installed inside the bays, and is monitored remotely 24/7, including the aforementioned motion censoring.

The final stage, recovery, is managed by a local security team who are notified automatically in case of alarm and aim to be at the site within 5-15 minutes of notification. For current users of Freightsafe's solution, this step is key for the additional peace of mind for cargo owners and drivers alike. It is a unique offer for secure parking, replacing the traditional process of law enforcement reliance, which as many will know, can be a long wait due to the low priority cargo theft has within the policing world.

result

To date, Freightsafe has parked over 600 trucks park in our bays, with 5 sites upcycled and one more planned for operation by 2023. There have been zero incidents reported from these 600+ uses, protecting our customers' cargo for over 2 years now, valued at roughly €900m in total.

We work closely with insurance companies and cargo security organisations alike to ensure that our product meets the latest safety requirements for our clients. As our solution greatly reduces the

The gate can only be opened remotely by our innovative access control technology, with internal and external CCTV monitoring

number of claims from an insurer's customer, this can allow for premium reductions too.

This is what one of our key long-term clients, BAT, had to say on Freightsafe:

"With the requirement to move high-value freight across Europe, BAT is constantly looking for safe places to park for our already security-enhanced vehicles. The issue we face, in addition to scarce resources, is that the status of secure parking can change quickly; if a fence is destroyed, or a camera broken, it becomes just another vulnerable parking space.

I was introduced to Freightsafe a few years ago, and was excited by the concept of what Charlie [Anderson, Founder and CEO of Freightsafe] had put together. BAT have been working with them since and are pleased that we now operate our vehicles into a Freightsafe parking location in a designated hotspot.

Our carriers are very happy with the situation, it has shown us a reduced cost overall and we are confident that the further rollout of parking bays will yield both security and commercial benefits."

conclusion

The world of logistics is progressing faster than ever, with new technologies and innovation bringing development within the industry. However, truck parking as a topic is still living in the past, causing problems for stakeholders at every level. Traditional truck stops provide hundreds of thousands of parking spaces for trucks every day within the EU, but new spaces take years to build, and cost millions of pounds.

For the industry to make up the 20,000 shortfall in secure parking spaces currently needed, truck parking needs to be reimagined. Freightsafe has done just that, with sites that can be built in just 3 months from first agreement, costing significantly less to procure and providing a more complete security program for users.

This added level of security provides users with a more safe and reliable service through 3 primary avenues:

1. Safer parking areas – more securely-parked freight deters thieves from stealing cargo, resulting in fewer criminal activities at parking areas.
2. Improved driver welfare – following on from previous point, Freightsafe's safer parking areas mean less stress on drivers to remain vigilant at all times, allowing drivers to have their rest in peace.
3. More secure cargo – logistics companies and shippers alike can be more confident in their plans for cargo to get from A to B safely. This can save millions of pounds and give them time to focus on other priorities such as efficiency, and decarbonisation.

Check out our solutions at https://freightsafe.co/

Park Smart, Freight Safe

11. || GBMS - SensoriumC system

the challenge

Container stacks collapsing at sea cause severe damage, both environmentally and economically. Incidents due to collapsing stacks have been in the media a lot lately. Whether it was about the Dutch beaches being washed up with litter from the MSC Zoe incident in 2019, the enormous quantity of lost containers in the Pacific with the ONE Apus incident in 2020 and the consequential temporary decommissioning. Or the various incidents where containers stacks caught fire, allegedly preceded by a stack failure. Larger ships, increasingly unpredictable severe weather conditions and an ever-growing pressure on the ship's crew to arrive in time has led to an increase of the number of containers lost.

Numerous investigations like those of the Dutch Safety Board (OVV), the German BSU and the Panama Maritime authority, the Maritime investigation Board (MIB) and the AMSA have shown that crew of container vessels are hardly aware of the forces acting in container stacks and in the lashing. Once the ship has set sail, lashing is checked regularly when weather conditions allow. However, when weather deteriorates, the crew cannot go outside to check. Especially during night-time, visibility of the cargo is very limited. Even if the crew can inspect the cargo, they still are unable to tell whether a stack is reaching its safety limits or not when a ship is experiencing large motions. This is where GBMS has set out to change things.

Beaches of Schiermonnikoog, 2019, (source ANP)

the innovation

When you drive your car on the highway, the speedometer tells you what speed you are driving. If you go too fast, you slow down. Imagine not having a speedometer and not knowing you are passing the speed limit or not. This is the current situation for crew on board container ships with regards to container stack loads. When caught in bad weather there is no way to tell whether the cargo is safe and the voyage can be continued or measures should be taken, like altering course and arriving later at the planned destination.
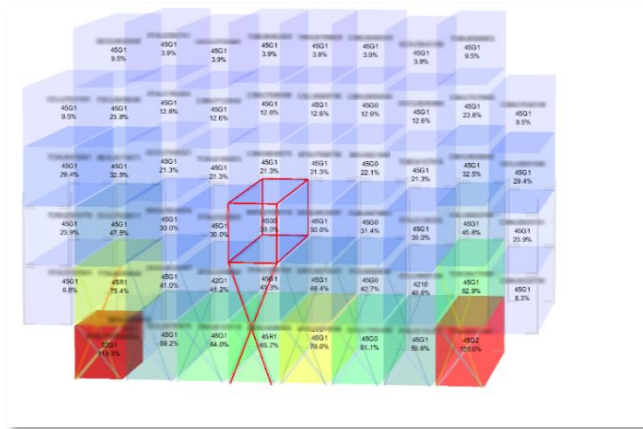

Our SensoriumC system is exactly this, a speedometer, but for container stack and lashing loads. In real time it evaluates racking loads, corner post loads, lashing tension and many more parameters to allow for the crew to stay informed.

SensoriumC is used in three stages of a voyage.

Before the containers are loaded, the system is utilised to check for compliance with class rules and the CSM of the ship and other inspections of the stowage plan.

During the voyage, safety levels in the stacks and lashings are shown in real time. SensoriumC acts as a decision support system to aid the captain and crew in making objective decisions during severe circumstances.

Afterwards, reports are made with the logged data that can be used by quality assurance departments for hindcast and optimalisation purposes.

container loads   lashing loads
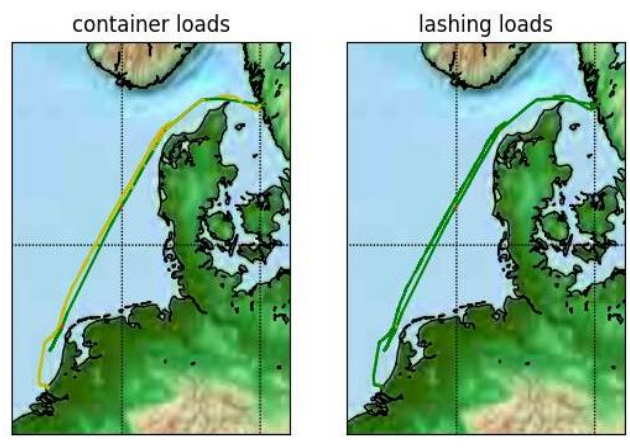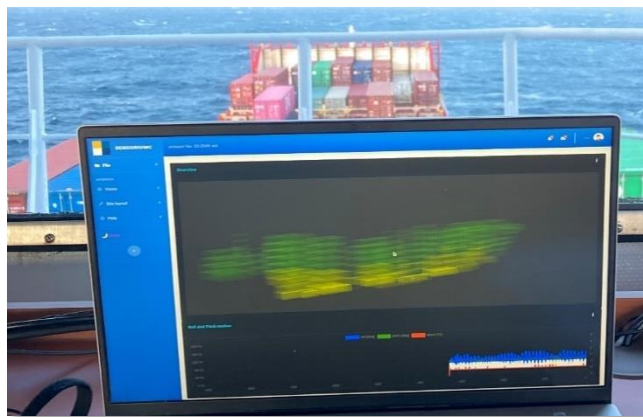
how it was implemented

GBMS is a start-up sparked by the damage caused due to several container loss incidents. Initially thinking along the lines of adding sensors to containers, we eventually realized the biggest bang for buck would be a ship mounted system. We deemed this system SensoriumC, a sixth sense for crew on board container ships.

At the heart of SensoriumC lies GBMS's proprietary 3D solver for stack and lashing loads. Together with the ship layout, the stowage plan per voyage (container positions and weights as contained in the BAPLIE-file) and a dedicated set of motion sensors installed on the ship, SensoriumC can provide real time feedback on the stack and lashing loads.

Installation of the system on board a ship is very easy and can be done as a retrofit. Before installing the system onboard, the layout of the ship is programmed into the software by GBMS as well as the ships specific class rules and CSM requirements.

The practical application of the tool was tested onboard the OOCL Rauma of JR-Shipping. During several sea-trials the system measured the ship motions and calculated the stack and lashing loads. During the voyages, the crew gave feedback on the development which led to features saving them time instead of being confronted with yet another task. Which led to this remark from the crew: "Now I've seen the future."

result

The crew welcomed the speed at which they could check the cargo, and the insights they obtained from the system while sailing. Them being confident in a secure loading of the ship makes shipping of containers safer.

The liner's office was happy to be able to supply the crew with modern tools to increase the onboard safety and safety awareness. Even opening the possibility to take in more cargo and applying alternative lashing methods to secure the containers even better. While on the other hand being alerted on stacks that looked safe when compared to the SCM but were unknowingly exposed to a larger wind area than anticipated. Simple rearrangements could therefore increase the actual safety margins.

conclusion

Our prototyping phase now comes to an end. With all the collected feedback we are finalizing our first delivery of the SensoriumC system which should set sail at the end of 2022 or beginning of 2023.

With the SensoriumC captains' decision support system we filled a gap in the information to the crew. The system enables a thorough checking of the loading plan before sailing. While sailing it provides independent information to the crew and the liner on status of the containers and lashings, and on the severeness of the conditions on which the crew can take any evasive actions when needed. After sailing, the system provides Q&A reporting to show compliance with regulations after any voyage.

In future the system will be extended with features to further improve safety at sea and tools to reduce the workloads for the crew.

At GBMS we are dedicated to reducing the loss and damage of containers at sea. With SensoriumC and our future planned developments, we will save costs for liners, insurers, and cargo owners while at the same time helping to protect the environment.

Joris Brouwer (GBMS) and James Manisan (first officer JR-shipping) during an inspection using the SensoriumC system

Information on the GBMS team can found at https://www.gbms.nl

12. || INDURAD GMH - iSilo3D

the challenge

Each year, an unknown number of Silos and Domes collapse due to improper material filling and unloading procedures. Besides the cost of these collapses and the inventory loss (e.g. grain loss through contamination) several fatalities are also registered. Furthermore, in Domes, unstable material poses a hazard to personnel walking around piles, specifically surveyors who must measure inventory. We could not identify a global statistic, but as it is frequently in the media, we consider that this is a H&S concern.

We are also aware of issues at our customer sites, especially in copper domes & Alumina Silos where Indurad has been approached about solutions to monitor the material level and profile.

During material filling, we sometimes see uneven loading (cf. picture attached of silos) happening because of incorrect feeder selection. If the wrong draw points are then used, or if material properties change (humidity, granularity) the safety margins for material stability in silos and especially domes can be reached.
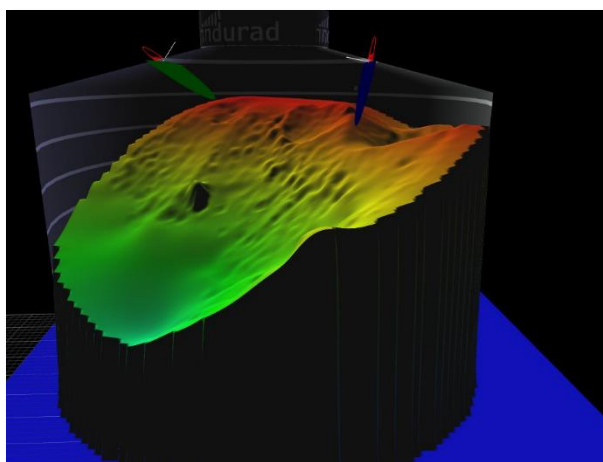
We have implemented a system in Thailand where the customer reported several of these incidents: The silo is regularly overfilled, because there was no accurate measurement. According to our customer, the roof or the roof structure has already been damaged once. They also regularly lose material that spills out of the silo and gets wet. These might be extreme examples but they highlight another benefit of a 3D measurement in general. However, the requirement of safe loading is especially well recognized in industries that use larger diameter domes with "difficult" product, like copper domes & alumina silos.

During the material filling, we can recognize uneven loading happening because of wrong selection or "faulty draw point" air which personnel are not aware of. If then the wrong draw points are used, and a material properties change (humidity, granularity) the safety margins for silos and especially domes can be tested.

the innovation

The innovation is based on the invention of a compact 3D radar sensor, the Indurad Scanning Dynamic Radar – Premium (iSDR-P) in combination with our Indurad Radar Processing Unit – Field (iRPU-F). Indurad has developed a stand-alone product called iSilo3D to continuously measure the surface of the material in the domes & silos. This information is visualized and a certain set of parameters is passed to PLC / SCADA systems. Alarm parameters are then set in the PLC / SCADA system.

However, the innovation goes beyond being a safety system but also providing normal operations with a set of data for better controlling and utilizing the silos. In the case of a copper mine in Chile, this resulted in the decision not to build a new storage facility as the existing one could be better utilized using a solution to scan the material which was previously prohibited due to safety concerns.

The 3D inventory data also goes to a visualisation and directly to customer's business tools (like BI tools and also ERP systems).
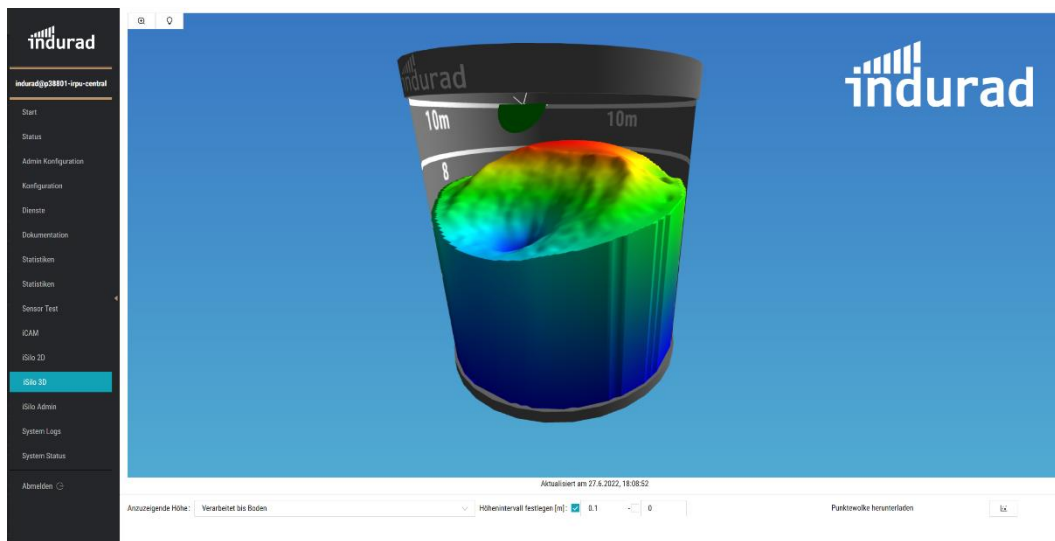
how it was implemented

We have implemented several comparable systems before, using a 2D radar sensor, mostly the Indurad Dual Range Radar (iDRR) which needed to be applied on several installation spots. However, these systems were limited by several factors (viewing area of the sensor, high price, and high commissioning effort).

The new iSDR-P sensor allows a single sensor installation in most cases. Also, the processing unit has been productized and the software allows partners & even customers to commission the system on their own.

The alarm setting is done by the customer in their PLC system based on the input values. This allows local expertise about specific conditions to be taken into account and changes can be made locally by the H&S people.

result

The result is simple. Customers are informed if one or several thresholds are met and can then react before the material starts, for example, pushing hard against the silo / dome walls causing structural damages.

We consider that we already prevented some dangerous situations – based on our data captures during the commissioning phase.

conclusion

The Indurad iSilo3D product is an easy and cost-effective way to monitor large silos in 3D in real time during operation. The data output allows alarms when silos and domes are operated outside their design limits. Besides this, the customer "connects" to their inventories in real time. The 3D visualisation helps them to understand material behaviour better, shows them when ratholes exist or bridges build up. Also, the data allows better production planning and logistics.

Further information can be found at https://www.indurad.com/
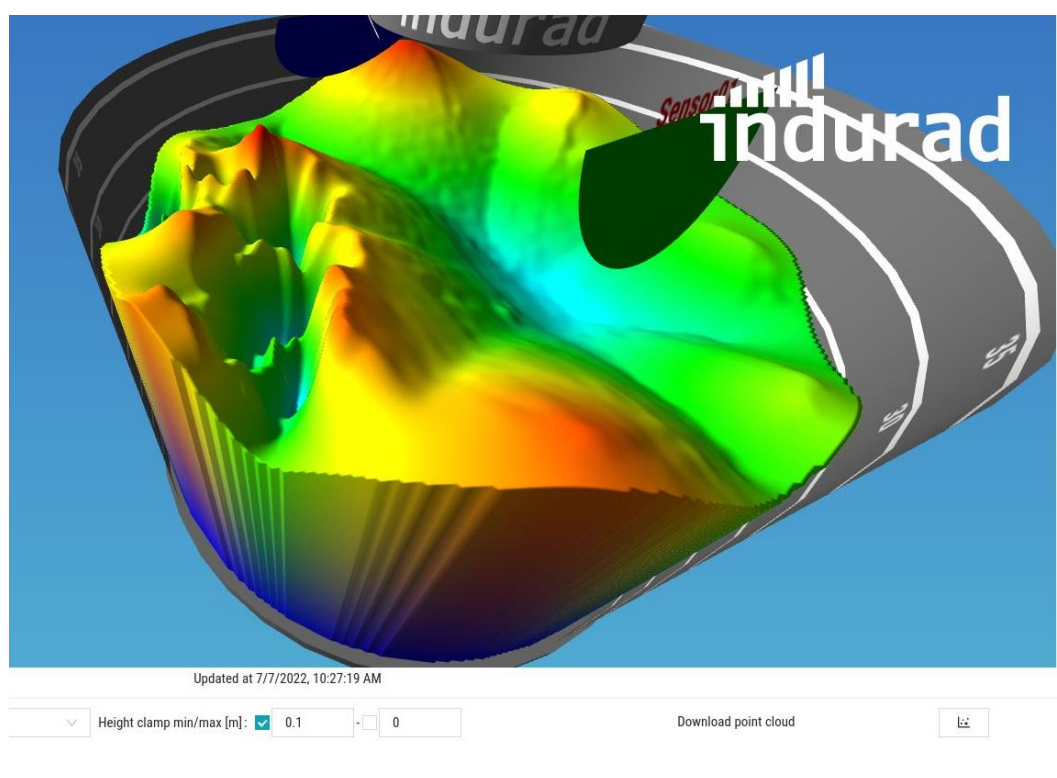
13. || KALP GMBH - Automatic Lashing Platform

the challenge

Even in the most modern container terminals, twistlocks and stackers are still removed from or inserted into container corners by hand. And this despite the fact that the manual lashing process has long been identified as one of the last major safety risks in terms of work safety.

Both work in the travel area of horizontal transport under the gantry crane and work under suspended loads repeatedly result in serious injuries to stevedores, including death.

Over the years, numerous attempts have been made to develop technologies that will eliminate the need for personnel to work under suspended loads, but with no or limited success.

the innovation

The ALP (Automatic Lashing Platform) is the only system on the market that can insert and remove twistlocks and stackers fully automatically, eliminating the need for personnel to work nearby or under suspended loads. The ALP operates independently of external power supply through an internal hydraulic system that utilizes the weight of the container and spreader. It has magazines that store over 1,000 twistlocks or 2,000 stackers (depending on sizing). This is equivalent to a bay of a Triple-E Class container ship.

The ALP can also be monitored and operated from a safe distance by integrating it into the terminal's own network and the corresponding integration software, or by using a handheld device.
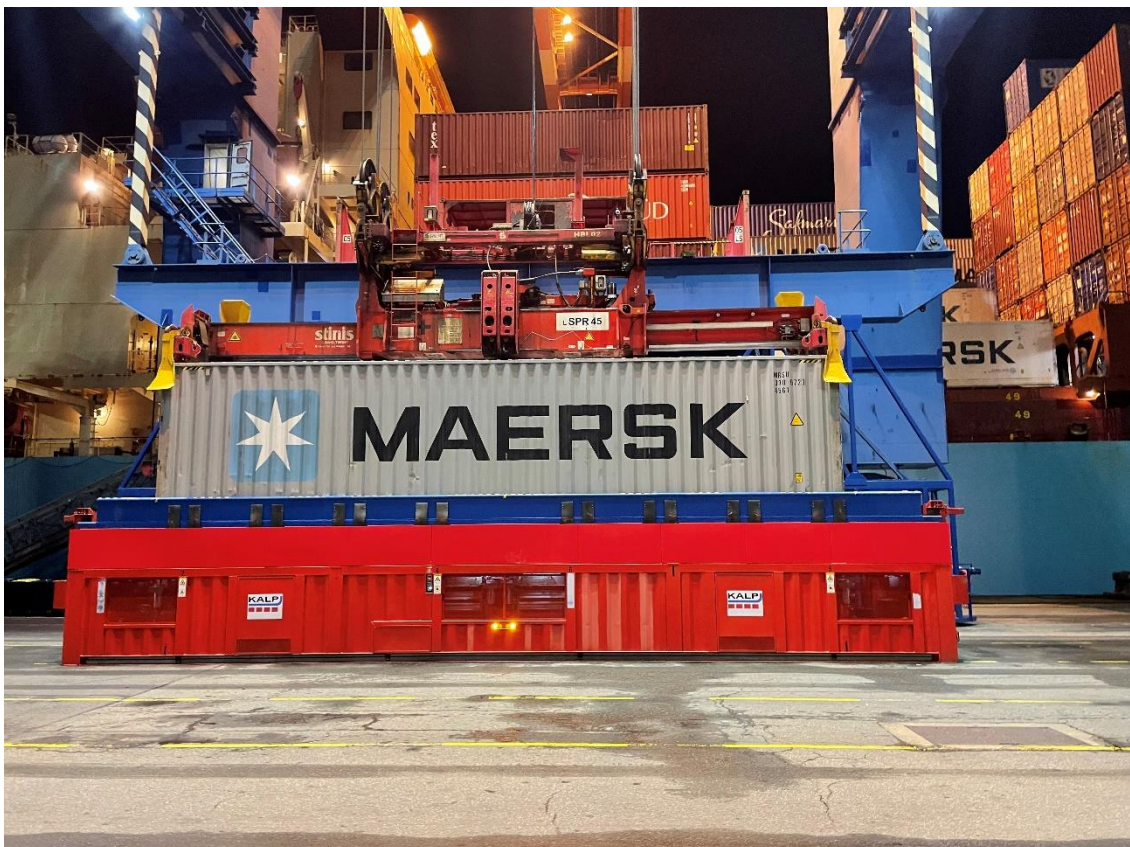
how it was implemented

The ALP was integrated into a German terminal in Aug. 2021 and is used there in real operation. To ensure error-free handling, the relevant terminal employees (gantry crane and horizontal transport drivers) were instructed by KALP GmbH in the use of the ALP

result

When operating with the ALP, there is no longer any need for personnel to conduct dangerous duty under the gantry crane. Furthermore an increase in Productivity and a general acceptance of terminal operators and employees as well has been observed.

conclusion

In order to really fully automate a modern container terminal and, above all, to fulfil all safety aspects, the use of employees in the hazardous area under the gantry must be eliminated. The ALP has shown that it is possible to operate without the need for employees to be next to suspended loads. This means that the ALP closes the last remaining gap in terminal automation and one of the last major risks for terminal employees.

In addition, the ALP can be used in any terminal. In modern greenfield as well as existing brownfield terminals. For running the ALP no changes in the terminal infrastructure are required.

The ALP is the missing link in terminal automation and a huge upgrade for each terminal safety concept!

Further information can be found at https://www.kalp-gmbh.eu/

14. || MEGA-INLINER

the challenge

Mega-Inliner® System provides safety on multiple levels.

1. Labour level.

A safe working environment as the utility access hole is located at the bottom of the tank container. This will allow filling and inserting the Mega-Inliner® to be done from the ground and eliminates the need to work on top of the tank container. This provides a safer working environment.

2. Product level.

Ensuring that no product residues will be left behind in the tank container after the transport of a product, because the entire Mega-Inliner is closed and will be removed after use, no residues of product will be left behind. The tank container is always equally clean. As a result, the danger of cross-contamination or oxidation of the liquid will no longer occur, e.g. No rejection of load no waste no loss.

3. Environmental level.

Eliminating the use of nitrogen, CO_2 and mixed gasses during the loading process with certain products. We use only compressed air. No cleaning, rinsing and use of drinking water needed. Unlimited matching of flows without prior cargo restrictions in doing so reducing CFP on multiple levels.

4. Process level.

Due to the fact the Mega-Inliner® is single use, fraudulent behaviour can not happen related to prior cargo restrictions and cleaning procedures. It is always a virgin tank container.

the innovation

Our total system stands out by its simplicity, yet it has an unprecedented impact on the way in which non-hazardous liquids are being transported.

The foundation is a bag made of multi-layer of high-grade recyclable plastic, the Mega-Inliner®. Once it is placed in an empty complimentary tank container build to our specifications, it can be filled with any conceivable (non-hazardous) liquid. Oxygen can not enter, and gasses can not escape the liquid due to the high barrier EVOH layer. The liquid arrives in top condition and the tank container stays clean, with no wear and tear, therefore the PLC of our tank containers is perpetual. Additionally, barely any liquid remains in the Mega-Inliner® once the bag has been emptied by applying compressed air between the tank wall and the Mega-Inliner®. We squeeze the liquid out of the bag without pumping again no touching the product, no contamination possible. Installing a Mega-Inliner® only takes five minutes, and removing it, takes fifteen minutes. From now on, any tank container in stock which is fitted with a Mega-Inliner® is ready for your immediate use without any prior cargo restrictions, making your transport more sustainable and cost efficient because no empty kilometres needed by matching non-hazardous flows unlimited.

how it was implemented

The Mega-Inliner® can be used in an easy way. The Mega-Inliner® is placed horizontally in the tank container, ensuring that the spout is located in the utility access hole. These actions take five minutes. Once this is properly attached, the hose with the non-hazardous liquid can be attached to the tank container. The Mega-Inliner® will deploy itself with the liquid in the tank. When the non-hazardous liquid is in the Mega-Inliner® and the tank container is fully loaded, the hose can be disconnected and transport can begin.

Removing the Mega-Inliner® is done in fifteen minutes. When the non-hazardous liquid is pushed/squeezed out of the tank container with compressed air, the Mega-Inliner®. To remove the Mega-Inliner® from the tank container, a strap is attached to the Mega-Inliner® so that it can be easily removed/pulled out by one person. Once removed, the Mega-Inliner® can be recycled, the tank container is clean and immediately ready for the next load.

result

The result/benefits of using the Mega-Inliner® System are:

- No cleaning or rinsing of the Tank Container
- No empty kilometres or depot downtime
- No previous cargo restrictions
- No cross-contamination or oxidation
- One-man operation
- lowest turnaround time
- Connect inbound <> outbound
- Recyclable only two waste streams
- Aseptic bulk loading possible
- Suitable as storage on wheels

By using the Mega-Inliner® System for transporting your non-hazardous liquids your Co2 emission will be reduced by a minimum of 30%. Due to our Mega-Inliner® which is 100% recyclable, cleaning becomes obsolete. Our system makes it possible to connect Inbound and Outbound logistics by simply removing the Mega-Inliner® after each load, this results in no empty kilometres to and from cleaning stations, wastage of valuable (drinking) water belongs to the past (saving ± 2.500 litres per cleaning), besides that the lifetime of our tank containers becomes infinite due to no wear and tear during the cleaning process.

We are competitive with all current supply chain packaging solutions. From transporting ready to drink in bottles, drums, IBC's, Flexitank to conventional tank containers. The impact of using our system is huge but converting the supply chain takes time. Switching from shipping cased goods (bottles, cans, kegs) to ship bulk globally, pack locally takes more time then converting conventional tank container or Flexitank to Mega-Inliner which is easier and gives you the benefits immediately.

By using the Mega-Inliner® System it is possible to go directly to the next load without the need of cleaning between each load. Therefore, costs such as driver wages, cleaning costs, and time are being saved.

conclusion

Mega-Inliner provides world's most sustainable, cost-efficient, and innovative logistical bulk solution for non-hazardous liquids. Our ambition is to convert the global shipping of non-hazardous liquids to our system, in doing so becoming the "Uber" or "Tesla" within the logistical world.

With over more than 100 years of experience in the tank beer industry, logistics and quality assurance Mega-Inliner is your partner in transporting your non-hazardous liquid. Connecting the worlds sustainable enables us to transform the tank container industry into a durable sector. Ship bulk globally, pack locally your non-hazardous liquid with Mega-Inliner, conquer the world and leave the planet in a better shape for the next generations.

Further information can be found at https://www.mega-inliner.com/

15. || MODALINTA - SafLash

the challenge

The tasks of lashing and unlashing container ships contribute around 40% of injuries in container terminals. Many of these injuries are related to the physical design of the hardware and process but others are related to the slowness of the task and its sequencing, leading to time pressure, rushing and dangerous proximity to "the hook".

Little has changed with lashing since the beginning of containerisation.

Lashing tension is a significant contributor to container loss at sea through stack collapses.

Providing visibility and control of lashing tension will help the industry to eliminate this significant safety and economic problem.

A death in Port Botany was the impetus for the project. Many more workers have been injured and killed and containers lost overboard since, but we now have a practical system that can avoid the problems that underpin lashing.

Lashing also has equality implications. The job is quite physical and is seen as part of the reason for the lack of diversity in terminals. In many container terminals, lashing is the entry level job. The physical nature of the job tends to discourage women and older people to enter the industry.

the innovation

Our innovation, SafLash, is a new lashing system that will directly replace legacy lashing in new builds and the current fleet.

The system has three main features:

1. We have redesigned the lashing process to reduce physical effort, eliminate pinch points, eliminate hazards related to poor storage, and make 3-high (long) lashing as easy and fast as single-height lashes.
2. A portable impact driver does the tightening and loosening. This approach is much faster, reduces effort and allows a better balance of tasks on deck. The system delivers accurate lashing tension and eliminates guess work by reporting on lashing tension.
3. The process is three times faster, reducing "rushing" especially near the hook, which is a major cause of fatalities.

In addition to making the process safer and faster, it ensures, measures, and reports lashing tension. Poorly managed lashing tension is a significant cause of stack collapse and impacts containers lost overboard.

SafLash is a direct replacement for old style bottle screw lashing and can be retrofitted to existing vessels in a single port visit. It is designed and certified to the same standards as the lashing it will replace.

As well as improving safety, SafLash reduces time in port allowing 2-3 hours of slow steaming making it profit positive and environmentally beneficial as well.
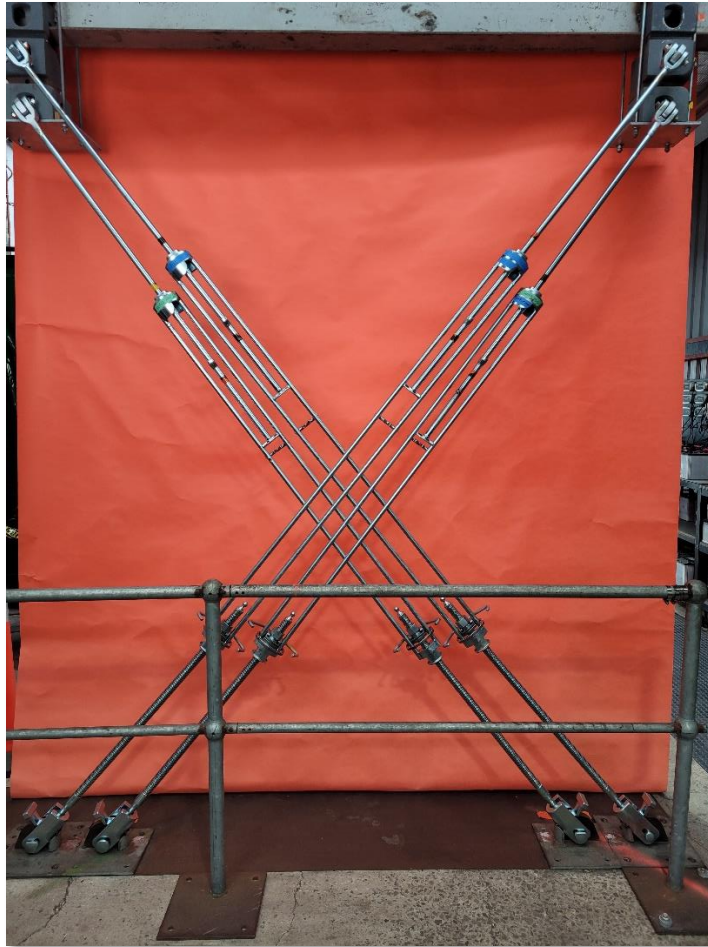
how it was implemented

We recently conducted small scale demonstration trials in Singapore. It will take several years to rollout to the world's cellular fleet. The system is offered at no capital cost, by generating substantial savings in port time will be revenue positive for terminals and shipping lines.

Swire Shipping is our partner for early implementation, but we have many of the worlds other leading terminals and shipping lines involved.

Retrofits of existing vessels to SafLash will be done during a single standard port stay and the process requires no structural change to the vessel. We replace legacy fittings with new SafLash fittings made using green electricity. In most cases we recycle the materials from old fittings.

SafLash operation requires simple conversion training. This training of the world's lashers is a significant task. The training approach allows for shore based and on-vessel training. Part of the training involves the use of wearable tech to make sure that the trainees are not only fast but safe and working efficiently. We expect some terminals will make ongoing use of the wearables to detect things such as fatigue or dangerous work practises.

result

We have demonstrated that lashing can be made safer, easier and faster.

SafLash reduces the idle time from last line to first lift to 6-8 minutes, and the lashers will leave the vessel before the last box is loaded, eliminating most post-loading idle time.

We have reduced the effort of lashing; SafLash is three times faster than conventional lashing. The physical exertion is significantly lower and can be performed safely by people of smaller stature. We successfully demonstrated the process in Singapore and have signed our first trial agreement.

As an example, based on the results of the trials, a Post Panamax vessel (19 faces across)

System	Lashing team (number of teams x team size)	Duration (minutes)	Labour (minutes)	Lashing tension
Conventional Lashing	2x2	30.5	122	By "feel"
SafLash	1x3	9.5	28.5	Calibrated and reported

The portable tensioning device delivers consistent lashing tension, improving cargo safety. It also provides enormous undoing (breaking) torque, with no backlash when overcoming difficult lashes, as may be found after a vessel has sailed in poor weather. SafLash has properly engineered bearing surfaces and is less likely to jam under load.

The 3 high lashes are stored and operated using a counterbalance so that a 3 high is as easy and quick as a single height lash.

In addition to improving safety, SafLash significantly reduces labour effort and improves vessel turnaround time.

conclusion

Very few people who have lashed enjoy the experience. We have made some long overdue process and engineering changes to make the job safer, more efficient, and more pleasant.

SafLash has been certified by DNV. Recent improvements to the design will be re-certified as part of the demonstration trials. Sea trials are planned with Swire Shipping in New Zealand, and we are setting up manufacturing with German Lashing Robert Boch as our foundation manufacturing partner.

SafLash is much safer and faster, requires fewer people to complete the lashing task, and democratises lashing by allowing a much wider variety of people to undertake the job safely.

We also expect to reduce cargo losses. An impact driver sets the lashing tension, and this tension is recorded and reported via a cloud database. By deploying a system for measuring, recording and reporting on lashing tension, we expect to eliminate this significant cause of cargo loss at sea.

Further information can be found at https://www.modalinta.com/

16. || SALGROM TECHNOLOGIES OY - Salgrom SPIDER™ /Salgrom Sense™

the challenge

Safety at sea and especially container fire safety has received significant attention in past years due the heavily increasing amount of dangerous goods transportation. The battery electric vehicles (BEV) market share has skyrocketed and at the same time other battery-operated devices have become ever more popular. Safety reports show that battery related fires have increased five times since 2016. Most battery-operated goods are transported in sea containers around the world, their origin being usually in Asia. Very cheap and poor-quality toys are one example of high fire risk products. Other issue are damaged vehicles which are transported for demolition purposes.

Li-Ion batteries are not the only high fire risk segment. Charcoal and other self-igniting materials, which are also transported from the Asia to Europe & US are very high-risk cargo since they are a self-heating substances.

Fire in a container vessel is always a serious problem and extremely risky for the crew. Unfortunately, we have seen many dramatic cases in past years where the whole ship has sunk, and crew members lost their lives. Crew members have very limited time to react and very limited efficient fire-fighting equipment against the fire inside the container. Water can be used for cooling the container from outside, but that is not very efficient. There are some new innovations, like Spider that may help, though.

the innovation

The innovation that solves the container fires is called Salgrom *Spider*. This device is developed to act as container internal fire suppression system and to react very early to the raising temperature with aerosol fire suppression (physical & chemical). The very early reaction gives much better probability of extinguishing the fire and also preventing fire from spreading to other containers. Spider mount and dismount takes just a few seconds via strong magnets on the bottom of the product. This makes Spider very easy to move from one container to another and the lifecycle can be more than 10 years. *Spider* is a fully mechanical device, it does not include any electric components, nor wiring, so it is fully maintenance

free. Its metal frame makes it very robust, and it is designed to be resistant for hard handling at the ports. Salgrom *Spider* and Salgrom *Sense* IoT device are a unique combination for container safety. Salgrom *Sense* passes the temperature information from the container as early warning to the vessel bridge, giving extra time for early reaction.

how it was implemented

Development of the *Spider* began in 2019 and the patent was granted in 2021. *Spider* fire suppression efficiency has been established in various fire tests, including accredited fire test laboratories. All the tests have been successful, and the product has been noted to be a perfect and very efficient solution for the container fires. Now *Spider* is widely used e.g., on WEEE (Waste from Electrical and Electronic Equipment) containers and it has also been successfully tested for WEEE fires.

The aerosol compound itself is a solid and unpressurized material, originally developed for space industry and today widely used in NATO and NASA destinations. It has wide range of different certifications, for example UL & ULC certificates.

One of the key features of the aerosol is that it is environment friendly. When properly designed, it does not pose a greater environmental or human health risk than other commonly available substitutes in the same end use. Aerosols do not contain CFCs, HFCs or PFCs, chlorine, bromide, or sulphur fluoride, nor do they form toxic halogen acids or hydrogen fluorides when in contact with hot surfaces or fire. Aerosol does not cause emissions to the water either.

result

Based on the feedback from maritime key players, the solution is unique and definitely gives a significant safety improvement for the container fire safety. *Spider* is very easy to install &

use, quick to move from one container to another. Since the *Spider* is installed inside a container, it reacts very fast to the fire and it guards 24/7 without the need of crew member action. Similarly, in case of fire, it works automatically without jeopardizing crew safety.

conclusion

Most probably the Spider will be the one critical part within container firefighting. Spider is the first available tool for container internal fire suppression and it is believed that the

- effectiveness
- easiness to use
- mobility from one container to another
- long lifetime
- reliability

will make *Spider* a most preferrable solution in the near future.

See the Spider in action on Salgrom YouTube channel:
https://www.youtube.com/watch?v=6zJMeb9R4SQ&ab_channel=SalgromTechnologies

17. || TAMTRON OY – One Power VGM weighing systems

the challenge

In global logistics, operations need to run smoothly since one hiccough may cause major delays, losses or damages for several companies and at worst even cost lives. Loading a vessel, a truck or a train is a job that means moving around heavy items, such as containers or other transport units, in the limited space, like port or station. To reduce the traffic while loading will reduce the risk of something going wrong.

Additionally, the cargo must be loaded in a vessel, train or truck so that legal limits are not exceeded and weight is equally distributed, to reduce the risk of tilting or other similar injuries for the cargo carrier or cargo itself. Knowing the weight of each container or load unit, is therefore a necessity to be able to load in an efficient and safe manner.

the innovation

When it comes to water transport, container weighing is one of the most important activities at ports. It will ensure that the cargo in the vessel is loaded correctly, meets the regulations and ensures safety during the operations. Correct weighing data not only ensures the right load, but also quickens ship turn-round time and minimizes cargo-handling cost.
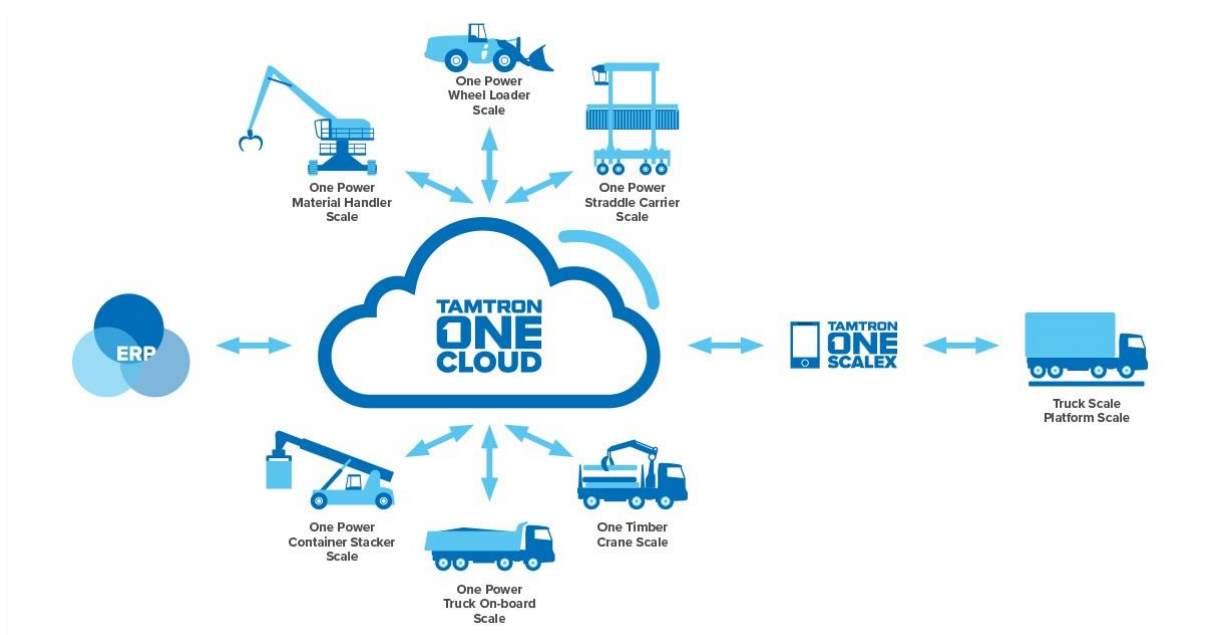
Tamtron provides busy seaports with complete weighing solutions - type-approved, accurate, high-quality scales and modern weighing information management that ensure real-time access to the weighing data, reports and operations monitoring. Advanced and easy-to-use Tamtron scales weigh containers according to the SOLAS regulations during normal operations without interrupting or slowing down workflow at seaports or in container depots.

Tamtron One Power Container Stacker Scale, One Power Straddle Carrier Scale and Scalift Forklift Truck Scale all weigh Verified Gross Mass (VGM) of a container accurately, during container transit and loading operations, and meet the requirements Of the SOLAS regulations. Tamtron's Container Stacker and Straddle Carrier scales improve safety at seas, as the incorrectly reported container weight that can cause cargo to fall over is possible to avoid.

On One Power Container Stacker and Straddle Carrier Scales container VGM and ID can be combined, and the information uploaded to customers' TOS, ERP or other system through integration to ensure real-time access to reports and operations monitoring

how it was implemented

Tamtron can, as an experienced international weighing technology company, make a turnkey delivery for any cargo operator, terminal, port or similar where container and other cargo is handled, by installing the scales on site, performing calibration and verification of scales having authorizations granted by the notified body.

For example, in Vado Gateway S.P.A. sea container terminal, Tamtron One Power Straddle Carrier scales are connected to the factory Ethernet network and integrated into NAVIS TOS (Terminal Operating System). Tamtron weighing solutions enable measuring the VGM as part of the normal machine operations, all containers handled by Straddle Carriers with Tamtron scale on board can be immediately transferred to the system speeding up the processes but also improving the safety during the loading as well as transportation.

REAL-TIME WEIGHING RESULTS

result

The biggest benefit of these mobile weighing systems is safety, as unnecessary transportation to truck scales is avoided. Additionally, the solution also leads to savings in fuel consumption and working time leading to lower amount of carbon emissions.

When the vessels, trains or trucks are loaded according to regulations they can in a safe manner transport the cargo in the sea, on the roads and on the rails.

conclusion

Tamtron scales, weighing data solutions as well as expertise contributed to the streamlining of daily operations and improved the work efficiency at several container terminals worldwide.

Further information can be found at https://tamtrongroup.com/en/

18. || TESUCON BV - The Evacuator®

the challenge

In case of a fire, or any other emergency situation, every second counts, especially when working at height. In panic situations, instinctively everybody wants to go down as fast as they can.

The Evacuator®, which is a fire-proof and panic-proof collective evacuation escape descent system is the World's first and only Click On and Go system at heights, preinstalled and fixed for immediate use and allows a crane operator(s) or a maintenance team to escape within 10 seconds!

The fully automatic system is entirely based on simplicity, common sense and human instinct. The procedure has only three steps: take the hook, connect to your harness and leave your platform.

Compared to the current systems used in Harbour cranes or other heigh constructions, the procedure consumes too much precious time. The people need search for their rope-based rescue set, open it up, unseal the vacuum bag, (need to remember how to) prepare the rescue system, connect the system to the correct anchor point and are finally ready for the escape. By pre-installing the Evacuator® all human-risk factors (as just mentioned) are eliminated and…

Multiple people can descend at the same time with a maximum load of 564 kg.

The system is installed for 30 years lifetime, does not need to be replaced in the meantime, is maintenance friendly, and has lower cost of ownership of your current rope based rescue equipment.

Just click on and go!

the innovation

The Evacuator® is a pre-installed and fixed evacuation descent system, developed and produced in the Netherlands. The Evacuator® is installed behind the cabin of the operator, or a platform which is easy to reach. Two escape hooks are hanging ready for immediate use in case of an emergency.

- The Evacuator® is fireproof up to 30 minutes at 1,750 degrees Celsius and up to 90 minutes at 1,290 degrees Celsius.
- Panic Proof, instinctively simple to use, connect harnesses on preinstalled hooks, open hatch or climb over barrier and start descent.
- Escape-procedure within 10 seconds.
- With a fully automatic descent, 1 m/s.
- The steel cables, cannot burn, melt or get tangled.
- Safe descent at all wind speeds.
- Always there where you need it, immediately ready to use.
- No time consuming preparation, just click on and go.
- No electrical supply required

- Multiple personnel can descend at the same time, max. load system 564Kg. (Max. load 282Kg per hook/reel).
- In case of acute health problems/cardiac arrest a person can be safely on the ground within the 6 Golden minutes.
- Can be done with 1 hand (in case Injury has been sustained to other hand).
- Maintenance friendly, visual inspection and system-test, approx. 15 minutes/year.
- Long Lifespan >30 years.
- Certified by DEKRA Germany EN341, in compliance with ANSI Z359/CSA Z259.

Escape/Evacuation from height within 10 seconds! In case of a fire, every second counts.

how it was implemented

The Evacuator® is bolted onto the platform, for example behind the cabin of the operator or to any deck or platform that is suitable to use for the escape. The steel box weighs 150kg and is a standalone system that absorbs any potential bending forces that could occur during the descent.

The Evacuator® can easily be retrofitted to any (harbour) crane or any other heigh construction, where an evacuation system is required.

Steps to install the Evacuator®:

- A pre-inspection defines that best location of the Evacuator® unit
- An installation proposal is prepared for the owner and OEM, which contains the installation technical details
- Certification of the installation, if required

The operator or service/maintenance team get a training in one of the dedicated Evacuator training centres. By just experiencing the descent, the operator can easily remember the procedure: just click on go. Experiencing the escape with the Evacuator® will let the operator 'feel' the difference, in speed and safety, compared to the current rope-based rescue systems.
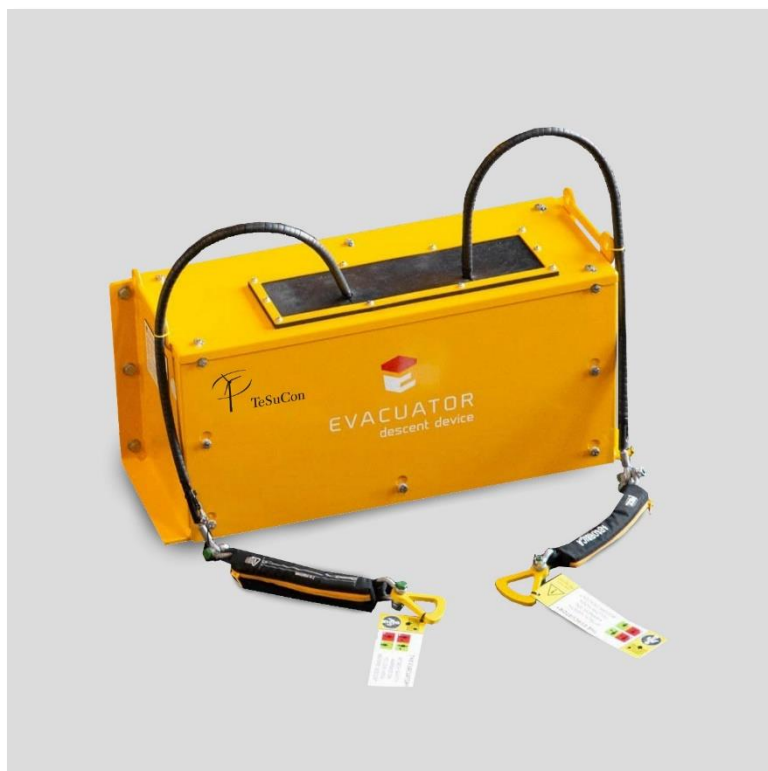
result

Today we are installing the Evacuator® in the global wind turbine industry and by participating in this innovation in safety award, we would like to introduce our innovation also to the global freight supply chain.

conclusion

Safety is everybody's highest priority. But if it really comes down to the practical part of a simple, fast and safe descent evacuation, the Evacuator® is the only system in the world, that has your operator(s) or maintenance team ready for their escape within 10 seconds!

Feel welcome to join our Evacuator Experience days and experience it yourself.

More information about our experience events, installation projects and other (technical) information is available on our website, https://tesucon.nl/evacuator/ and on our Tesucon-account on LinkedIn, https://www.linkedin.com/company/tesucon-bv/

Feel welcome to watch the video:

https://www.linkedin.com/feed/update/urn:li:activity:6942429272942764034

19. || TRAXENS – seal detection sensor

the challenge

Given their limited security, shipping containers are subject to unexpected opening which can impact the operations of Shippers and Carriers. Container cargo theft is down but the overall value of goods stolen is up. Illicit cargo smuggling seems to be increasing as customs seizures are larger and more frequent.

Violence due to container cargo theft or illicit goods smuggling impacts the safety of port and vessel personnel and warrants automated and anonymous measures to avoid also endangering logistics teams.

the innovation

Traxens makes the containers smart by adding an advanced IoT device to track its position and detect door openings. Thanks to global and timely communication, the container events are available on Traxens platform. Along with advanced contextualization algorithms, knowledge of customs practices and locations (geozones) characteristics, it allows to raise exception events showing suspicious or unexpected door openings that could point to theft or smuggling. Then, Traxens application allows automated notification and collaboration to reach resolution of the incident through authorities' quick intervention and provide extra proof to help investigating.

A normal (dumb) container latch

To bring an extra level of security, Traxens has developed an innovation called the Seal Detection Sensor. It allows to detect insertion and removal of standard ISO 17712 H security seals to provide even better door opening detection and knowledge of context. By knowing the exact time when the container is sealed, Traxens algorithms are even further empowered to notify

The Seal Detection Sensor concept shown with a standard ISO 17712 H security seal

unexpected door openings. And all this can be done without any impact on shippers' process thanks to the use of standard seals.

how it was implemented

The Seal Detection Sensor is a device which replaces the container latch the seals lock through.It is a permanent device installed in collaboration with the container owner that communicates through standard Bluetooth protocol to the main Traxens IoT device on the container.

Actual fully working device prototype on a container

Integration of seal status and unlocking events in trade security application InSafety

It can also communicate seamlessly to a mobile application developed by Traxens to check the locking history of the container. It does not require the use of specific security seals and thus doesn't impact shippers, consignees and customs.

A patent has been filed by Traxens for this innovation and several counter-measures have been implemented to avoid tampering of the device and its detection function. For this reason, it is a device made of metal to fit with the rough and challenging environment related to this use case.

result

The innovation is currently at an advanced prototype state and industrialization is ongoing to be able to benefit from it on a sizeable field deployment.

conclusion

Traxens already has success with theft and smuggling with its current solution and we are confident this extra innovation can help reduce illegal practices with containers.

Further information can be found at https://www.traxens.com/

20. || UNIVERSITY OF VALENCIA - LABORATORY OF SIMULATION AND MODELLING

the challenge

95% of the world's cargo is shipped in containers and this poses challenges to container unloading health and safety, as most containers are still loaded and unloaded manually. According to the report jointly conducted by TT Club, ICHCA International and PEMA the four main causes of quay crane accidents are, in order of importance:

1) Boom to ship collisions
2) Other Collisions
3) Other Spreader, Hoist Issues
4) Wind damage

Both human factors and mechanical failures are responsible for these accidents, often leading to the fall of containers. However, even with proper routine maintenance and periodic inspections, accidents do happen and additional preventive measures must be taken. One way to reduce risks is improving the skills of the stevedores before operating on the real crane.

Nowadays it is possible to address these challenges with the use of professional training simulators. Training stevedores in a simulator enables them to improve skills in a risk-free environment before using a real crane. In this way, they can learn how to manage difficult situations before exposing to them in real life.

the innovation

We present a training system based on a simulator that reproduces the working environment of real quay cranes, i.e. ship-to-shore (STS) cranes. Below you can see an STS simulator with two screens, two joysticks with consoles, the operator seat with a motion platform underneath and the instructor station on the back.

It can input sudden crane breakdowns, hazards and changes in the weather conditions, since all these alter the behaviour of the crane. Within the weather parameters, wind is the most important when operating the crane as depending on its strength and direction it can become extremely difficult for the operator to handle the load. These conditions are reproduced by the motion platform under the seat. The simulator also has a theory module and pre-operation inspection exercises to guide users on how to perform the correct procedures and safety measures to check on the crane before turning it on, minimizing the risk of mechanical failure.
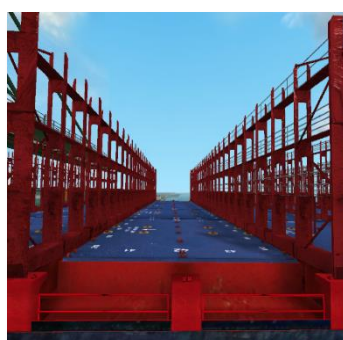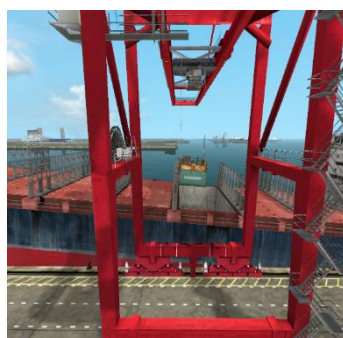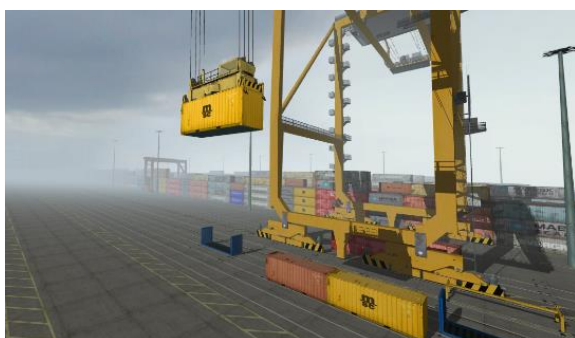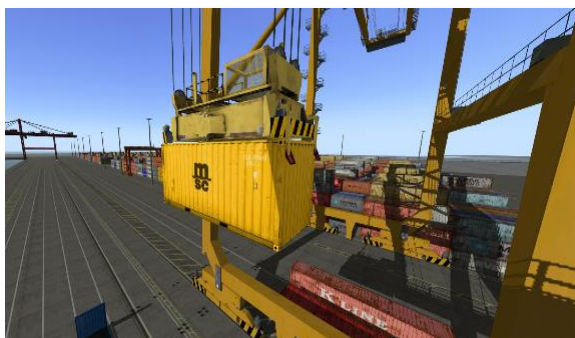
Additionally, the simulator allows the operator to program a semi-automatic manoeuvre, by means of a GUI displayed in a touch screen next to the operator seat, which controls the crane. In this way, the operator learns how to use the functionality that activates the automated sway control system. Activating this functionality on a real crane helps the cargo to move swiftly, safely, and without causing any damage to the load.

Finally, one of the most important parts of our innovation is the incorporation of the STS Crane Prevention Exercises Module into the simulator. It specifically focuses on carrying out exercises aimed at reducing the risk of accidents in STS Crane operations.

how it was implemented

To design the new functionalities, port operators, technicians and instructors provided details of the latest technologies used in the real cranes that help to prevent high-risk situations.

To develop the risk prevention exercises in STS Crane operations, it was necessary to count with the participation of experienced stevedores and instructors who provided details of the most common accidents and their feedback on how to avoid them, so we could design the exercises accordingly. Once the exercises were coded into the simulator, they had to test them and using their feedback, we accurately adjusted the parameters. For the implementation, this this process was repeated for each exercise until we obtained the approval from the instructors.

result

We found that with the new features described, the simulator makes the training more effective and efficient as the stevedores acquire the required expertise more quickly compared to older simulator models. The key aspect is that stevedores can now learn how to work in the most dangerous operations at the terminal using the instructional system of the simulator. As soon as each exercise ends, the instructor receives the performance report and a debriefing session displayed in their station, which they use to provide direct feedback in situ.

New STS Crane Risk Prevention Exercises Module:

- • Exercise 1: Lack of visibility with the hatch cover hooked
- • Exercise 2: Centre of mass control in hoisting
- • Exercise 3: Waiting areas with a hanging container
- • Exercise 4: Collision with the lashing bridges of the ship
- • Exercise 5: Operations with personnel working nearby
- • Exercise 6: Flippers on deck
- • Exercise 7: Hooking two twenty-foot containers without lowering the twin
- • Exercise 8: Unloading in series mode causing risky listing of the ship
- • Exercise 9: Penultimate lashing to the top and last with three heights bridges
- • Exercise 10: Lashing bridges of the ship with protuberances
- • Exercise 11: Containers with twistlocks closed between chimneys
- • Exercise 12: Problems with central billet clamps closed in twin mode
- • Exercise 13: Antenna collision by positioning the spreader over the ship bridge
- • Exercise 14: Personnel on top of the hatch covers
- • Exercise 15: Routine fatigue training

conclusion

There is an ever-increasing trend towards higher safety and productivity when it comes to crane handling and transport operations. This is achieved through increased automation, among which electronic sway control plays a major role in preventing accidents, reducing damage, increasing the productivity of the crane system as well as reducing the mental strain on crane operators and the rest of stevedores.

The simulator, combined with the STS Crane Risk Prevention Exercises Module and a virtual interface for the control management software is a solution for increasing safety in the cargo handling industry. It is a training tool for operators that replicates the behaviour of the crane and its automatic controls.

As a result, it provides significant improvements in risk prevention as crane operators can be trained in a risk-free environment and practice dangerous situations that have led to accidents in the past and that cannot (or should not) be trained on the real machine. For instance, in difficult load situations, sudden breakdowns, or extreme weather conditions. When these situations arise while operating a real crane, the stevedores are prepared to act appropriately and mitigate the risks as much as possible.

Further information can be found at https://lsymserver.uv.es/LSyMWeb/en

About TT Club

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