

ICHCA
INTERNATIONAL



ICHCA INTERNATIONAL PRESENTS 3RD TT CLUB INNOVATION IN SAFETY AWARDS 2019

A digest of entries received & winners announced



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#makeitsafe



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ICHCA INTERNATIONAL PREMIUM MEMBERS





1 | FOREWORD

At a time of increased operational demands on cargo handling infrastructure and operations worldwide, the TT Club Innovation in Safety Awards, now for the third time, both champion and celebrate the many companies and individuals around the world who are fully dedicated to 'making it safe' every day. Equally, the Award acknowledges and fosters innovation to improve safety in cargo operations and logistics.

Both ICHCA International and TT Club have a fundamental objective to reduce risk throughout the supply chain and enhance safety within cargo handling operations. Promoting such safety advice is paramount to the ethos of the two organisations and the Award reflects this commitment.

TT Club has always emphasised the critical nature of loss prevention in its role, as a dedicated supplier of liability and asset insurance to those operating in the freight supply chain industry. As such, TT remains steadfast in encouraging safety awareness and is delighted to maintain our support of this joint initiative with ICHCA.

The entrants of the 2019 award once again provided great examples of equipment, systems and processes that are designed to result in improvements on safety. Therefore, there is a great pleasure to recommend this digest of detailed entries, all of which deserve acknowledgement as leaders of innovation in the pursuit of safety in our industry.



Peregrine Storrs-Fox,
Risk Management Director,
TT Club



2 | ABOUT THE SAFETY AWARDS

The 2nd TT Club Innovation in Safety Awards were presented by ICHCA International in October 2017 to highlight the importance of safety at a time of increased operational demands on cargo handling infrastructure and operations worldwide.

The goals of the Award are to champion and celebrate the many companies and individuals around the world who are 100% dedicated to 'making it safe' every day, and to acknowledge and foster innovation to improve safety in cargo handling, operations and logistics. Both ICHCA International and TT Club, the Awards Sponsor and a Premium Member of ICHCA, have a primary focus on risk reduction throughout the supply chain and, in particular, within cargo handling operations. The Awards reflect this commitment.

The 2017 Awards were open to anyone – an individual, team or company – involved in cargo logistics. Entrants were required to show that a product, idea, solution, process, scheme or other innovation had resulted, or would result, in a demonstrable improvement to safety.

Empirical evidence or corroborative support was required to illustrate that the entry enhanced safety in a defined situation or provided a solution to a defined issue. Among other criteria, the judging panel was looking for originality and the possibility for applications in wider industry circumstances.

Applications were received from a wide range of industry stakeholders, including individuals, companies and teams. The geographic scope of entries was also diverse, demonstrating that safety is a global concern. Entries covered both new technology developments and examples of 'on-the-ground' innovation to influence safety culture, behaviour and processes positively. The standard of entries was once again extremely high and the judges were impressed by the thought and time that had gone into many of the applications. It is clear that a passion for safety is prevalent, which is very encouraging.

As detailed on the following pages, entries covered technologies, processes, systems and approaches to deal with a variety of safety issues in cargo operations at sea and on land, including:

- Anti-piracy
- Bulk operations
- Collision detection and prevention
- Container lashing and securing
- Container stacking
- Container technical characteristics
- Container weighing
- Dangerous goods declaration and compliance
- Electrical risk
- Port ladders
- Port personnel safety
- Refrigerated container operations
- Twin container lift
- Ship mooring
- Working at height

The TT Club Innovation in Safety Awards 2017 were announced at the ICHCA International 65th Anniversary Conference in Las Palmas and presented by Joseph Westwood-Booth, Senior Deputy Director for Marine Technology and Cargoes

3 | AND THE WINNER IS...

KUNZ GMBH, CSXIT, YARDEYE

Yardeye

Safe.Time.

Künz

CSX INTERMODAL TERMINALS



L-R; Heike Deggin, IMO; Stephan Trauth, Yardeye; Peregrine Storrs-Fox, TT Club

CSX Transportation is a Class 1 freight railroad operating in the eastern United States and the Canadian Province of Quebec. CSX operates about 34.000 km of track and 3600 locomotives. CSX Intermodal Terminals (CSXIT) operates 30 Intermodal Terminals on the CSX network. CSXIT is always looking to develop and incorporate new technologies to improve safety and operational efficiency. CSXIT operates under the principles of scheduled railroading two of which are "Optimizing Asset Utilization" and "Operating Safely." There is no doubt that safety and operation go hand in hand – no operation is efficient if it is not safe. Operating Safely necessitates that CSXIT does not take commercial or legal risks.

A typical CSX Intermodal train can extend in length to over 4,200 meters and carry more than 250 double stacked 53' intermodal containers. In order to realize the efficiency of intermodal

transportation, containers are double stacked on railcars connected by manually operated Inter Box Connectors (IBCs). During the loading and unloading cycle, personnel are needed to place, lock, unlock and remove the IBCs. Currently, there is not an automatic connectivity solution for the upper and lower containers in a double stack train. Therefore, personnel and the automated equipment must safely share the same workspace. The automation of the crane work would not have been possible without the Yardeye system technology.

In order to automate their intermodal cranes, Künz has worked out a full automation concept customized to the specific CSXIT requirements for personnel safety and productivity. This project was a joint effort by CSXIT, Künz and Yardeye.

The Yardeye technology is part

of an automation ecosystem that pushes intermodal operations to the next level, securing Yardeye's position as an enabler for the most efficient container terminal handling company in terms of container lifts per man hour worked (LPMH).

Safety Challenge

An intermodal terminal is a complex operation with multiple personnel performing different distinct tasks to efficiently and safely move containers in the same workspace. This is not ideal but the only way an intermodal terminal can achieve the productivity and efficiency to make rail intermodal transportation commercially attractive. It starts with the commercial truck driver that brings containers into the terminal and receives instructions to proceed to a designated spot. The crane driver picks up the container and lifts it to a railcar that has been designated by the terminal

operating system. Once the container is placed, an IBC (Interbox Connector) needs to be placed on top so that a second container can be placed. Once this placement is done, the IBCs need to be locked. At the same time, inspection and possible minor repairs are performed on the railcars.

In a terminal with operating personnel in the cab of the crane, responsibility for ensuring personnel is not under a suspended container load rests with the crane operator and with the people on the ground in the vicinity of container handling cranes. CSXIT desired to remove the operators from the crane cab and allow automated crane motion in portions of the operating area.

Yardeye technology

The Yardeye technology consist of two major layers, a differential global navigational system with real time kinematic (D-GNSS-RTK) and a Real Time Location System (RTLS). The reason for choosing

two technologies is primary redundancy with diverse technologies. Although the system is not safety certified yet, the system has been developed following certain design criteria and mechanisms on circuit base up to solution software. On all layers, the best available technology has been chosen.

Solution Deployment

The project implementation was a challenge – as it is common for these projects between Research and Development. That was clear to the parties from the beginning. Additional challenge was the implementation while the terminal was still operated. As the human brain and even experienced project teams cannot foresee all challenges, especially in automation projects, the project execution took in total 24 months from planned 18 months. An exceeding of the project time by factor 25% is not uncommon in

these kinds of projects due to the fact that the last automation mile is usually full of challenges and time-consuming programming work to deal with the exceptions.

Results

The overall results of this project met or exceeded the requirements from CSXIT. Additionally, the safety and productivity gains of the automation project were not possible without the final integrated Künz/Yardeye solution. The results from a period of twelve months in full operation are:

1. The total number of personnel required to operate the terminal was reduced by 33% (39 to 26) while also adding an additional crane (a 4th crane was added in conjunction with the automation). Moving the crane operators inside to a remote operating station (ROS) allows pooling the crane operation of the semi-automated cranes such that 1 or 2 operators are required to operate all 4 cranes.

2. The number of personnel operating outside on the terminal grounds was reduced by 50%. By moving the crane operators inside instead of eight people outside, only four are needed outside in an average shift.

3. Terminal productivity improved 43% from 2.76 LPMH to 3.94 LPMH

4. All cranes operated from the terminal building. Operators have a comfortable and ergonomic operating station. They appreciate

their new workspace and find it a massive improvement compared to the operator cab on the crane. This has led to an improved workforce satisfaction. Also, the operators work together in one room, adjacent to the clerical support. Information flow is improved, and overall team-spirit has been established. This leads to better work results.

5. Truck drivers are serviced more quickly as there is no down time in operations from shift changes or lunch breaks. Estimate is an additional 2.5 hours of crane working time each day.

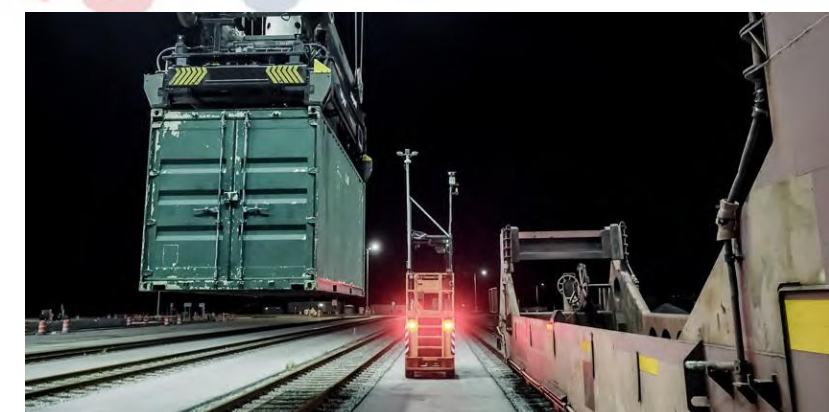
6. Truck drivers are outside of their cabs and visible to the remote operators. The available camera angles from the ROS are better than the view from the cab.

7. Remote operators are actively supervising or in direct control of cranes during critical portions of the container movement.

8. There have been no recorded instances of unsafe container movements since the solution was put in place.

9. Overcoming the additional challenge while the terminal was operating.

10. Based on the success in Winter Haven, CSXIT implemented the same solution at a larger facility in Fairburn, GA and are considering future projects using the same solution.



4 | HIGHLY COMMENDED

LINX CARGO CARE



LR ; Heike Deggim, IMO; John Warda (on behalf of LINX); Peregrine Storrs-Fox, TT Club

Safety challenge addressed
 LINX CCG is an organisation with over 4000 employees across 70 sites in 2 countries. Given our dispersed and diverse workforce, some of whom operate 24/7 in hazardous environments with large machinery, it is important safety is continuously improved to create a compelling, simulated experience that cuts through and has an impact.

Summary of innovation

The LINX CCG VR program is designed to increase understanding of hazards and risk management as well as develop greater awareness of operational safety across our organization:

- Identify foreseeable hazards that could give rise to health and safety risks
- Eliminate or reduce risks to health and safety
- Verify control measures implemented are maintained and remain effective We used the

mediums of immersion and interaction to deliver this outcome.

Immersion - 360 Video Overview

This tour is designed to give insight into an operating site from a wide range of workers perspectives. Users can observe the activities of a heavy industrial operation in a safe environment, as well as the safety measures that must be delivered consistently to ensure everyone goes home safely every day.

Interaction – Site planning

As a frontline leader, your decisions affect lives. This activity helps reinforce the importance of using the correct people, equipment and site layout to ensure everyone goes home safely every day.

Results

The LINXCCG VR Program has been able to demonstrate a measurable impact on safety outcomes and increased ability for operators to provide input to how the job is done safely and efficiently. The greatest appeal of virtual reality

safety training is the fact that our workers can be exposed to high-risk situations in a 100 per cent safe environment. They can be trained for situations that they could never be trained on in a classroom or a mock training facility. In addition, our VR training solution is portable which enables a consistent training experience at our sites across Australia and New Zealand. This addresses a key business challenge to ensure employees are trained the same way across our organisation. VR training and assessment also appeals to all learning styles to provide a visual, interactive and immersive learning experience.

5 | ENTRIES

ASSOCIATED BRITISH PORTS



Safety challenge addressed:

Suitable PPE and Work wear for our female staff

Summary of innovation:

Designed and provided suitable PPE & Work wear

How was it implemented?

By having suitable products designed, trialed and provided

What was the result?

PPE & Work wear that fits, is safe and makes our female staff feel valued

Conclusion / any other comments:

Our female staff are now safer and feel as is the are part of our organisation

GLOBAL CONTAINER TERMINALS CANADA



Safety challenge addressed:

In 2014, GCT Canada identified the need to densify operations at Deltaport and increase container capacity through improvements to existing port infrastructure within the existing footprint while increasing the safety of our workforce. At the time, road and rail constraints limited the capacity of GCT Deltaport to meet forecasted demand for additional container traffic. GCT's goals were to develop a project that satisfied operational needs while significantly improving worker safety through a complete re-development of the Rail Yard. Our safety goals were to:

- a) Move at least 50% of personnel from the direct terminal operating environment into an ergonomically enhanced office environment
- b) Eliminate workforce railyard injuries and incidents of back stress by providing crane operators with a more ergonomic environment
- c) Reduce the risks associated with climbing a ladder to a crane cab in all weather conditions and the need to evacuate personnel from crane cabs during severe weather.
- d) Enhanced truckdriver safety. This necessitated a safety system integrated with the crane operating system to:
 - a) Accurately/reliably track personnel location in Rail Yard.
 - b) Provide the vehicle with a real time monitored "safety halo".
 - c) Continuously feed personnel location to the crane systems.
 - d) Develop and implement crane slowdown and stop distances.
 - e) Facilitate more stable lifts per hour over the day with less dependency on operator concentration level/fatigue and environmental conditions.

Summary of innovation:

GCT Canada reconfigured the original rail track to optimize the facility's design, increase capacity, reduce equipment travel time and greenhouse gas emissions. Older, electric rail mounted gantry cranes (RMGs) were replaced with the latest generation of semi-automated, electric CRMGs.

Because of the technology innovations associated with semi-automation, GCT Canada was able to remove workers from the crane cabs and relocate operators to an ergonomic and comfortable Remote Operation Centre which greatly reduced risk of injury and fatigue. GCT Canada added remote operating derrails, radar and laser train spotting, complimented by CRMG mounted visioning lasers, optical character recognition (OCR), and train position equipment in an attempt to bring all possible workers out of the automated area and increase efficiency of train switching by allowing continuous operation during switching. Highly accurate differential GPS and RFID based positioning technology



was used to continuously monitor and report positions of personnel within proximity of the Rail Yard. All personnel are automatically verified and tracked at entry points to the automated area.

How was it implemented?

The project was conceived in two parts, the densification of rail to increase capacity and introduction of semi-automation to increase safety and operational capacity. Multiple vendors collaborated with GCT Canada to create the first semi-automated continuous crane and rail operation with people working alongside automated machinery. The system is capable of detecting personnel and vehicles and the purpose of this advanced location tracking system is to enable safe semi-automated CRMG crane operation while ensuring no suspended loads travel over vehicles or personnel. The Yardeye system detects and transmits positions of personnel and vehicles inside the rail yard for the semi-automated CRMGs to make intelligent and safe operating decisions. Real time position information is continuously provided to the Yard and Crane Controller for path optimization. A user interface with a top view of the rail yard was developed to be able to continuously monitor personnel, equipment and vehicles for the operational group. Heading, speed and positional accuracy are transmitted from the Yardeye/indurad positioning server to a



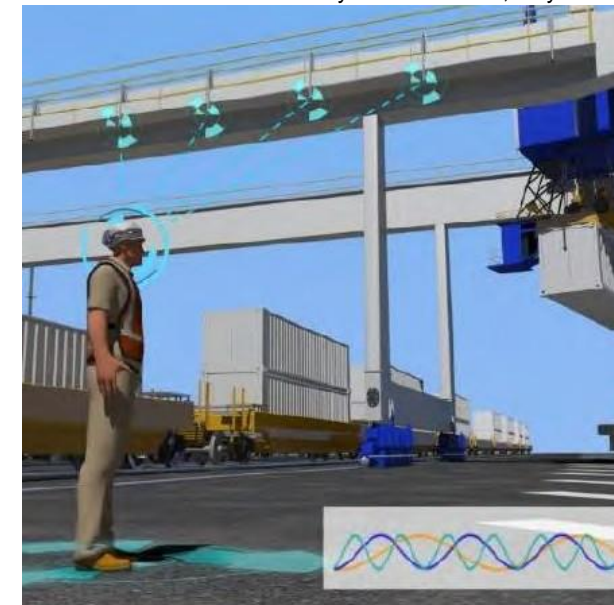
PLC to create exclusion zone avoidance of personnel and vehicles. Exclusion zones were fed to ABBs static obstacle path controller that was redeveloped for dynamic obstacles to produce an operationally stable avoidance system. The path controller was integrated with ABBs dispatch system to facilitate automated work dispatching from the Terminal Operating System.

What was the result?

All aspects of operation were analyzed, and technologies tested and implemented to either remove the worker from the area or increase the visibility of personnel within the rail yard while successfully increasing capacity. The new systems are providing collision-avoidance and path optimization for safe and efficient interactions between automated equipment and people required to work within these environments. Through the project 136 hazards were addressed; 281 job hazards were analyzed; 0.63% Lost Time Injury Frequency through construction; 1 Lost Time Injury during 316504 contractor hours; 47% reduction in Rail Lost Time Injury Frequency per year. Safety is significantly enhanced as the cranes are operated from the Remote Operation Centre which means most of the labor has been removed from the yard and operates from an ergonomic environment. Automation processes not only increase safety by reducing human errors in operation but also reduce the impact of potential accidents by creating a physical gap between people and the area where operations are physically being carried out. The automation of the tasks being carried out reduces the intervention of the operators of equipment in handling movements. Even when it is not completely reduced, the minor automation of equipment introduces assistance systems for handling operations, increasing the accuracy, predictability, productivity, and safety of operations.

Conclusion / any other comments:

Collaboration of submission by Daniel Howell, Roy



HARBO TECHNOLOGIES

Safety challenge addressed:

Oil Spills turn quickly into a significant health and safety threat for the environment, for seafood, and response operations personnel. Only about 10% of oil and fuel in spills is recovered, mainly due to late response actions. The rest, about 90%, goes down the water column or up into the atmosphere. In many cases, devastating financial results is a direct outcome. The consequences of marine oil spills are disastrous for fisheries and coastal communities, and many other seaside activities. Oil spills cause safety breaches for oil terminals, for refineries, for oil tankers, ports, pipelines, and coastal infrastructure facilities. Downtime could cost Millions per day. Usually, responders bring equipment from afar. Since the oil, in most cases, is already spread, they must focus on spill clean-up. They try to collect the oil with skimmers or absorb oil using absorbents. Dispersants break oil down into smaller droplets but the net benefit to the environment and hence their use is highly controversial. The residual effects of the use of dispersants on fish and human health are regarded as a severe safety threat. The current technology is based upon towing and "mopping" oil spills in the open sea using heavy and bulky booms. This kind of operation involves at least two vessels and an eight-person crew. If an offshore spill occurs, it usually takes the first responders 4-10 hours to assemble and arrange the crew and equipment, and then additional time to reach the spill site. In a typical setup, the team will have only 200-300 meters of the boom. By the time the crew enters the scene, the oil slick is kilometres long.

Summary of innovation:

HARBO is the first and only to offer a portable, lightweight, and immediate containment solution with heavy-duty capability. The T-Fence stands out in the market because it is the only containment solution enabling rapid response. The T-Fence can be kept onsite taking up 1/5 of the storage space and be deployed in 15-30 minutes by anyone. No need for a specialized crew. T-Fence's unique geometry creates a perfect balance of aerodynamics, and hydrodynamics is the secret behind its' superb functionality. HARBO is creating a revolution in Oil Spill Response that protects the world from Oil Spill damage. It enables anyone, anywhere to respond to a spill, within minutes. HARBO enables a safer environment, safer oceans, safer food. HARBO's systems are made to be pre-installed on decks of Tankers and other ships, on oil rigs and close by to oil terminals. A cartridge weighs only 23 kg (50 lbs.), one man could easily carry it. Each cartridge contains a 25meter (82 feet) long disposable boom. It could be carried on compact vessels, brought by a pickup, an ATV or a helicopter. A

unique connector enables us to connect it to the next boom unit in a few seconds. The length is unlimited. The storage footprint of the cartridges is tiny. It saves lots of space while being stored and for example, an 8.5-meter (28 ft) long vessel, will carry more than 400 meters of T-Fence.

How was it implemented?

It took us over 350 prototypes until we could start demonstrating a marketable product. We had to build our unique production line from scratch. At our fourth year, we reached the first sales milestone. Now, finally, HARBO introduces the world's lightest and smallest first response emergency system that could be pre-installed wherever a spill might occur. The source of our most significant advantage is that oil spills turn into major disasters because there is no immediate spill spread stopping systems nearby. Nothing prevents the spill from spreading and splitting. The damages grow exponentially because response operations cannot be efficient since the responders with their heavy and bulky equipment arrive after hours or even days. HARBO is creating a revolution in Oil Spill Response that protects the world from Oil Spill damages and keep it a lot safer. It enables anyone, anywhere to respond to a spill. No delays. Almost no logistics. What made it possible was the unique, unprecedented design. Before the T-fence is deployed, it is only 2 centimetres thick. Minutes after being submerged in the water, it pops up to its final shape and size: 32 centimetres (12.6"). The floating part has a very low drag factor in order not to be affected by wind. The underwater part has an "X" shape, so the oil cannot go under it.

What was the result?

Here are two examples: In June 2018, a large oil spill occurred at the port of Rotterdam. A tanker hit a jetty by an oil terminal and spilled about 220 tonnes of its own fuel. HARBO's team took part in the response operations. In about 90 minutes, we deployed one kilometer long and prevented oil from continuing to spread. T-Fence boom from a service boat to contain the oil and stop it from spreading. It helped responders to do their job a lot safer and faster. An extended downtime was avoided. In June 2019, A refinery in Northern California had a spill in the middle of the night. If not contained, the oil could flow into the creeks leading to the bay and cause costly and widespread damage to shorelines and infrastructure. While the details of the incident were unfolding and they assessed the situation, the team chose to use HARBO's T-Fence in their initial response instead of their onsite boom. With just two people and HARBO's 82 ft of portable boom, the refinery contained the oil

in under 15 mins.

Conclusion / any other comments:

Please see this video about the product – <https://youtu.be/aH4G8f6pQVc>. The target market for the T-Fence is any entity that can potentially be impacted by an oil spill worldwide. Globally, there are about 100,000 locations in which HARBO's system should be pre-installed. It is a perfect fit for ship and tanker decks, oil terminals, pipelines, ports, coastal infrastructure facilities, oil rigs, remote communities, and coral reef reserves. Marine oil spills cause major safety problems. HARBO Technologies promises safer oceans, safer operations, safer Environment, and safer seafood. The bottom line is better risk-management for the oil and marine industries.



HARBO
TECHNOLOGIES

HEALTH AND SAFETY EXECUTIVE (HSE) & SAFETY CLIMATE TOOL (SCT)

Safety challenge addressed:

The Health and Safety Executive (HSE) overall mission is to prevent work-related death, injury and ill health. Additionally, have been at the forefront of understanding organisational safety culture and its impact on business performance for many years now. HSE help and support organisations to measure and improve safety culture through the application of evidence-based approaches and effective behavioural change programmes. Whatever the business sector, whatever the company size, HSE know that every organisation has the potential to improve their safety culture. Our work with a wide range of organisations, including the Olympic Delivery Authority, has demonstrated that making safety an asset, rather than a liability, Safety challenge addressed: will not only improve health and safety performance but strengthen business performance too.

Science proves up to 90% of incidents have a human and organisational factor associated with them. Consequently, many workplaces are now choosing to measure their safety culture as a proactive step towards improving their health and safety performance. Having said that, all organisations must be realistic - culture change happens slowly and changing the attitudes and behaviours that influence safety culture takes effort, commitment, resource and, most importantly, time. Many organisations have also found it difficult to measure and track due to its intangible nature. To support on this matter, HSE designed a holistic approach whereby rather than becoming overwhelmed by what might first appear to be a monumental task, it is helpful to look at the wider process and break it down into more manageable steps. Therefore, improving safety culture can be broken down into 5 key stages:

1. Foundation
2. Analyse
3. Focus
4. Act
5. Evaluate

To help support larger organisations with the analysis and focus stages, HSE developed an online assessment tool (SCT) with software developer Snap Surveys to accurately gather data to implement behavioural change.

Summary of Innovation:

The HSE Safety Climate Tool is an innovative digital solution to assess and determine an element of an organisation's safety culture in the form of a survey. It was meticulously constructed to evaluate the attitudes of individuals towards health and safety issues. The results then deliver an objective measure of safety culture, the 'way things are done' in an organisation when it comes to health and safety. This is a significant starting point for any business to continually improve and raise standards.

The Safety Climate Tool is a simple, online questionnaire, which explores employees' attitudes and perceptions

in key areas of health and safety, while guaranteeing anonymity. The licence structure varies depending on the number of users and is universal for all industries. Once the survey has been completed, it generates an automated report and provides comprehensive guidance and data for the organisation to utilise to improve their safety culture moving forward.

The data collected can also be segmented in a range of different ways to identify good practice, as well as areas for improvement. For example, can be divided by job role, location, age or department. Analysing these data sets, can assist the organisation to pinpoint key focus areas and make prompt changes for areas of concern.

Another substantial benefit of the Safety Climate Tool is that it incorporates benchmarking data for a range of different industries and sectors. Therefore, not only does the SCT help understand your own safety culture, but its extensive benchmarking data set allows you to compare performance against industry standard. This helps management position the company in accordance with industry standards, so health and safety can be measurable. This is extremely important for ports and terminals where safety is a number one priority, however, has always proved to be difficult to measure due its intangible nature.

The Safety Climate Tool can also be used to support organisations to achieve the ISO45001 accreditation. Using the results collected from SCT will provide part of the evidence required to achieve the accreditation. While ISO45001 is not a legal requirement, proportionate adoption of a health and safety management system standard like ISO45001 can tremendously help businesses measure and evaluate their performance.

How was it Implemented:

Over 300 organisations both in the UK and overseas are proactively using Safety Climate Tool to measure and improve their safety culture. It is used and trusted by organisations of all sizes, across all industry sectors. One of those being a reputable international company that leads the Spanish market with its strategic presence in port locations, offering complete logistic services. The company initially approached HSE to analyse their safety procedures with the objective of improving standards overtime and ensuring there was cohesion between the terminals.

Another reason for seeking external support was to shine a light on the passionate and committed Health and Safety representatives working at the terminal; as their feedback/enthusiasm rarely made it past senior management and through to the board. This was due to a lack of supporting evidence identifying problems within the internal operations system. This disconnect created inconsistency between local and group decisions and would continue to be harmful if not eliminated swiftly.

Therefore, to achieve improving safety culture within the organisation, HSE had to understand the attitudes and opinions of employees across local, group and National level. This is where the Safety Climate Tool could add real impact, as it could survey the entire working groups and provide instant results to act upon. This approach rapidly introduced and nurtured an attitude that all workers could trust and rely upon to create managerial change.

Throughout this document we will reference the

Spanish organisation by including extracts from their internal report that has been anonymised for confidentiality purposes.

What was the result?

Since the business implemented the Safety Climate Tool, the results immediately indicated that many workers felt most internal decisions were implemented to make management look better, and do not necessarily reflect care for the workers. This outcome tends to manifest and creates a disconnect between operational management and front-line supervisors. This obviously has a knock-on effect where health and safety compliance are not suitable for all staff, as attitudes and relations differ enormously.

Example graph from SCT that highlights the differing views of senior management and workers. The analysis section of the results was also extremely useful, as it enabled the organisation to filter by each individual terminal. This highlighted the poorest and highest performing terminals and a direct comparison could be done to monitor the key differences. The organisation could then embark on a behavioural change programme by involving all staff to adapt the necessary change required.

Report extract (anonymised for security) showing filtered results by terminal: The initial results of the SCT survey across the terminals who took part are as follows: Benchmark summary against maximum of 5: (current benchmark industry average is 3.47). While the results show that the combined group on "average" came out marginally above the "all industry benchmarking average" recorded by HSE to date, this should not be considered enough for a Group with leading aspirations. Therefore, the organisation should continue to invest if they are to achieve change and the results of the [SCT] survey indicate where those efforts should be focused.

It was also clear overall where the organisation was performing strongly and where the problems existed. One of the many benefits was that the tool was able to provide a list of recommendations for future implementation. This created the foundation to build a complete action plan moving forward. This included objectives such as, more training for board directors, develop the group wide health and safety policy, engage with all companies and unions to ensure collaborative working, present the findings to all who took part in the survey to highlight key themes and provide clarity etc.

Example report extract highlighting recommended next steps. There is no doubt that the organisation would not have been able to identify the issues areas so quickly and effectively had they not used the HSE safety climate tool to gather the data. Without this data, the organisation would not have been able to move forward in implementing change, as there would have been little evidence to support the case. As a result, the organisation is now in a much stronger position, as all

employees see the value in raising standards to mitigate potential accidents and injuries. Management and the Board have also undertaken more specialist health and safety training and made improving safety culture a strategic objective for the organisation.

Example report extract on health and safety-oriented behaviour Report extract (key recommended actions): Recommended action list:

- Develop a Group Wide Health, Safety and Environmental (HSE) Policy
- Appoint a named director to be responsible for such policy
- Train all board members in their responsibilities
- Develop a group wide HSE improvement strategy programme [based on the output from the SCT survey]
- Present and communicate the [SCT survey] report and findings in an impactful way to engage the workforce.

Conclusion/any other comments:

To summarise, the Safety Climate Tool has been a resounding success with over 300 businesses proactively using the tool to improve their health and safety culture. As highlighted, the tool has significantly helped the Spanish Ports to understand their safety problems and how they can make positive change. This overtime reduces accident rates, increases employee productivity, morale and retention, and improves the organisations reputation overall.

The SCT also helped eliminate a barrier between management and worker, as the data proved there was currently too much discontent and uncertainty around decision making. This enabled the organisation to reevaluate their processes to ensure a suitable communication model was adapted.

Report extract (findings): In some ports, the senior management took great efforts with their time and explanation of their terminal and accompanied the auditor throughout the visit, in others they were not seen altogether. The report also highlighted the excellent initiatives taking place in specific terminals, that could then be replicated in other terminals to improve safety culture. Using the best practice in one location across all locations. Ultimately, improving safety culture takes a significant amount of time and resource and is not always straightforward in its approach. However, once an issue is recognised, not acting can lead to major incidents and injuries. Therefore, to enable change, data is usually required to evidence the problem. The SCT achieves this outcome and can be used continually to monitor performance.

Nominated on behalf of 'Health and Safety Executive' by their Official Publications and Products Partner 'The Stationery Office (TSO)'.



HILO MARITIME RISK MANAGEMENT

Safety challenge addressed:

1. The UK shipping industry has a fatal accident rate 20 times that of the average British worker and 5 times that of construction. Based on death rates, shipping is 25 times riskier than aviation.
2. In the last 10 years there have been 25,898 casualties and 1,186 total ship losses in the shipping industry.
3. Over the last 10 years, there have been 60 seafarer fatalities and 145 serious injuries from lifeboat testing alone. Indications are that the level has plateaued, meaning that existing controls have done all they can to improve safety. There is a need for a new way of reducing maritime incidents. In other transportation industries, such as air and rail, great progress has been made using predictive analytics to improve safety. HiLo was created when Shell, Maersk and LR Energy Consulting asked the question 'is there anything...

There is a significant opportunity to improve maritime safety:

1. Shipping has been reactive to incident management rather than being pro-active; relies on learning from incidents after they have happened
2. There is no data sharing of near misses or unsafe acts (weak signals). Companies act based on their internal data.
3. The prioritisation of actions is based on frequency of each accident or incident rather than looking at risk HiLo was inspired by the success of other industries to develop a statistical model which uses near misses to predict high impact events for shipping companies.

Summary of innovation:

HiLo was created when Shell, Maersk Tankers and LR Energy Consulting asked the question 'is there anything we can do to predict and prevent shipping accidents?' High impact, low frequency events are notoriously difficult to predict. Because they are rare, shipping companies do not have enough data for analysis, and industry bodies only get access to incidents which catch media attention. HiLo has created a first of its kind statistical model which uses near miss data to predict future high impact incidents. While the industry looks at past incidents to develop safety plans, HiLo turns previously unexploited data into a tool to prevent disasters. Historically, companies treat incidents based on how often they happen, but HiLo's statistical approach uses precursors or "leading events" to predict the risk of a larger serious incident. Identifying and eliminating the precursors allows companies to rectify issues before a serious event takes place. HiLo has created something which has never before existed in the shipping industry – a platform which uses high volumes of internal

data to connect the industry across companies and asset classes and provide insights which cannot be reached elsewhere. At present HiLo works with 50 shipping companies and receives reports from 3800 ships in the tanker and bulk carrier sectors. A container ship model will be available from 1 October, and ferries and passenger ships will follow later this year.

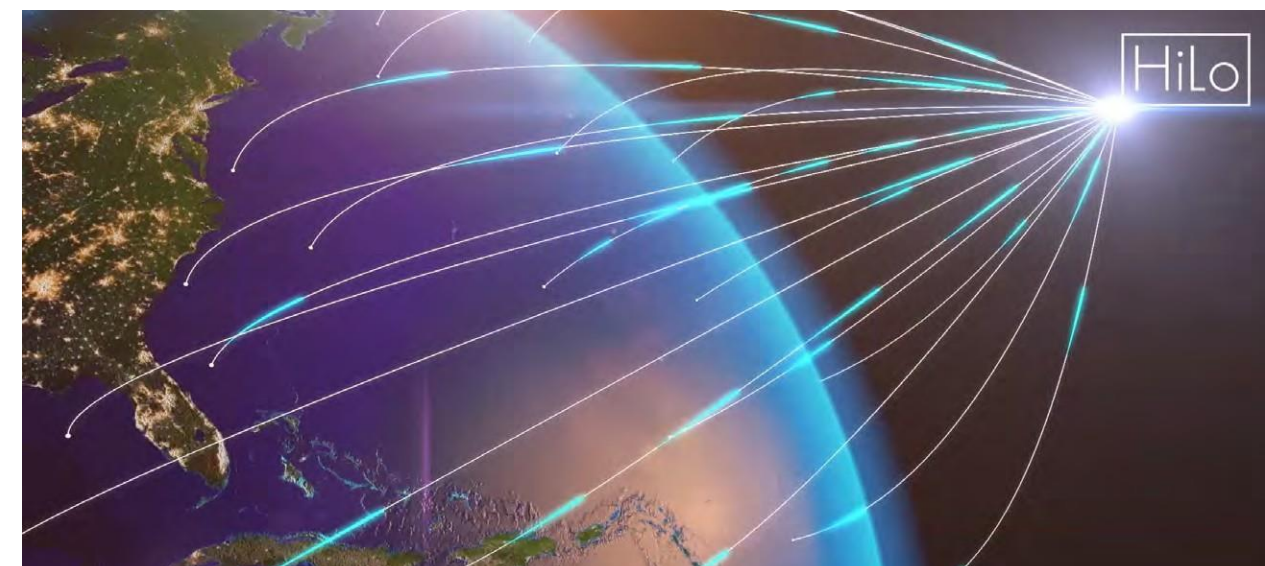
How was it implemented?

For as long as shipping companies have collected safety data, the maritime industry has wanted to get hold of it. Internal data within companies is gold dust – it gives the best insights to make the industry safer. Shipping companies keep this data internal, because:

1. Sharing near misses and accidents externally can cause huge reputational damage
2. Awareness of poor safety records reduces the likelihood of vessels being chartered
3. They have not been offered a valuable service in return for sharing data. Many industry bodies are given data on incidents, where the media has become aware or an insurance claim needs to be made. There is no incentive for companies to hand over more information than required. HiLo has broken this pattern, receiving everyday safety data from 50 of the industry's biggest shipping companies. The first prototype was developed by Shell and Maersk Tankers in 2014, built by LR Energy Consulting and peer-reviewed by experts at Imperial College London. In the second stage, the model was piloted by Gaslog, Maran Gas, Northern Marine, Stolt, Teekay, Torm, Tsakos Columbia Ship Management and V Ships and the statistics were reviewed by The Alan Turing Institute. 20 further companies joined the HiLo fleet. The HiLo product was finalised in January 2018, with incorporation of the company in April 2018. Even in the test phase, participating companies noted a marked reduction in accidents and incidents as a result of using HiLo's predictive reports.

What was the result?

HiLo is reducing the number of injuries and fatalities across the maritime industry. With its statistical model – a first in this industry – HiLo is helping ship managers learn from each other's near misses to prevent fatalities in their own companies. HiLo has seen early evidence of success in the tanker industry. HiLo's subscribers saw their risk of accidents drop by 72% for lifeboats, 65% for engine room fires and 25% for bunker spills between 2017 and 2018. HiLo streamlines safety processes, allowing safety managers to be more efficient, and marking sure



that the issues addressed are those most likely to save sailors' lives. For example, HiLo predicted that the risk of an engine room fire was high for a particular subscriber's vessel. The subscriber investigated the weak signal – small leaks of fuel – and discovered a link to inadequate bolt tightening, with some bolts being the wrong size. Corrective actions were taken to significantly reduce the risk of an engine room fire. By basing the analysis on large volumes of data and peer-reviewed statistics, HiLo removes subjectivity, enabling ship managers to be more consistent. Many incidents are common across ships and asset classes, so this shared knowledge helps mariners as a whole to identify permanent solutions to recurring incidents.

Conclusion / any other comments:

HiLo's focus is on improving safety of seafarers by taking away the subjectivity of safety managers and replacing it with data-driven insights. Starting with correct procedures, seafarers find it easier to act safely and focus on the right areas, using good practices from the Deep Dive report to save lives on board. Many of the leading events within HiLo's model are created by human error, which gives greater clarity on the issue, but HiLo is also developing a human error model to tackle this issue at its heart. HiLo is partnering with leading shipping companies to develop a Human Error statistical model to gain understand how they manage human elements. Working with experts across industries and different parts of shipping, HiLo is analysing the ways in which humans contribute to accidents, and by extension, how to prevent these outcomes. HiLo is planning to launch this model in September 2019. HiLo has created a community of people passionate about saving the lives of seafarers. This community will develop to include maritime safety professionals and the seafarers themselves in a forum for crowdsourced safety solutions. The shipping industry has never communicated about safety issues at this level. HiLo has created the foundation to utilise

expertise across the industry to solve common safety problems and improve safety on a global scale.



KALP-GmbH

Safety challenge addressed:

To fulfil the customer's need of a smooth and quick container handling, KALP-GmbH developed the technology for a fully automated container handling process. Today stevedores are removing twistlocks during the discharge process and are fixing twistlocks during the load process. They work close to suspending loads and mostly in the same area as the horizontal transport (straddle carriers, trucks). The handling of centre twistlocks on twin and twin-tandem lifts is particularly dangerous because stevedores have to step between the containers to access them.

Summary of innovation:

The Automatic Lashing Platform (ALP) is a fast and reliable system which can fix and remove twistlocks and furthermore stores most of the currently available twistlocks automatically in internal stacks. The twin lift capable ALP is equipped with eight magazines, the magazines can hold up to 1200 twistlocks or 2400stackers. As the ALP is using the weight of the Container and Spreader to power the hydraulic system there is no external power needed during operation to add and remove the twistlocks and stacker. The ALP can be positioned and transported with a spreader. Additionally, the ALP can be used as a weighing bridge. Due to the use of CCTV camera systems and WIFI the ALP can be remote controlled.

How was it implemented?

- The ALP was tested on several Container terminals in real operation in Europe and Asia. The ALP was placed under the STS crane, switched to the required mode (load or discharge) and then worked automatically and only had to be observed. The ALP was finally sold to VICT in Melbourne. There the ALP was placed under the STS crane and communicated directly with the PLC of the STS crane to receive the required job order (load or discharge). The implementation to work autonomously on a crane was planned to be the next step.

• https://www.worldcargonews.com/in-depth/in-depth/vict-on-the-road-to-30-mph?utm_source=newsletter&utm_medium=email&utm_campaign=WCN%20Weekly%20Newsletter

What was the result?

The ALP was successfully tested. The ALP never became a bottleneck under the STS crane. The ALP performed the twistlock handling in equal quality as a human.

Conclusion / any other comments:

There is a high potential to increase the productivity if the processes are slightly adjusted for the use of the ALP (>15%) The ALP is a key technology to fully automated container terminals. As the innovation to put



the twistlocks under the containers was an important step to reduce the risk of falling down from container stacks, forced by OSHA, the invention of the ALP will reduce the today's safety issues of stevedores such as contusions, run over and striking to death. The ALP technology reaches sales readiness. The ALP technology is owned by KALP-GmbH. Rainer Kapelski the inventor of the ALP is the managing director and 100% shareholder of KALP. KALP - GmbH gave an exclusive license of the ALP technology to Cargotec.



LASE GmbH

INTRODUCTION

Unremoved Cone Detection

The rise in implementation of automated equipment at many ports means that "man and machine" are coming into contact with each other far more often. For example, manned trucks frequently work in close proximity to automated rubber-tyred gantry (RTG) cranes, when picking up containers and moving them from place to place.

Herewith we submit the "Unremoved Cone Detection" System, a solution to detect if twist locks (cones) are still connected to the containers after lifted up by an ARMG or RMG. These cones can lead to severe damages, if their removal had been forgotten. Together with PNC Busan Port we have made a feasibility test in a separate operation area for six months.

PROBLEM

In container terminals it is quite a common problem that container cones are not completely taken out and stay attached to the container after being unloaded from the vessel. In total more than 2 billion cones are removed manually worldwide in every year, which bears a potential risk. When a container with connected cones is transported to the yard and dropped on another container, it will be locked with this subjacent container by the self-locking function of the cone (interbox connector). Later on, in case of a pick of this container, both containers are lifted up at the same time! As a consequence, during crane travel over the yard other containers can be hit and fall into the yard or truck lanes. This causes material damage on the container, the material in the container and in the worst case it can lead to deadly accidents when containers fall into the truck lane.

Furthermore, when the door of a container is also open, it can also cause damages on the container and the goods inside the container or it can cause unforeseeable situations during the operation in the yard.

In order to prevent lifts with connected containers the system LaseUCD - Unremoved Cone Detection can be a reliable solution. Together with PNC Busan Port we have made a feasibility test in a separate operation area for six months. Due to the previous success of another installed system at PNC (truck lifting prevention) we have been asked to develop a system to prevent double container lifts for safer operations.

The system consists of two 2D laser scanners which are mounted at the sill beam of a yard crane in a height of approx. 5 meters above the truck lane. Both 2D laser scanners build a horizontal scan plane in direction to the truck lane. When a container is hoisted from the

truck chassis by the yard crane it passes the scan plane where the profile of the container is scanned. The scan data are processed in the application software LaseUCD, which generates a 3D point cloud of the container in the first step.

The system for the detection of unremoved cones is designed for RMG and RTG cranes and to increase the safety as well as to avoid damages on the container(s) and the crane.

Additionally, the system also detects open doors of containers during the same measurement process.

If any obstacle underneath the container protrudes from the container, it is an indicator that one or more cones are still connected to the container. In both cases the application software sends an alarm signal to the PLC in order to stop the crane hoist move and to undertake a visual inspection of the detected container issue. Hoist moves with skew, tilt or trim angles of the container under the spreader do not have any influence on the reliability as well as the container type (20, 40 or 45ft) or the different cone design.

Because of the strong partnership with PNC Busan Port the local engineering team came up with the idea to discuss about a solution for their general problem. After creating a common project, the solution could be qualified within an extensive trial over six months in total. After the general system description further learned lessons from the trial are going to follow.

The pictures above show a container lift with a normal and a trim angle. In the second case one edge of the container enters the scan plane earlier than the other side. Nevertheless skew, list and trim angles do not have a negative effect on the scan results resp. the system reliability. During the trial six different common cone types have been used, which have been mounted at standard containers with a size of 20ft, 40ft and 45ft. For this test, only a small amount of additional list-angle could have been created by the remote control (below 0.5°). To get larger angles, the tension of the trolley ropes should have been adjusted (mechanically). As described, the cone detection algorithm is able to deal with tilted or rotated containers.

Two different hoist velocities were realized (and reproduced) by the manual remote control of the crane, whereof the "Fast" Mode is in the range of the practical values:

- "Slow" : 350 mm/s (13% of max. hoist velocity)
- "Fast" : 2167mm/s (80% of max. hoist velocity)

Additionally, it should be tested, if the system could detect open container doors. This splits into the case, if there is a really open door (different angles) or only the door handle is in an open position, where the door itself is closed so far. The detection algorithm for the presence of cones and also open doors does not rely on the evaluation of single scans but will examine the complete point cloud generated by the scanners. After the identification of the container edges, a virtual container is fitted inside the point cloud. This also includes possible skew, tilt and list angles of the container. Subsequently, the positions of the "regions of interest" (ROI) for the presence of cones (and also "open door" case) are determined automatically. The cone detection then reduces to a simple count of the scan hits inside the ROIs. CONE DEPICTIONS

The pictures above show cone type 1 with a normal hoist velocity from different perspectives as real picture on the right and as three-dimensional point cloud out of the application software. The unremoved cone can be identified clearly.

The pictures above show cone type 4 with a fast hoist velocity from different perspectives as real picture on the right and as three-dimensional point cloud out of the application software. The red box indicates the ROI (region of interest) which has been detected by the software.

CONCLUSION

The positive results came up by working on to perfect the sensitivity of the system. On the one hand, the system has to be sensitive enough that no twistlock should be missed. On the other side, it should not be too sensitive that it is influenced by environmental conditions like snowfall, heavy rainfall or container swing. In the first time of the trial there was a high rate of unacceptable false alarms, but after analysing the raw data we undertook some optimisations within the application software until we reached a rate of 99,9%. Additionally, the system detects, whether the container door is open.

The final order of our system for the unremoved cone detection system for the whole fleet of ARMGs at PNC Busan Port underlines the reliability and the trust of this newly developed safety solution.

LASE also has received a patent for the system in South Korea and has applied for further patents in several other countries.



MEGA-INLINER BV



Safety challenge addressed:

Cross contamination, oxidation, saturation or desaturation of non-hazardous bulk liquids.

Summary of innovation

The foundation is a bag made of high-grade plastic, the Mega-Inliner®. Once it is placed in an empty tank container, it can be filled with any conceivable (non-hazardous) liquid. Oxygen can't enter and gasses can't escape the liquid. The liquid arrives in top condition and the tank container stays clean, with no wear. In addition, barely any liquid remains once the bag has been emptied. Installing a Mega-Inliner® takes only five minutes, and its removal takes just fifteen. From now on, any tank container in stock which is fitted with a Mega-Inliner® is ready for your immediate use.

How was it implemented?

Using or own tank containers suitable for the Mega-Inliner®

What was the result?

No risk anymore of above mentioned risks, making cleaning and prior cargo restriction obsolete achieving significant reduction of the carbon footprint involved with international shipping and costs and last but not least also extending shelf live by higher quality of the liquid in doing so less product loss and therefore less liability claims

Conclusion / any other comments:

As we say "Ship bulk globally, pack locally, Convert today!"



MSC-MR., CLAUDIOBOZZO, MARITIME INDUSTRY



Safety challenge addressed:
Cargo Safety

Summary of innovation:

As from the 1st of March 2019 MSC has started to go for Container Cargo Inspections. We have opted to search for cargoes that, to 11 criteria are posing a safety problem for the ship and crew, but also to terminals, ports and even during the intermodal transports. The system name is MSC I and is as such standing for guided inspections. The process is based on 5 different cargo screening processes and a two additional apps for the fieldwork. Except of the problems and errors found, we have also made available an app that can be used by Shippers who have passed our KYC questionnaires and who do want to prove legal compliance.

How was it implemented?

It was implemented by implementing two pilot projects that led to a more in-depth analysis of the container cargo inspections and the needs from terminals, agents, inspection teams and the MSC HQ Top Management. MSC Owners decided also later on not to follow fines form is-declarations but to implement container inspections worldwide.

What was the result?

We found out that problem detection analysing systems resulted in 96% error findings, rather than a normal random inspection score of 7 to 28%

Conclusion / any other comments:

We are expanding the MSC I project worldwide and we are looking forward to a neutral platform that could do this for all container cargo shipments for the maritime industry.



OMC INTERNATIONAL (OMC)

Melbourne-based OMC International (OMC) is the only specialist maritime engineering firm worldwide whose core focus is providing proven Under Keel Clearance management technology (DUKC®) to enable shipping regulators and pilots to determine in real-time a safe UKC in depth-restricted waterways, typically approach channels to ports.

Dynamic Under Keel Clearance (DUKC®) technology is all about the critical vertical dimension of navigation (what you can't see under the water) in shallow waterways. It calculates the safe clearance in centimetres, not metres, which requires a high degree of accuracy.

OMC was established in 1987 by Executive Director Dr Terry O'Brien AM in response to a perceived need for a more scientific approach to UKC management, one which would ensure both the safety and efficiency of transits.

This multi award-winning technology is becoming a standard safety implementation in most Australian and New Zealand ports and customised DUKC® systems are operational in some of the world's largest bulk, container and multi-cargo ports and waterways. These include the ecologically sensitive waters of Torres Strait (which is a vital shipping route for the Asia-Pacific region) and in Canada's St Lawrence River (one of the world's busiest inland waterways) from Montreal to Quebec City.

As well as UKC management systems, OMC also specialises in ship motion analysis, optimised dredging and mooring systems including passing ships and transshipment challenges.

OMC's innovative maritime technology won the prestigious International Bulk Journal (IBJ) 'Safety in Bulk Handling' (Marine) Award in 2015 further cementing their reputation as world leaders in UKC management.

Safety challenge addressed:

DUKC® technology at Port Hedland - the world's largest export port.

Port Hedland is responsible for about one third of the global seaborne iron ore trade. Pilbara Ports Authority (PPA) facilitates approximately \$130 million of trade through this port each day, with around 6000 ship movements annually through a long uni-directional and tidally constrained channel.

PPA must also handle larger ships with their dimensional challenges of increasing length, beam and draft. Its challenge is to ensure maximum export productivity while preventing any incident that could block access to the port.

PPA Chief Executive Roger Johnston, quoted in a DCN news story in August 2017, said Port Hedland faces 7.4 metre tides and a 45km long channel which is 183m at its narrowest point. With the vast size of bulk ships, he said it could be described as "like threading the eye of a needle".

Such safety risks must be carefully managed, considering dynamic variables as well as geographic constraints and ship characteristics. To this end the port authority installed a customised DUKC® system in 1995.

In 2016 this was upgraded to the cloud-based Series 5 which offers the optional extra of the Dynamic Port Capacity Model (DPCM®). This new technology developed by OMC incorporates the DUKC® directly into port capacity modelling and meets the challenge of increasing operational efficiency safely by regularly sailing up to 8 ships on a tide.

This Australian Port thus safely manages its enormous throughput, with minimal capital expenditure.

Summary of innovation:

DUKC® technology maximises the cargo-carrying capacity of large ships while ensuring safe navigation through depth-restricted waterways.

OMC developed DUKC® because the necessarily conservative 'rule of thumb' static rules, used in many ports, are in some cases also risky. OMC's historical records show approximately 95% of ship transits are conservative, 4% marginal and 1% potentially unsafe but not recognised as such.

DUKC® is safer than static rules because it considers real time dynamic variables such as tides, waves and currents, as well as ship size and shape, in the UKC decision making. Latest cloud based DUKC® Series 5, released after extensive Ramp in-house, also offers optional enhanced capabilities such as DUKC® Chart Overlay and Dynamic Port Capacity Modelling (DPCM®).

DUKC® Chart Overlay, which is a world first, provides on a pilot's laptop safe and unsafe transit areas overlaid on navigational charts. High resolution bathymetry surveys and real-time tide and wave data provide predictive advice for each ship re "go" and "no go" areas.

DPCM® is aimed at making more efficient use of existing infrastructure and facilities rather than building new ports or harbours.

DUKC® has also been used by PPA to evaluate the proposed channel design as part of Port Hedland's \$120 million dredging project CROP (Channel Risk and Optimisation Project). CROP involves the delivery of an emergency passing lane alongside the shipping channel,

so that if an incident occurs other ships in the convoy can still safely navigate in and out of the port.

How was it implemented?

Initially DUKC® was offered to the regulators, usually Harbourmasters, in OMC's Australian Ports following its first installation in the Queensland coal port of Hay Point in 1993. By 1995 it was operational in four major Australian ports.

Over the years, implementation has followed the constructive industry feedback OMC has received from regulators, pilots, port authorities, ship schedulers, owners, charterers, brokers and agents on the use and usability of the DUKC® system. For example, Chart Overlays were requested by pilots at Port Hedland.

Following installation DUKC® systems are independently tested by specialist risk management consultants to ensure that they satisfy internationally accepted levels of risk for safely managing the UKC of ship transits. OMC's existing database includes more than 600 full-scale ship measurements. Due to OMC's rigorous testing and validation regimes, there has never been a single incident involving DUKC® systems another fact which encourages implementation.

Also, OMC is increasingly working very closely with its ports. For example, the Dynamic Port Capacity Model (DPCM®) was developed in cooperation with Port Hedland to enable the identification of additional capacity. The port's declared port capacity has since increased by 16% from 495 million tonnes to 577 million tonnes per annum.

Funded by OMC, the company's highly qualified research staff spent more than two years developing the DPCM®. It assists the port and its users, including BHP, to maximise throughput from the Inner Harbour for a fraction of the cost (<10%) that would have been required from a proposed \$20 billion Outer Harbour development.

What was the result?

Port Hedland, the world's largest bulk port exemplifies the benefits gained from OMC's innovations.

DUKC® typically delivers draft increases of 20 cm to 70cm for each ship, maximising cargo and in some cases allowing more cargo to be transported on fewer ships.

Every day fully loaded bulkers, under DUKC® advice, are being sent out with 90 cm clearance from the bottom of the channel. DUKC® has allowed port users including BHP and Fortescue Metals Group (FMG) to potentially ship out \$1.1 billion in extra iron revenue - per year.

In a remarkable achievement in 2015, a record eight deep-draft ships sailed from Port Hedland for the first time on the one tide under DUKC® advice.

In 2017, in a joint effort with PPA, OMC's DUKC®

technology helped the largest ever iron ore shipment to leave Port Hedland at a record sailing draft of 19.95 metres. DUKC® allowed an increased draft of 0.70m over the static rule, which meant an extra 12,000 tonnes of iron ore could be loaded. Another impressive DUKC® result is its ability to minimise delays following an incident. This emergency response capability was showcased in 2008 when the port authority requested OMC's technical help to refloat a large bulk carrier, the 'Iron King', which ran aground on the side of the shipping channel due to a steering malfunction. From some 3000km away in Melbourne, OMC in conjunction with the port ensured adequate UKC was available as eight tugs removed the grounded bulk carrier to deep water on the next tide. Conclusion/any other comments: DUKC® technology has helped more than 180,000 ships sail safely in and out of ports since the first installation in 1993 at Queensland's Hay Point coal terminal. While maintaining the core DUKC® framework and calculation engine, every DUKC® system is customised for the particular waterway ensuring maximum safety

As ships get larger, UKC limits are increasingly critical and OMC's technology, with its unblemished 26-year safety track record, is an essential decision support and risk mitigation tool for ports and waterways worldwide. OMC Executive Director and DUKC® pioneer Dr Terry O'Brien AM is still the recognised world expert on UKC management. Operationally, DUKC® has, under the direction of OMC's team of Engineers, Naval Architects, Hydrographers, Modellers and IT specialists, led by CEO Peter O'Brien, delivered billions of dollars of increased port productivity to users without a single grounding incident. The scientific accuracy of DUKC® ensures that ships sail under DUKC® advice only when it is safe to do so – thereby protecting lives at sea, preventing groundings and averting potential environmental disasters.

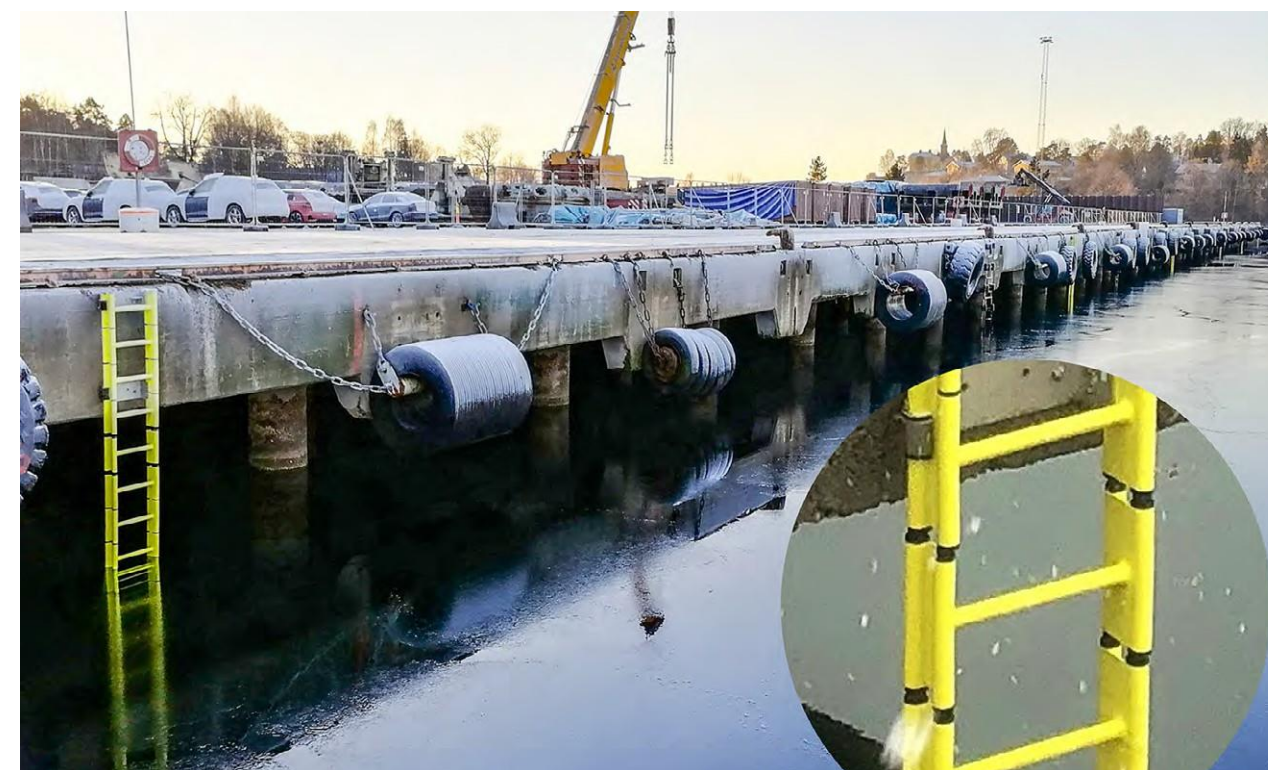
On average, a large ship transits somewhere around the world under DUKC® advice every 45 minutes.

In June 2018, PPA – in conjunction with industry partner OMC – was awarded the 2018 inaugural International Harbour Master's Association (IHMA) Award for its contribution to port efficiency - taking account of safety and security. This 'Safe, Efficient and Secure Port' award was presented in London to Dr Terry O'Brien.

This award further cements OMC's reputation as a world leader in dynamic UKC technology.



PORT-SAFETY



Safety challenge addressed:
Safety ladder installation on Open Quays

Summary of innovation:
Landbased test during summer 2018. Installation of 8 x4,5m Life Ladders with Flex-Joints in Port of Oslo in November 2018. Installed with 3,5m cantilever. Enabling visible access to safety avoiding the safety challenges of chain ladders and the design/manufacturing/ installation/maintenance of corrosive ladders and support structures.

How was it implemented?
Enhancing the LifeLadder invention

What was the result?
Improved safety, reduced maintenance

Conclusion / any other comments:
The test installation runs over two winters periods. The final validation of this improved safety products is expected by spring 2020.



RODA ROAL SERVICIOS INDUSTRIALES, S.L

Safety challenge addressed:

Graphite electrodes for electric arc steel mills have become an essential element for the sustainability of the sector. Due to its size and weight, cylinders 600 to 800mm in diameter and 1.3 to 2.5 metric tons, one of the most used means of transport is the sea container. Initially manufacturers and customers used special equipment (open top and flat rack). With the development of the sector as efficiency and competitiveness requirements become bigger, they have begun to use box containers. The loading or unloading of large size and heavy weight cargo in closed containers is a challenge for the safety of operators, goods and of course for the integrity of the container itself.

Summary of innovation:

The equipment for loading heavy material in box containers, patented model LC6000, is a machine tailored designed for loading and unloading electrodes in closed containers 20,40 and 45 feet. It allows a single operator to be able to carry out the loading or unloading of packages / pieces of up to 6 tons/each in a safe way for both the operator, cargo and the container itself.

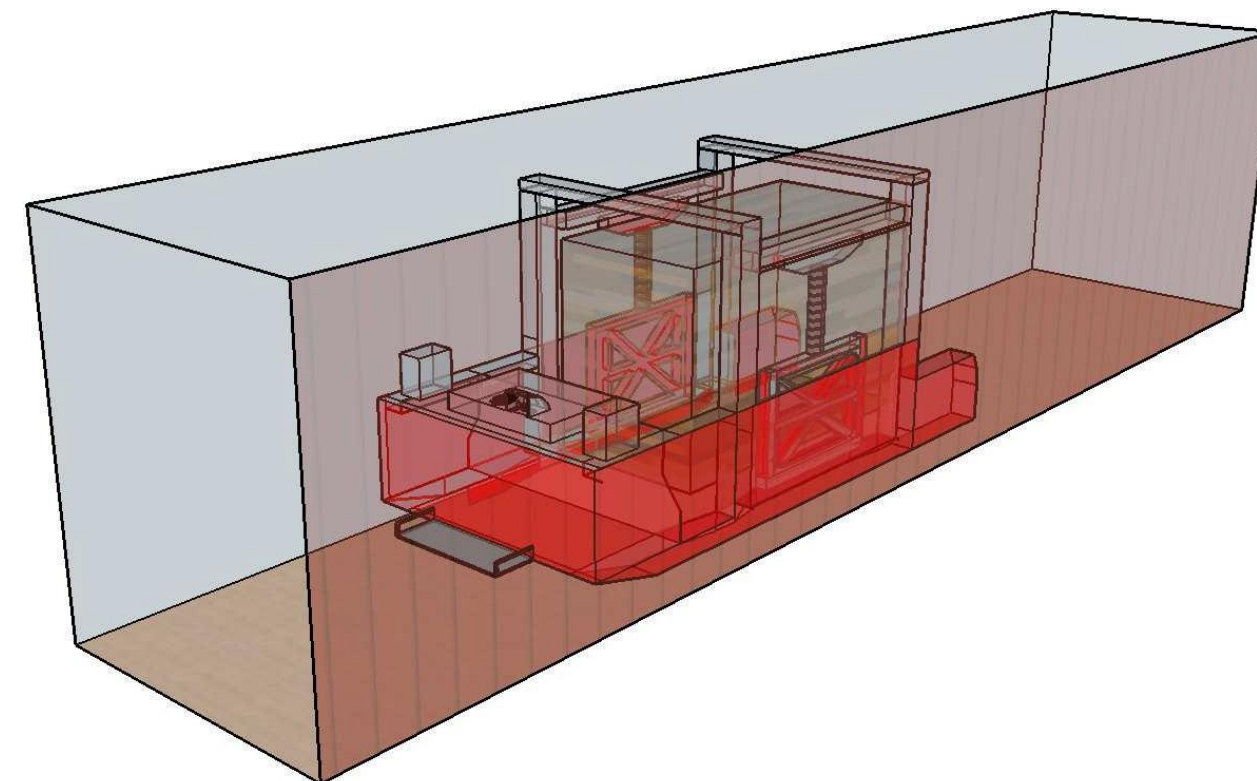
How was it implemented?

First ideas for the design of the loading electrodes equipment in closed containers came from EMILIORODRIGUEZ FERRO, founder of the company RODAROAL SERVICIOS INDUSTRIALES, S.L.(Spain). In 2010, after starting the management of the graphite electrode warehouse for SHOWA DENKO CARBON A Coruña (Spain), high frequency of incidents during

the load of electrodes in closed containers is confirmed. After several drafts and tests, in 2014 the first LC6000 prototype came out in collaboration with the firm MAXIMINO SEOANE, S.A. Design of the LC6000 allows lifting and transport the cargo inside the container without the need of counterweights. Driving position allows the operator to have total control of the operation. Its design respects the resistance of the container floor maintaining the axle load within its design parameters. LC6000 propulsion is fully electrical so it eliminates the risks of generating toxic atmospheres. Its flexible design allows it to handle with different types of packaging or palletizing.

What was the result?

In April 2015, the LC6000 was launched- for loading and unloading graphite electrodes in closed container for SHOWA DENKO CARBON A Coruña (Spain). To date, a total of 2300 containers (around 45,000 metric tons of electrodes) have been loaded without any incident regarding people, cargo or containers. The LC6000 has the capacity to load and unload up to 16 electrodes (a total of 21 to 24 metric tons) in 4 crates, 4 electrodes each in box and open top containers from 40 or 45 feet. It allows a team of 2 operators with the support of a forklift to load/unload up to 7 containers in an 8-hourshift. LC6000 has been design and built-in accordance with Directive 2006/42 / EC of the European Parliament and of the Council, of May 17, 2006, concerning the STANDARDS FOR COMMERCIALIZATION AND COMMISSIONING OF THE MACHINES, providing it with the CE marking. Although the LC6000 was designed exclusively for loading and unloading electrodes in a closed



container, this equipment can be used for loads of similar characteristics. We are currently working for the development and improvement the LC6000 capabilities.

Conclusion / any other comments:

The LC6000 has been a significant step to ensure the safety of electrode loading operations in closed containers. On the other hand, the performance of the LC6000 maintains similar production ratios and in some cases better than the means used to date. If we add to these two factors that it is a relatively low-price solution, we have an efficient, safe and reliable solution.



SIBRE

	SLP	Traditional Systems
SAFETY	1. PROTECTION	✓
	Snag protection	✓
	Abrupt movement detection	✗
PRODUCTIVITY	2. PREVENTION	✗
	Detection up-coming snag	✗
	Protect assets crane from stresses	✗
REABILITY	3. SURVEILLANCE	✗
	Abrupt movement notification for analysis action with crane camera system for root cause and correction actions. ex. due to vessel type or operator	✗
	4. SERVICE	✗
	Data analytic of snag detected & hoist motion intensity	✗
	Consulting & Support	✗
REABILITY	5. COMPATIBILITY	✓
	Compatible with traditional system	✓
	Allow bypass to keep crane in operation	✗
	Fast reset for back to operation	✗

Safety challenge addressed:
Snag Protection and optimization of hoist operation

Summary of innovation:
SLP System

How was it implemented?
Collaborating with important Terminals Operators

What was the result?
Very positive, customer is satisfied with performance

Conclusion / any other comments:
System increase crane protection and help to optimize hoisting operation



STRAINSTALL UK LTD



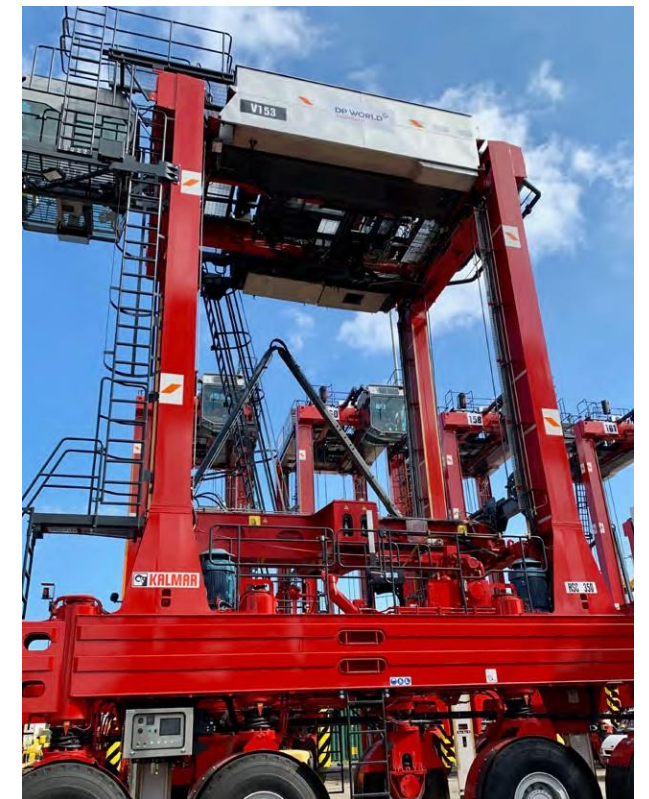
Safety challenge addressed:
Container Ship cargo weight safety.

Summary of innovation:
Retrofit weighing load cells for terminal equipment, seamless weighing whilst moving, no delays in process.

How was it implemented?
Trialed then implemented in various global terminals

What was the result?
Terminals have implemented across the globe

Conclusion / any other comments:
Southampton terminal now fit every port equipment with weighing systems.



Windbreaker International Bv

Safety challenge addressed:
Windbreakers prevent container storm issues for Customers and Associates.

Summary of innovation:
Connecting top level of container clamps. At this very moment these are no alternatives.

How was it implemented?
On my own container depot in Rotterdam during 2014.

What was the result?
Since then, no containers were damaged by storm accidents till now!

STACKING OVER 4 HIGH

FRONT OF STACK

to recognise a connected container clamp

LONG TERM STORAGE
fill complete top layer with container fittings

1
2
3
4

FRONT OF STACK

to recognise a connected container clamp

LONG TERM STORAGE
fill complete top layer with container fittings

HOW TO USE

- 1** REPEAT
WHEN STACKING ALWAYS START WITH TWO DOWELS ON THE BACKSIDE
- 2** PLACE WINDBREAKERS FROM EMPTY HANDLER
OR
WITH PIPE FROM GROUNDLEVEL
- 3** CAUTION! CONNECT AND DISCONNECT WITH CARE
20 INCH
ON 45' CONTAINERS USE 40" CORNER CASTINGS

NOT SUITABLE FOR PALLET WIDE CONTAINERS

WINDBREAKER

Why join ICHCA?

Did you know? ICHCA International is a cross-sectoral body with members spanning 37 countries worldwide



REPRESENTATION AT IMO:
Join delegations representing the voice of cargo handling at IMO, ILO and other key bodies

NETWORKING OPPORTUNITIES:
Build contacts with an influential international community of transport professionals

IMO PUBLICATIONS:
Discounts on all IMO publications

INFLUENCE POLICY:
Participate in ICHCA's working groups & Technical Panel

INDUSTRY KNOWLEDGE:
Access to over 90 ICHCA reports & research papers

TECHNICAL ADVICE:
Access to the Technical Advice service for expert feedback

DISCOUNTED EVENTS:
Special rates to attend ICHCA seminars, conferences, roadshows & networking events

TRAINING & E-LEARNING:
Discounted training courses - IMDG Code compliance, proper CTU packing & more

"The value I see from ICHCA membership is the industry experience and resource materials, which are invaluable. The network of industry related participants is also wonderful."



CARGO HANDLING VOICE

Supporting global best practice in cargo operations

ICHCA INTERNATIONAL

Cargo Handling Voice is ICHCA International's monthly global digest of industry, policy and regulatory developments related to safety, security, sustainability and efficiency in cargo handling across all transport modes and nodes. **Subscribe for free!**

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6 | ABOUT TT CLUB



TT Club is the international transport and logistics industry's leading provider of insurance and related risk management services.

As a mutual insurer, TT Club exists to provide its policyholders with benefits, which include specialist underwriting expertise, a world-wide office network providing claims management

services, and first-class risk management and loss prevention advice. Customers include some of the world's largest shipping lines, busiest ports, biggest freight forwarders and cargo handling terminals, to companies operating on a smaller scale but whose operations face similar risks.

TT Club specialises in the insurance of Intermodal Operators, NVOCs, Freight Forwarders, Logistics Operators, Marine Terminals, Stevedores, Port Authorities and Ship Operators. TT Club is managed by Thomas Miller.

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7 | ABOUT ICHCA INTERNATIONAL

The International Cargo Handling Coordination Association (ICHCA), founded in 1952, is an independent, not-for-profit organisation dedicated to improving the safety, security, sustainability, productivity and efficiency of cargo handling and goods movement by all modes and through all phases of national and international supply chains.

ICHCA International holds official observer status as an NGO and has a substantive role representing the global cargo handling community in regulatory and policy developments at the International Maritime Organization (IMO) International Labor Organization (ILO), International Organization for Standardization (ISO), UN Economic Commission for Europe (UNECE) and other UN agencies.

ICHCA's Technical Panel (ITP) - provides technical advice and publications on a wide range of practical cargo handling issues, while its Technical Advice Service provides members with recommendations on a wide range of cargo handling and transport issues, drawing on the experience and expertise of the ICHCA global member community.

ICHCA also operates through a series of autonomous national and regional chapters – including ICHCA Australia, ICHCA Japan and ICHCA Canarias/Africa (CARC) – plus Correspondence and Working Groups.

Co-operation between many different parties is critical to the safe, secure and efficient performance of today's increasingly complex cargo chains. Both internationally, and through its various national and regional chapters, ICHCA exists to co-ordinate the dialogue and build relations between the many private and public sector stakeholders, to foster greater cross-party understanding, and to shape and share good practice for the benefit of all.

ICHCA's members include other trade membership organizations, corporate enterprises, government bodies and private individuals representing all aspects of the cargo handling and transport chain: regulations and policy, cargo owners (shippers), ocean and land transport, ports and distribution infrastructure, road, rail and intermodal operations, equipment and technology, insurance, legal and finance.

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