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ICHCA INTERNATIONAL PRESENTS 2ND TT CLUB INNOVATION IN SAFETY AWARDS 2017

A digest of entries received & winners announced



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ICHCA INTERNATIONAL PREMIUM MEMBERS



1 | FOREWORD

Following the success of TT Club's inaugural Innovation in Safety Awards in 2016, we have been delighted to support their second iteration.

Our aim to identify innovative developments that engender greater safety and efficiency in the intermodal supply chain has once more been achieved. We have celebrated many achievements and acknowledged the winners of our challenge. Now is our opportunity not only further to promote our objectives but also to disseminate awareness of advances in the industry that this competition has evoked.

22 high quality entries were proposed in the 2017 challenge. We have included a summary of all but one in this digest. Each, in its own way, evidenced improved safety standards through the implementation of an original product design or operational process that has the scalability to be applied in similar work environments in an international context.

What we reveal is a set of exciting and proven improvements to supply chain practices ranging from tracking of falsely declared hazardous materials to an anti-piracy device and from securing top tier empty containers to enhanced training techniques for dry bulk operations.

Both ICHCA International and TT Club have a fundamental commitment to risk reduction and operational improvement throughout the supply chain. Promoting such matters is paramount to the philosophy of the two organisations; the awards initiative and this digest are offered as positive reflections of this joint commitment.



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 at the Maritime Safety Division of the International Maritime Organization (IMO).

Please contact secretariat@ichca.com for more information about the Award.

3 | AND THE WINNER IS...

HAPAG-LLOYD FOR THE CARGO PATROL SYSTEM

Hapag-Lloyd was the winner of the TT Club Innovation in Safety Award 2017 for its Cargo Patrol System. This innovative software has produced measurable, proven results in identifying erroneous and potentially fraudulent cargo declarations that obscure the nature of dangerous goods and restricted cargoes transported around the world.



Peregrine Storrs-Fox, Risk Management Director, TT Club (left) congratulates Ken Rohlman, Senior Director and Dangerous Goods Safety Advisor, Hapag-Lloyd (centre) on winning the 2017 TT Club Innovation in Safety Award from ICHCA International. The Award was presented by Joseph Westwood-Booth, Senior Deputy Director for Marine Technology and Cargoes at the Maritime Safety Division of the International Maritime Organization (right) during the ICHCA International 65th Anniversary Event in Las Palmas, October 2017

The problem

The problem of misdeclared and undeclared cargoes, including dangerous goods (DG), restricted and embargoed commodities, has blighted container shipping for many decades. Today, it is estimated that misdeclared or undeclared cargoes are the root cause of a major shipboard fire on average every 60 days, according to the TT Club.

While not the only cause of non-compliance, fraudulent activity plays a significant role. A common method of deception is to hide the real cargo name behind synonyms and trade names,

such as 'bleaching powder' for calcium hypochlorite or 'plant growth regulator' for ammonium nitrate. Material safety data sheets, laboratory reports and photographs may also all be manipulated.

While the problem has long been known, historically there was no way to accurately measure and prove the huge risk of undeclared or misdeclared cargo. In 2011, Hapag-Lloyd set out to tackle this issue by creating a restricted commodities search engine that would be able to visualize exactly the scale of the problem and which could be used to actively reduce the risks to people, cargo and ships.

The solution

The Cargo Patrol search engine software scans the entire Hapag-Lloyd booking environment, detecting potentially undeclared or misdeclared dangerous goods, plus other suspicious cargo like military, radioactive, waste or embargo-related shipments.

Twice daily, the software searches nearly 7,000 prioritised keywords across seven major categories:

- General dangerous goods
- Synonyms and trade names
- Proper shipping name (IMDG code)
- Waste related search terms
- Military search terms
- Radioactive related search terms
- Special cargo

Every single day, Cargo Patrol detects 1200-1300 suspicious bookings, all of which are excluded immediately from loading operations. Every one of these is then investigated by Hapag-Lloyd cargo experts. Customers, laboratories and authorities are also involved. After investigation, Hapag-Lloyd decides if the container will be loaded or not.

The results

Early real-time search and expert analysis have helped dramatically reduce risk to crews, ships, the environment and other cargo on board, says Hapag-Lloyd. From 2014-2016, Cargo Patrol detected over 662,000 potential hits and close to 11,200 actual hits, where a real risk was identified and the cargo was not transported.

"By extrapolating data we assume that today approximately 0.059% of all TEU transported worldwide contain undeclared or misdeclared cargo," notes the company. All of the findings from Cargo Patrol are reported to CINS, the Cargo Incident Notification System established by the container shipping industry, as well as to the US Department of Transport and other authorities, contributing to industry and regulatory knowledge.

"The risks we are exposed to are the risks we cannot see - dangerous goods or other sensitive commodities which are not properly declared to shipping lines," says Ken Rohlman, Senior Director and Dangerous Goods Safety Advisor at Hapag-Lloyd. "From my perspective, undeclared commodities are the challenge of the future for all of those participating in the transport business."

The future

In view of the collective maritime risk exposure, Hapag-Lloyd has decided to pass its Cargo Patrol software onto IBM for further development in order to make the solution accessible to all shipping lines, other members of the global transport community and regulators.

"The potential enhancement and broader market use through IBM's 'industrialising' of the system is exciting," notes TT Club Risk Management Director Peregrine Storrs-Fox.

www.hapag-lloyd.com

"The risks we are exposed to are the risks we cannot see - dangerous goods or other sensitive commodities which are not properly declared. This is why Hapag-Lloyd has decided to make Cargo Patrol available to all interested parties transporting goods by sea, road, rail, air and to authorities in cooperation with IBM."

4 | HIGHLY COMMENDED

SAFETY AMMO FOR THE SMART PINNING STATION

The Highly Commended award for 2017 went to Safety Ammo for the Smart Pinning Station, an RFID-based solution developed for DP World Brisbane to enhance safety and operational efficiency for stevedores working under quay cranes in proximity to straddle carriers



From left to right, Peregrine Storrs-Fox, Risk Management Director, TT Club, Andrew Hayek, Co-Founder, Safety Ammo and Joseph Westwood-Booth, Senior Deputy Director for Marine Technology and Cargoes at the Maritime Safety Division of the International Maritime

SAFETY AMMO.co

The problem

Stevedores working at the DP World container terminal in the Port of Brisbane, Australia, were required to work on the inside leg of quayside cranes to fit and remove container twistlocks, while manned straddle carriers worked on the outside crane leg to collect and drop containers between ship and yard. DP World Brisbane was seeking a solution that would allow the straddle carriers and stevedores to share the same working area without compromising the stevedores' safety, while simultaneously increasing operational efficiency.

The solution

Through a core combination of passive RFID and radar technologies, Safety Ammo developed the 'Smart Pinning Station' to create a safe area with proximity control for the stevedores interacting

with large machinery on the wharf. Many companies have tried to use RFID to improve safety within the port environment, but Safety Ammo says it is the first to successfully test and implement an RFID-based safety solution within a major port.

The system, which requires minimal user interaction, provides real-time monitoring of any personnel within the safe zone and indicates all activity through a simple user interface. Using extensive I/O and wireless capabilities, the pinning station can notify any external control systems of worker whereabouts.

As well as passive RFID and safety certified radars, the Smart Pinning Station utilises industrial touch screen tablets, ID card readers, two-way radio, PLC integration, wifi and industrial ethernet technologies.

Safety Ammo turned to RFID distributors for equipment, but developed the entire solution in-house and owns all the intellectual property. DP World helped in the development process with access to the port, insight into its operations and narrowing down the concept.

DP World Brisbane subsequently commissioned Safety Ammo to add Smart Pinning Stations to all four of its quayside cranes. After the initial system was installed successfully, Safety Ammo also added a completely customised radar system to detect when straddle carriers enter the shared zone, adding another level of safety. This first project has led to asset tracking and personnel tracking around the entire port that links to the core solution.

The results

Since implementing the Smart Pinning Station, DP World Brisbane has increased operational productivity on the quayside by 75% without

jeopardising the safety of personnel. Crane productivity has increased from 15 moves an hour to 25-30 moves per hour and there have been no incidents or injuries to workers.

Following the roll out in Brisbane, another Australian terminal was scheduled to install the system during 2017. Terminals in the Philippines and UK are also reviewing the technology and Safety Ammo is working to implement projects across several different terminal set-ups.

As well as bringing safety and productivity benefits to manned container terminal operations, Smart Ammo says that its technology can also help facilities to take full advantage of their investment in automated equipment, by providing a solution to protect people who need to work near unmanned cranes and other mobile machinery.

<https://safetyammo.co>



5 | ENTRIES

Entries are presented in alphabetical order and include all those that have granted permission for details to be given.

APM TERMINALS ZEEBRUGGE - IMPROVED TWIN DETECTION AND CONTAINER APPROACH

The problem

The origin of this project was an incident that occurred during unloading operations on the 'Maersk Clifford'. The quay crane driver landed the spreader on twin containers in the ship hold and attempted to lock his spreader onto them. After a few tries he proceeded to lift. However, the containers were not correctly locked and became stuck in the cell guides of the ship. A second incident occurred when a driver mistakenly lifted two 20ft containers in 40ft spreader configuration. The containers were the same colour and a wooden board, also the same colour, lay between them, creating the false impression of a 40ft container.

APM Terminals Zeebrugge therefore set out to create a solution that would ensure crane operators could never lift in twin mode when the lock occurred on top of the corner post, as opposed to fully inside the corner post, to help prevent future such incidents.

The solution

The solution to this problem lay in monitoring the distance from the spreader to the container roof in the first 3 seconds of the hoist movement. This was accomplished using ultrasonic sensors that can measure up to 8m. The new system works in conjunction with the existing twin detection, which looks for a gap between the containers.

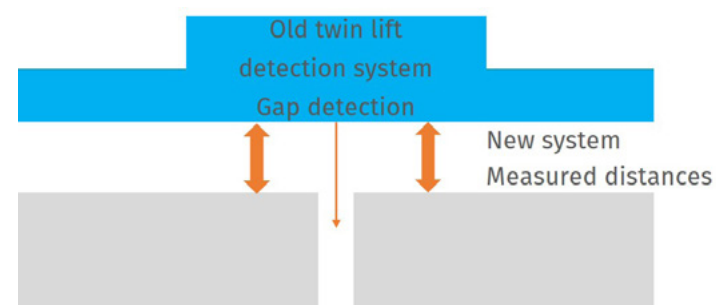
With the new technology, spreader speed is reduced to 10% of the maximum for the first 3 seconds of the hoist. If one of the sensors on either end of the spreader exceeds the gap threshold of 810mm, the PLC automatically stops the hoist movement and

gives a warning to the driver that there is a problem. He can then safely lower the load back down while it is still in the ship cell guides to evaluate the situation. A second benefit of the system is to enable a soft landing for the spreader. A push button system allows drivers to hoist special items such as hatchcovers and open top containers, over-riding the sensor outputs but with speed still limited.

The results

Since implementing the new system, there have been no more incidents, no problems with the twin system and no damage on spreaders and cranes.

www.apmterminals.com/operations/europe/zeebrugge



ARX - ABAC SYSTEM

The problem

Piracy, hijacking, kidnapping and robbery are life threatening situations that affect the shipping industry every day. Millions of dollars are spent every year on ineffective measures such as razor wire, meaning that ships are often left extremely vulnerable when they need constant protection.

The solution

The ARX barrier is non-lethal 'denial of access' system that prevents unwanted intruders.

Developed with extensive input from naval architects and seafarers, the plastic modular barrier can be attached simply and quickly to the guardrail of any existing ship, offering complete denial of access by deflecting climbing apparatus and aids.

The system takes less than 1 minute per unit to install and this can be done simply and safely by the crew, eliminating both the risk of lacerations from razor wire and the potential ocean ecosystem impact of rusty razor wire falling off into the sea.

The barrier is produced with virgin grade polypropylene using rotational moulding. The patented design means that each unit can be self-installed with speed and strapped to any maritime guardrail.

The system's fend plate will repel hooked ladders and climbing poles, while its ribbed surface defeats rope-based climbing systems. The modular system has been designed to integrate onto the existing guardrail with no hot-works or lengthy onsite cutting.

The results

After sea trials had been completed, the anti-piracy barrier was offered to the market as a sustainable and non-lethal proactive and defence measure.

Ships that are equipped with the ABAC anti-piracy barrier no longer have to constantly renew razor wire, which reduces injuries to crew, the amount of man hours required to protect ships and the risk of rusty material falling into the ocean.

<https://arxmaritime.com/products/arx-abac>



BUREAU INTERNATIONAL DES CONTAINERS - BOXTECH TECHNICAL CHARACTERISTICS DATABASE

The problem

Significant safety challenges exist because of a lack of efficient sharing of container technical characteristics in the supply chain. One example is containers with reduced capabilities being mixed in stacks with ISO containers due to improper marking. Also, when old, second-hand containers that have not been properly re-marked re-enter the supply chain, improper assumptions can be made about their safety.

Mistakes do happen, and incidents stemming from the improper safety assessment of containers are a reality. Other safety challenges can also be mitigated through the more efficient sharing of container characteristics. For example, in the absence of a centralized database, shippers wishing to utilize Method 2 for IMO VGM container weight declarations are forced to obtain container tare weight information from the container door or from one of many different carrier or lessor websites. They must then re-enter the data into their own systems. This practice introduces errors and inefficiencies.

The solution

The BIC's BoxTech Technical Characteristics Database helps address these problems, and more, through the establishment of a central industry database of container fleets. BoxTech allows for the upload of the full set of technical characteristics of each container, making the information available to anyone in the supply chain who needs it. Information is available on a single platform, meaning users can access one website for all units instead of dozens of websites.

Equally important, the information is made available for automated access and integration directly into users' systems. Thus, shippers performing Method 2 VGM declarations can obtain tare weights directly into their systems, avoiding any manual search and

re-entry of data. The same goes for information like maximum payload and container size/type, to help ensure safe stack and stowage planning.

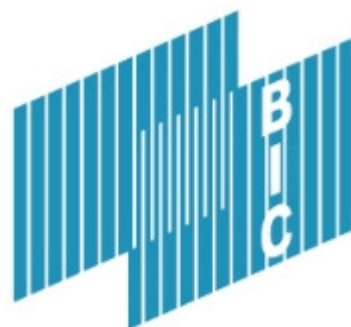
New features and alerts are being added to help increase transparency, safety and security. New alerts will allow supply chain stakeholders to easily identify second-hand containers that have not been properly neutralized and inspected upon sale. Alerts are also being added to assist with container recoveries, or any situation requiring a particular container, or list of containers, to be flagged - including security-related situations.

The results

Launched in mid-2017 in close consultation with several ocean carriers and container lessors, BoxTech has grown rapidly. Over 1,000 users were signed up after 11 months, including some of the largest ocean carriers and container lessors as well as over 800 shippers, forwarders and terminals.

The industry now has a single, centralised, neutral and non-profit database allowing complete transparency into technical characteristics simply through use of the container number. While its adoption is still in the early stages, there is tremendous promise for such a platform to address a variety of safety and operational efficiency issues to the benefit of multiple stakeholders.

www.bic-code.org



BOLLARDSCAN LTD - NON-DESTRUCTIVE BOLLARD SAFETY TESTING

The problem

Incidents with mooring bollards have taken place all over the world. While most have only resulted in structural damage, some have caused injuries to mariners and port staff. Bollards are generally considered 'safe' and not always considered as a risk factor. But the age of the bollard and wharf, plus frequency and type of usage, will cause the bollard to deteriorate just as any other manmade object does. In Europe, the estimated average age of bollards is 60+ years.

It is therefore critical to determine the integrity of the bollard and its anchor in the quayside. In the past, this was only done by destructive testing, involving the risky operation of pulling the bollard with a tugboat and hoping that nothing happened. Bollardscan set out to apply a new approach to accurately determine bollard condition and assure the safety of personnel, infrastructure and operations.

The solution

Non-destructive test and monitoring technologies are widely used in aviation, automotive and other industry sectors, but have not been extensively deployed in the maritime sector.

Bollardscan has now developed a non-destructive solution to determine bollard integrity, combining

visual, ultrasound and vibration testing methods to give a reliable estimate of bollard integrity and safety. The 3-step process includes:

- Initial consultancy-based evaluation leading to go/no-go report on further testing
- As needed, use of ultrasound to measure the bollards' main features, body and anchorbolts. If any anomalies are revealed, recommendation for further testing
- As needed, transient testing for repeated surveying on a monthly, quarterly or yearly basis, using an accelerometer and advanced algorithms to test both the bollard and the surrounding concrete structure holding the bollard within the quay's superstructure.

The results

The combination of non-destructive testing methods used gives a reliable indication of the load a mooring bollard can bear, giving the port operator confidence in this vital equipment and contributing to the safety of port staff.

Further developments are now underway to create a 'traffic light' system, helping ports to continuously monitor the health of their bollards.

<http://bollardscan.com>



CAMEROON NATIONAL SHIPPERS' COUNCIL - ELECTRONIC CARGO TRACKING NOTE

The problem

Shippers exporting goods from Cameroon required a solution to help them comply with new International Maritime Organization SOLAS rules on the requirement mandating the provision of verified gross mass for packed containers.

The solution

Cameroon National Shippers Council (CNSC) created the 'Electronic Cargo Tracking Note' (ECTN) as a national reporting mechanism, underpinned by a web platform that facilitates the transfer, validation and integration of information on the gross mass of packed containers.

The system also helps in sharing such information with consignees, terminal operators and other administrative bodies, to help mitigate risks in cargo handling operations.

The ECTN was implemented as follows:

- Legal monitoring of the imminent entry into force of the VGM Amendment to IMO SOLAS Chapter VI
- Consultations with national stakeholders leading to the signing of a decree laying down the terms and conditions for the implementation and enforcement

of the SOLAS amended requirement from 1 July 2016

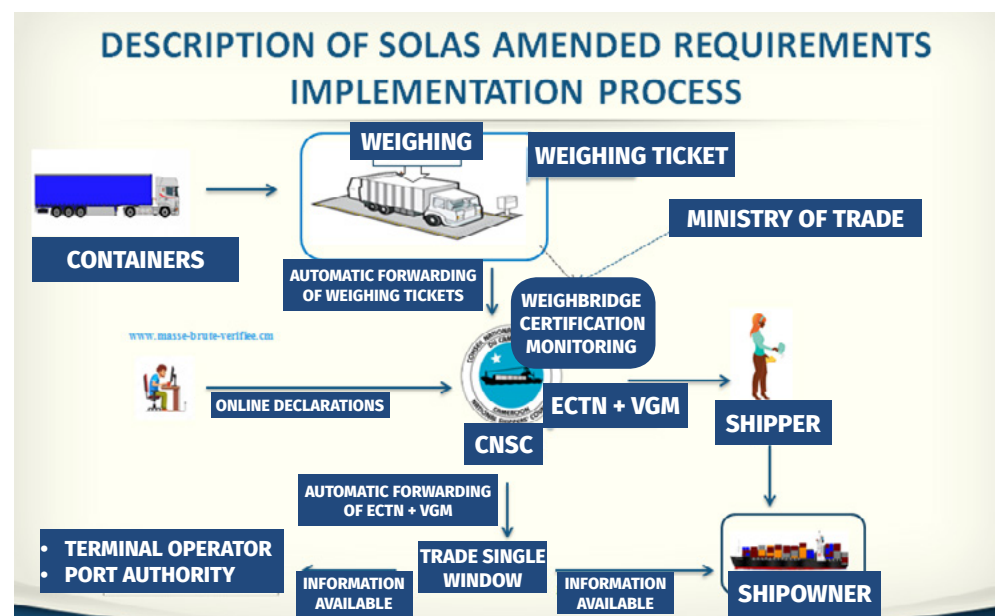
- Official designation of CNSC as a technical body tasked with enforcing the SOLAS amended requirements in Cameroon
- Development of a web application www.masse-brute-verifiee.cm
- Interconnection with weighbridge operators and stakeholders, notably those charged with the certification of container handling and weighing equipment
- Continuous improvement of the process

The results

Introduction of the ECTN has helped ensure efficient control and verification of packed container gross mass, reduced ship loading time, reduced risk of incidents in terminals and at sea and better assessment of parties' liability for damages.

CNSC is working hard on a daily basis to make cargo handling infrastructure and operations as safe as possible. In the future, the ECTN will be coupled with weighing equipment, which CNSC is in the processing of acquiring, in order to better control weighing operations and reduce their related costs to the benefit of shippers and Cameroon's foreign trade.

https://cncc.cm/en/divers/procedure_besc.htm



CONWEIGH - VGM CONTAINER WEIGHING PEDESTALS

The problem

Overweight containers pose safety risks along the supply chain, from handling to road transport to ocean voyages, causing casualties and damage to infrastructure, equipment and cargo. Industry laws have never required actual, physical weighing of packed containers to make their true mass known until the IMO SOLAS Verified Gross Mass (VGM) law took effect in July 2016.

The new global maritime law requires that every packed export container must, before it is permitted to be loaded on board a ship, have its gross mass verified by weighing the entire container and its contents (Method 1) or the individual components (Method 2). While some shippers were able to comply through their own certified equipment, others turned to off-site public weighing facilities, like weighbridges. The most obvious danger of this option is the transport of potentially overweight containers to the weighbridge, exposing drivers, trucks and other road users to risk.

The solution

Conweigh developed a simple mobile weighing solution consisting of weighing hardware and cloud-based software to digitise the entire compliance process, from capturing weight measurements and centre of gravity right through to processing payments and, most importantly, submitting 100% valid VGM certificates to the ocean carrier instantly.

The Conweigh pedestal is a set of Class III weighing devices (like weighbridges) that can be easily stored in a box, with a normal capacity of 40t and maximum capacity of 120t. The pedestals use the Conweigh Chip to communicate weight measurements to the Conweigh mobile apps, which calculate and generate the VGM certificates. This chip can be integrated into any certified Method 1 or Method 2 weighing equipment

to weigh containers, communicate weight data to the Conweigh app and create VGM declarations.

The Conweigh solution is a mobile kit that can be safely operated by one person. The basic process consists of lifting the container, attaching the pedestals to each corner fitting, lowering the container onto the pedestals, receiving their weight readings in the Conweigh app and finally generating and forwarding the VGM to the port directly from the app. Containers can be lifted through manual jacks or through the Conweigh Power Boosters, developed to reduce the risks of repetitive strain injury. Containers can also be weighed through the user's existing handling equipment.

The results

Overweight and unsafely packed containers (non-compliant to the IMO/ILO/UNECE Code of practice for packing cargo transport units (CTU Code)) have been identified and corrected prior to transport. VGM certificates generated from unsafe containers showed "Warning" or "Overweight (Must not be Shipped)" messages to alert successive parties that the container is overweight and unsafe.

Users have been able to weigh containers on-site to maximise the amount of cargo packed and eliminate risks and costs from additional and in some cases unnecessary container movement. Conweigh VGM certificates have also exceeded regulatory requirements for the road transport of packed containers. Conweigh VGMs work as an all-in-one weight declaration, giving road and port authorities confidence that containers are accurately weighed and safe to handle anytime and anywhere.

www.conweigh.net



DADM ENTERPRISES – THE AFTER-HOURS SAFETY SYSTEM

The problem

Working alone, after hours and in remote locations poses safety risks to isolated personnel. Current methods of securing a lone worker's safety generally involve measures such as periodical manual check-ins by the affected worker, a Buddy System and/or a Supervisor/Operations Manager having to be aware that a staff member is working after-hours. If either the worker or the Supervisor fails to take the required action, the consequences for health and safety can be severe.

The solution

The After-Hours Safety System automates lone worker safety procedure through the use of GPS real-time tracking technology with geo-fencing, cloud software, and 2-way smart phone SMS and Interactive Voice Response automation to alert management 24/7 in case an emergency situation occurs.

Taking advantage of the wide adoption of smart phone technology, the After-Hours Safety System works with both Android and iOS smart phones and makes other electronic safety devices and their associated fees obsolete.

Once the system is activated, all the user in isolation must do is respond via their smart phone and either an alert or a 'confirmation of safety' is sent to their management team. Even though the After-Hours Safety System has the ability to manually enter a location, it also has an accurate GPS tracking system installed and is an efficient, beneficial way of minimizing the risk to health, safety and security of an individual.

The results

The After-Hours Safety System removes the need for manual processes that can be prone to human error, thereby endangering the health and safety of lone, isolated workers.

The After-Hours Safety System automates the safety monitoring of workers and contractors who are exposed to isolation. It is suitable for all those who work remotely and is designed for use by organisations of all size. Using modern technologies, the After-Hours Safety System allows lone/isolated workers and their management to have confidence that safety is continuously monitored.

<http://loneworkpolicy.com/>



EXIS TECHNOLOGIES - HAZCHECK RESTRICTIONS

The problem

Complications can arise when container lines are shipping dangerous goods (DG), which are estimated to make up to 10 per cent of global container traffic, with potentially upwards of a thousand DG containers stowed on larger ships.

With the continued increase in slot charter arrangements and vessel sharing agreements (VSAs), critical checks need to be made against the particular voyage legs (segments between different ports/terminals) for the DG being shipped. Will the partner line carry particular DG items, for example explosives? Are there any restrictions on where items can be stowed on the ship or at ports and terminals where it will call?

Before a booking can be confirmed to the customer, it has to be sent to the partner line for acceptance, often by email and phone. The primary line taking the booking is accepting the cargo as if carried on its own ship and using its source of data for port/terminal restrictions, so it cannot explain delays by saying it is checking with another line.

Multiply this process by the thousands of partner line DG bookings made each day plus the number of ports/terminals in the network and the scale and complexity of the problem becomes clear. There is no single database of port/terminal restrictions or indeed carrier restrictions. Each shipping line is trying to capture and keep its own record of port/terminal restrictions as they change on a frequent basis anywhere in their global network.

The solution

Hazcheck Restrictions is an internet portal which simplifies customer/partner line bookings for container ships using slot charter agreements or VSAs.

It started as an initiative with several major lines that were using Exis Technologies' Hazcheck DG Systems to help simplify the management of prohibition/restriction checks during the DG booking process.

Participating lines can enter/upload and maintain operator, ship and port prohibitions/restrictions on the portal. Each line controls its own data and authorises access for partner lines who can then check the DG compliance and accept a provisional booking. Lines can also download the complete set of prohibitions/restrictions into their own IT systems and check the provisional booking there.

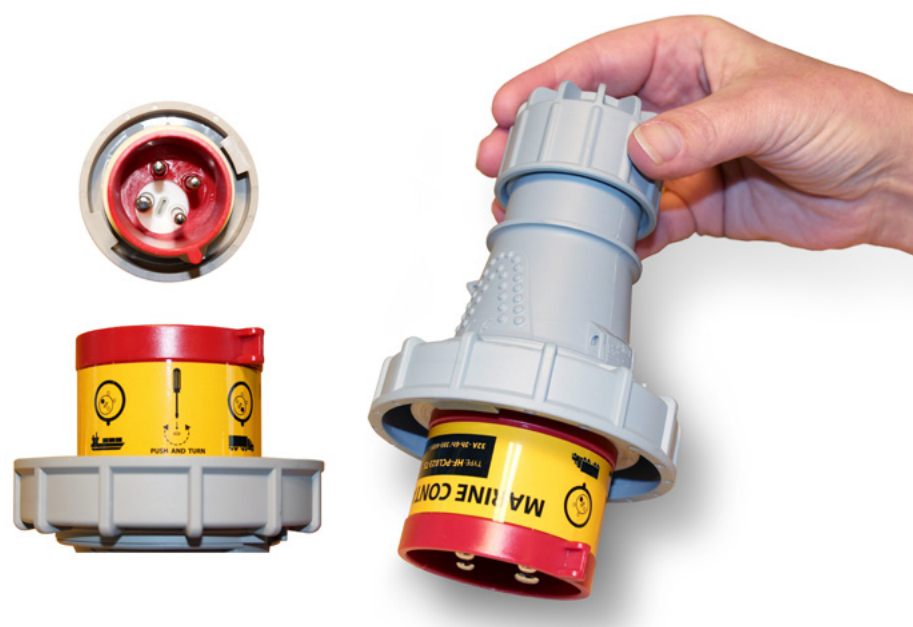
Hazcheck Restrictions is currently supporting the management of shipping line restrictions, but the design also allows the user to store and share data relating to location, port/terminal and ships. Exis is now working with the container shipping community to develop this part of the database with key industry partners, specifically ports and terminals.

The results

To date, 3 major container shipping companies are using Hazcheck Restrictions for their DG restrictions checking. As a result of initiatives like this the process for accepting DG has become more automated, with time to carry out acceptance coming down from more than a day to hours in some cases. There is an acceptance within the industry that data sets should be shared between alliances, and between different stakeholders, to improve safety to the benefit of all.

www.existec.com





HANS FØLSGAARD – CONVERTIBLE 3H/6H REEFER CONTAINER PLUG

The problem

For years now, refrigerated container (reefer) logistics have been bedevilled by the difference between the female receptacles most commonly used on ships and terminals, and the receptacles found on landside equipment, including trucks and gensets.

For reasons that are somewhat lost down the line of history, the plug that powers the reefer container is keyed differently to the land-based CEE plug. The position of the earth-pin on the plug for marine is set to 3H, and land is set to 6H – as in three or six o'clock on a clock-face.

This means that the otherwise similar power plugs run on two different standards, depending on the placement of the reefer, thus minimising the value of the so-called standard plug. To date, the industry has not been able to fully standardise on a common CEE plug configuration.

Aside from the impact on operational efficiency,

this state of affairs poses potential electrical shock risks to workers

The solution

Working with Maersk, Hans Følsgaard has developed a convertible 3H/6H CEE male plug design. The IP67 certified plug can be converted from the 3H to the 6H position using a screwdriver to push down a latch and rotate two of the four pins of the plug by 180 degrees clockwise or counterclockwise to change the pin-out of the plug. A latch gives a well-defined click to indicate the twist has done a full half-circle.

The results

In cooperation with Maersk Line, the product has now been introduced to the market, ensuring that handlers and users will not risk electrical shock due to defective or inappropriate plugs.

www.hf.dk



INDURAD/PACIFIC COAST TERMINALS – AUTOMATED BULK SHIPLOADING

The problem

Automated loading of bulk ships has long been one of the biggest dreams of the mining and material handling industries. Bulk crane operators are exposed to health and safety issues including dust, collisions and falls, and in many cases also are responsible for manually determining the accurate distribution of materials in ships' holds, with critical impact on ship safety.

Pacific Coast Terminals (PCT) in Vancouver BC, Canada wanted to make an investment in technology that would allow the operator cab to be removed from the shiploader boom. Collision avoidance and the safety of crane operators were the main requirements for the new technology, together with more accurate ship positioning and volumetric distribution of cargo to improve ship handling efficiency.

The solution

Years of research by indurad and industry experience have shown that the feasibility of automatic shiploading primarily depends on the precision and reliability of the sensors that scan for collision objects, provide position data and measure the interior of bulk carriers in real-time during loading/unloading.

The indurad radar technology claims to be the first industrial grade sensor system to truly live up to these requirements. Indurad's Shiploader™ system acts as a collision avoidance and 3D scanning system to provide the remote operator with all the data they need to "see" and "feel" the machine during operation. Several indurad radar sensors are installed around the shiploader in key locations, including next to and under the boom to scan for

collision objects, and at the chute to measure the loading material and provide protection for the chute and boom tip. The position of the shiploader is determined in a fail-safe manner by the indurad State Measurement Unit Global Navigation Satellite System (GNSS) with differential Global Positioning System (GPS). This also allows for the measurement of ship drift, trimming and tide. All information is processed in the indurad Radar Processing Unit (iRPU™) that integrates into all Programmable Logic Controller (PLC), Supervisory Control and Data Acquisition (SCADA), Manufacturing Execution Systems (MES) already existing.

The results

All parties involved in the PCT project - including labour, training, integrator, sensor supplier and port - worked very well together, having a common vision of providing a more safe workspace to the operator by removing the workspace from the boom to an office.

The new technology increases productivity compared to direct operation on the shiploader and relocates operators to a safe office-based environment next to amenities and colleagues.

The PCT development demonstrated that safety and productivity can go together and that a project is usually successful if all parties work together.



LASE – LOAD COLLISION PREVENTION SYSTEM FOR YARD CONTAINER CRANES

The problem

Container stack topples pose a considerable safety, productivity and cost risk to terminal operators. Collisions between equipment and containers during yard operations are a particular concern. Nearly 75% of these incidents happen in the operation bay and 25% in adjacent stacks. Collisions account for 70% of yard crane insurance claims for damages to equipment, containers and cargo, plus injuries and worse. Additionally, yard collisions cause extended downtime for the affected crane and associated equipment.

The most serious consequence of toppled containers falling into the truck lane alongside yard cranes is of course fatal or severe injuries to humans. This is especially the case in terminals where truck drivers are not allowed to leave their vehicle.

Load collision prevention systems (LCPS) are already on offer using a 2D laser scanner attached under the yard crane. However, such systems do not provide full safety - for instance there is no detection of adjacent stacks - and can slow down operations.

Moving forward from current solutions, laser technology company LASE GmbH wanted to create a next generation LCPS for rubber-tyred and rail-mounted yard cranes that met today's increased performance requirements, including reliable protection against malfunctions and operational safety, and provided support for automation.

The solution

The LaseLCPS-3D-2D system satisfies the demand to transition from manual to automated operations and also improves communication between man and machine. The laser-based measurement system scans the whole container yard environment and

enables crane movements without any collision accidents. At the beginning of 2017, the LaseLCPS-3D-2D was certified to Performance Level D category 3 of EN ISO standard 13849-1 by the German BG Employers' Liability Insurance Association. The certification by this statutory body is a milestone in the product development and meets today's requirements on performance levels for safety standards in the port industry.

As well as supporting automated operations, the new system provides active assistance to crane drivers. Like a parking assistant system in cars, the driver receives visual and acoustic signals while moving the crane via an indicator panel in the cabin with LED lights and a sound module. If the crane/spreader come too close to the container stack, the system status turns from green to yellow and automatically triggers a speed reduction down to 5% in trolley or hoist movement. In case of a near miss, the panel indicates a red light and sounds an alarm.

The results

This system makes major contribution in risk reduction in container handling operations. Feedback from crane drivers is fully positive and they rate it as a real help during their daily work. They do not lose their "feeling" for the crane and benefit from the support of advanced driver assistance. No collision incidents have occurred in facilities where this system has been installed.

www.lase.de

LASE
Industrielle Lasertechnik GmbH

LEHNERT – COLLISION PREVENTION FOR SHIP-TO-SHORE CONTAINER CRANES

The problem

Collision prevention for ship-to-shore (STS) container cranes had to be ensured even when the anti-sway system was switched off, to ensure continuous safety for people, equipment and cargo.

The solution

Lehnert Regelungstechnik GmbH offers electronic anti-sway, positioning and collision avoidance control solutions for cranes. Previously, the company's LENNIX Charlie system for STS gantry cranes had no collision prevention functionality if a crane driver had switched off the anti-sway system.

Lehnert therefore developed a "Smart Activation" function, which monitors driver behaviour at all times so as to detect and prevent collisions even when the anti-sway system is switched off. This helps manage human error and ensure that the system provides collision avoidance in all situations

The results

Cranes, crane drivers and loads stay safe and sound at all times.

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PORT-SAFETY – LIFELADDER

The problem

Safety ladders are found in ports worldwide. They are pathways to safety and often the only mean of rescue for a person in distress in the water. Traditional safety ladders are made of galvanized steel and at many ports are painted every so often to enhance safety. The selected material has been the same for decades and comes with some challenges, particularly corrosion. Even with regular maintenance, steel ladders can be very difficult to find, especially at night time.

The solution

LifeLadder from Port Safety is a new generation of safety ladder that increases the safety of harbour fronts by addressing two key issues: visibility and maintenance. The ladder is made of reinforced synthetic modules in a bright, yellow color that ensures visibility during daytime. At night, solar-powered LED lights provide visibility and clear direction to safety. The robust and non-corrosive materials are maintenance-free and have already proven their worth in harsh maritime environments.

LifeLadder is suitable for use worldwide across all ports and quay wall designs and has already been contracted by several different facility types including container, oil, bulk, ferry, locks, and city environments.

The LifeLadder is designed for flexible installation with customisable fixation points. Due to its lighter weight, it is easier to handle and install than the traditional steel version. Like conventional safety ladders, LifeLadder should be protected by fenders or installed in niches to avoid impacts from large ships. The depth of the LifeLadder has been minimised without compromising on matching industry standards, where EN14329 calls for minimum 15cm from the centre of the step to the quay wall. Where the installation is protected by a niche, it is important that the niche should be at least 20.3cm deep, or be combined with protection from fenders. Through an annual replacement programme, ports can upgrade



their safety ladders to the LifeLadder solution in line with their regular replacement needs. The annual replacement program includes a fixed price, providing assurance on future costs. At the same time LifeLadder delivers reduced maintenance costs.

The results

Based on the change in material and a unique construction (patent filed), an original solution delivering 24/7 visibility is achieved. LifeLadder not only improves safety but also reduces the total costs of ownership. The modular construction contributes to improvements in sustainability, as repairs only involve replacing damaged modules rather than an entire ladder.

LifeLadder represents a simple solution which by its nature also contributes to increased safety awareness. As a Pilot / MasterMariner comments: "As a professional user of ports, I often need to move across the quay wall. This takes place at all hours of the day and in all kinds of weather. I consider the implementation of LifeLadder to represent a significant improvement in the safety level for seamen and other professional users of ports – given the solution can be applied across all types of ports, and thereby also benefit civilian activity on or near quay walls, adds even further to the contributions this innovation can bring."

<https://port-safety.com>

PORT OF SALALAH/CAVOTEC - AUTOMATED SHIP MOORING

The problem

The handling of mooring lines presented injury risks to berth personnel and ships' crew at Port of Salalah, including extreme risk from breakages and 'snap-back' during the Khareef (monsoon) long wave season in Oman. The port was looking to reduce the risk to personnel on the ship and quayside as well as to avoid container mishandling when loading and offloading ships.

The solution

The solution was to install an automated mooring and remote monitoring system on all berths, removing the requirement for mooring lines of any kind. The system selected was Cavotec's MoorMaster™ automated mooring system, specifically the MM400E15 unit. MoorMaster is a vacuum-based system that can hold ships up to the largest 450,000 dwt bulk carriers and 18,000 TEU container ships. Remote-controlled vacuum pads, recessed in or mounted on the quayside and attached to hydraulic actuated arms, extend, attach and moor ships in a few seconds.

In operation, electronic hydraulic controls minimise ship movement (surge, sway and yaw) to maintain the ship's position with precision accuracy, automatically adapting to tidal and draft changes. Units can also be used to warp the ship position without the need for ship's own steam or the help of tugs.



Conventional mooring normally takes 20-90 minutes, involving mooring gangs, ships' crews, pilots and tugs. MoorMaster requires just 30 seconds for mooring and 10 seconds to detach, says Cavotec. The system needs only one person to operate it - either a single port officer or even the ship captain, equipped with a smart remote.

The system incorporates continuous load monitoring and alarm functions relayed in real-time to operations personnel onshore, onboard and/or in the port control office. Alerts can be sent to pagers, mobile phones and other devices.

The results

By implementing automated mooring, Port of Salalah has eradicated the risk of injury to port staff and ship's crew associated with mooring lines and sudden unplanned detachment of the ship from the berth. In addition to the safety benefits, the Port has increased container handling efficiency and speed of ship turnaround, reducing mooring time by around 90%. Air and noise emissions during mooring operations have also been reduced by around 90%.

www.apmterminals.com/operations/africa-middle-east/salalah

www.cavotec.com



SHORETENSION - DYNAMIC MOORING SYSTEM



The problem

Berthed ships face increasingly severe weather conditions, due to climate change and construction of more marine terminals in exposed areas. Furthermore, increasing demands on the accessibility and operability of terminals impose higher demands on mooring facilities. The continuous growth in ship size also poses fundamental challenges for the safety of mooring and berth operations. Due to the increased lateral wind areas of, for example, large container ships, car carriers and cruise ships, mooring lines are exposed to high loads under severe wind conditions.

The solution

The ShoreTension® system has been developed to enhance the mooring capabilities of large ships, providing high tension and paying out the mooring line to cope with peak loads without exceeding the minimum line breaking load.

With the traditional method using mooring lines on bollards, ship movement is always present. In extreme conditions, the tremendous pressure this exerts on the ship can cause the mooring lines to snap, with potentially serious consequences. ShoreTension mitigates this risk significantly, allowing ships to be moored to the quay more sturdily and safely. In addition, the flexibly deployable systems allows terminals to operate more efficiently. As ships are moored alongside the

quay with greater stability, ShoreTension promotes unhindered quay crane operations and reduces the risk of damage during unloading and loading.

The cylindrical device requires no electricity except for an external hydraulic system, which only needs to be used once to get the ShoreTension to the correct setting. After that, the device hydraulically moves along with the forces to which the mooring line is exposed. This process continues perpetually without the need for additional energy. ShoreTension aims to keep all mooring lines at the same, constant tension regardless of swell, waves, wind and passing ships. The system continuously measures mooring loads and alerts users when safe working load (SWL) limits are exceeded.

Depending on ship size, weather conditions and local conditions, two to four ShoreTension devices are needed for optimal operation. The system has been developed for all loads and is adjustable, ensuring compatibility with all other mooring devices such as bollards and fairleads. It has been certified by Lloyds Register with an SWL up to 150 metric tons.

The results

ShoreTension has delivered up to 90% reduction in ship motion compared to a conventional mooring arrangement.

<https://shoretension.com>

SIAM SHORESIDE SERVICES – AVOIDING ELECTRICAL RISK FROM REEFER SERVICING

The problem

Day-to-day operations with electrical work pose a risk of electrocution, which is the 4th ranked risk in APMT Terminals' Fatal-5 risks. The Reefer Technician and Safety team at Siam Shoreside Services in Bangkok identified some electrocution risks that were not covered by freely available safety equipment and wanted to address these.

The solution

The team invented, designed and produced their own Lock-Out Tag-Out device to prevent the possibility of mistakenly plugging in a reefer cable while another technician is repairing the reefer unit. This invention makes it impossible to plug the cable in a socket and so eliminates the electrical hazard for working people.

The solution is practical, cheap and easy to use. The device is made from easy-to-obtain standard PVC material. The cover is made from the PVC cap which is heated and put in a special mold to create the shape. The addition of a hole in the side gives the users the option to physically secure the cover over the plug at the end of the cable with a lock.

Like the typical Lock-Out device, one person needs to be responsible per device. The electrical hazard must be isolated before starting work. The name of person in charge, date, and time needs to be written on the individual device. Only that person can unlock the device with his/her own key.

With everyone taking part in the design and brainstorming, and the deep understanding of the risk of electrocution, the team immediately started using the device and it became standard practice within a matter of days. Siam Shoreside Services has also rolled out use of the device to

other areas where plugs at the end of cables are sometimes out of sight from the person working on the device and the company is now creating further sizes and types. The company reports that its Reefer Technicians are willing to use the Lock-Out device on each reefer box, making it an effective preventative and effective solution.

The results

The new device prohibits anyone from causing harm to other people when wrongly plugging a cable into a power socket. The employees' safe working environment has been guaranteed and by including them in the development process they have embraced the new tool and use it all the time. The Lock-Out device is firstly initiated to create safe work with the maintenance and repair of reefer containers. The invention will be further enhanced to be waterproof and to fit on various plug sizes. This can also be applied more broadly in the reefer container industry to prevent electrical hazards to working people.



SIAM SHORESIDE SERVICES BANGKOK – WORKING AT HEIGHT

The problem

Container inspection is one of the crucial processes in the operation of inland container services. Whenever a truck enters or leave the depot, every container is required to undergo a full inspection in accordance with the Institute of International Container Lessors' IICL-5 regulations.

Until recently, inspections were conducted without any separation between truck/handling machine and personnel. Consequently, there was a risk for people standing in the blind spot of the trucker's view. As the container is on a chassis, inspectors also faced a risk of falling while stepping in and out of the container or when doing a roof inspection.

The original process of container inspection also consumed a large quantity of time and resulted in traffic congestion at the gate.

The solution

To address the problems, Siam Shoreside Services has invented, designed and built the 'Inspection Platform' where a truck can stop safely and the inspection can be performed. These all-in-one platforms are situated next to the traffic lane and offer a full walkway around the container to check both side panels. By means of lowering a walk-bridge at the back of the container (door end) at

the same height as the chassis, the inspectors have a safe way of inspecting the outside and inside of every container.

The roof inspection area is also fitted with a lifeline to prevent falling from heights. As a result, inspectors are never again required to be on ground and risk the possibility of being hit by a moving truck.

The structures were built in-house and checked by a certified engineer to confirm the strength and structural soundness of the design. After that, platforms were placed in their locations and traffic lanes have been further separated by concrete blocks. The inspection platforms have been separated from the actual gate booth to provide dual working of both activities at the same time on different trucks.

The results

The final result of the project is clear separation between man and machine, as well as taking away the risk of working at height. People no longer stand on the ground between trucks. The Inspection Platform has increased safety for our people and has enhanced productivity. Hence, operational efficiency is increased while optimal safety is achieved.

STARBOX INTERNATIONAL - WINDBREAKER FOR EMPTY CONTAINERS

The problem

Once containers are on the move on truck, rail, barge or at sea they are well-secured with twistlocks. In container yards, inland depots and empty stacks, however, this safety is at stake. Rains, wind and storms are stronger than before, causing damage to containers, especially to the empties that are piled up and light in weight. Limited space has forced depot operators to stack containers to risky high levels, often in port areas close to the sea with a bigger chance for heavy winds.

The solution

The Windbreaker has been designed to connect empty containers in the top row of a stack to reduce the risk of a stack being blown down by high winds. It is a straightforward system for lashing stacked empty containers.

Basically, the Windbreaker is a patented metal bracket with two fittings that slide into the corner castings of containers on top of adjacent stacks. Two windbreakers are manually placed on one side of a container on the ground before it is lifted onto the top row of a stack.

When the container is lowered into position the hook elements drop into the corner castings of the adjacent container, securing the stacks together. A technical report of the independent research organization TNO shows that a horizontal connection of a row of containers provides a very high level of protection against high winds.

The Windbreaker has been designed and tested for a breaking force up to 120 knots. It is a cost-effective protection system for container depots

and container owners, reducing downtime caused by damaged containers to a minimum and dramatically improving safety.

This innovation allows empty depots and yards to operate more safely during storms, and also offers the opportunity to reduce insurance costs with a proven record of fewer incidents over a longer period of time. Staff will feel safer and labour inspectors will be assured that safety provisions are in place to help protect workers during bad weather.

www.starboxintl.com/containers/windbreaker



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VISTRATO LIMITED - 3D TRAINING PROGRAMME

The problem

Discharging dry bulk material from ships poses significant safety and operational challenges to terminal personnel as well as safety implications for the ship and its crew. The unloading of solid bulk materials such as iron ore, coal and bauxite/ alumina from bulk carriers must be carried out in accordance with the mandatory requirements of IMO's International Maritime Solid Bulk Cargoes (IMSBC) Code and the recommendatory requirements of the IMO Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code) and BLU Manual.

A busy bulk terminal operated by Aughinish Alumina in Ireland - Europe's largest alumina refinery - which used a large grab unloader to discharge ships, identified the need to improve its safety performance, reduce grab damage to ships and improve its operational efficiency. The challenge was to change the behaviour of crane operators, who considered themselves to be operating at optimum levels, as well as terminal personnel, so as to adopt standardised operating methods across all of its four operations teams.

The solution

Vistrato Ltd created an immersive training program using 3D environments to show the consequences and implications of poor operating practices by both crane and pay loader operators.

All assets were realistically modelled in 3D to engage the learner, including a Panamax bulk carrier and a full bulk terminal with all equipment and machinery in place. The program demonstrated how incorrect grab operation and non-compliance with the ship's unloading plan can lead to damage and overstressing of the ship's structure,

with potentially devastating results. The screen-based product demonstrated the correct operating practices in a manner that ensured fast knowledge transfer, giving invaluable insights to all the personnel concerned and thereby ensuring 100% acceptance and compliance.

The product was readily adopted by all the personnel concerned, following some short introductory and coaching sessions. Training was delivered to operations personnel by their team leaders and was then followed up with on-the-job coaching with each operator, as required, in applying the new standardised techniques. The feedback received from the operators themselves was very positive and encouraging. The product resides on, and is delivered from, the company's internal network.

The results

The result of this project was an immediate improvement in safety awareness and operating rates, a reduction in grab damage and improved ship/shore cooperation. Within a matter of 3 months, safety performance at the ship/shore interface had improved all round, unloading rates had steadied out at a consistent rate across all four teams and damage was negligible.

The terminal management call this product 'ground breaking' and use it continually to address any slight slippage in safety awareness or performance. The result is always an immediate improvement back-up to steady operation. All new jetty operators are now given this training initially, with scheduled refreshers.

<http://vistrato.com>



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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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