

Addressing container yard safety

Peregrine Storrs-Fox, risk management director, TT Club

Container yard operations, located both at port terminals and at inland depots, have drawn the attention of safety experts, who have issued recommendations aimed at reducing the incidence of accidents which result in bodily injury, cargo damage, equipment damage and operational downtime. According to the analysis of insurance claim data provided by the freight transport specialist insurer TT Club, telling statistics are revealed, such as: 53 percent of the total costs of operational-related claims were caused by yard equipment; 75 percent of the cost of injury claims in terminal facilities resulted from yard equipment accidents and 67 percent of costs related to fires were attributed to yard equipment. This analysis was based on a total of over 4,000 claims valued above US\$10,000 received over a six year period from operators of container terminals, yards and other container handling facilities, with a total cost of US\$341 million.

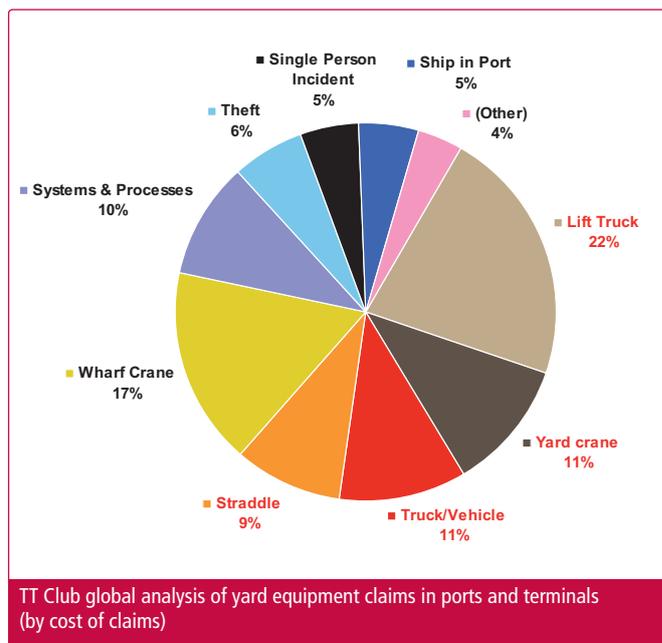
“These headline findings point to a heavy concentration of avoidable incidents”, comments Laurence Jones, TT Club’s director of global risk assessment. “Analysis of TT’s data shows that up to 1,600 claims amounting to US\$130 million resulted from such incidents. Changes to operational procedure, additional training and/or fitting safety equipment to machinery could significantly reduce this bill.”

For example, lift trucks were involved in 30 percent of the bodily injury claims analysed. This was mainly the result of trucks reversing into people. The installation of anti-collision devices could potentially have saved US\$30 million and prevented 51 workers from being killed or suffering serious injury over the last six years.

Recommendations to improve safety

In order to try and reduce the consequences of these risks, TT Club has once more joined with two leading associations from the cargo handling industry, the Port Equipment Manufacturers Association (PEMA) and International Cargo Handling Co-ordination Association (ICHCA), which represents port and terminal operators, to recommend minimum safety features for container handling operations. The past joint initiative of these three organisations in campaigning for increased safety measures to be adopted in quay crane operations included the publication of the ‘Recommended Minimum Safety Specifications for Quay Container Cranes’ in 2011. Now attention turns to the operation of container yards with the release of ‘Recommended Safety Features for Container Yard Equipment’.

The chart below puts some meat on the bones of the basic results of the claims data analysis, outlining the relative proportions of the cost of claims represented by each type of yard equipment. This predicated the structure of the recommendations which outlines in tabular format the safety feature, and functional requirement associated with it, that can be employed to minimise each specific safety risk for seven different types of equipment. These include rubber-tyred gantry cranes (RTG), rail-mounted gantries (RMG), manually operated and automated straddle-



carriers, reach stackers/lift trucks, automatically guided vehicles (AGV) and terminal/yard tractors.

Content of the recommendations is not exhaustive, but it does constitute a shortlist based on experience, accident records and insurance claims analysis. The ultimate goal of the initiative is that the recommended safety features, which have been proven to reduce injury and damage, be adopted by the industry.

It is preventative measures that are key to the future minimisation of hazardous incidents and while many of the recommended safety features and technologies are available and proven, they are not commonly part of standard specifications. However, the TT Club and its partners advise that adoption of the recommendations must go hand in hand with safe procedures, training and effective maintenance and yard design, including controlled traffic flow arrangements and speed limits.

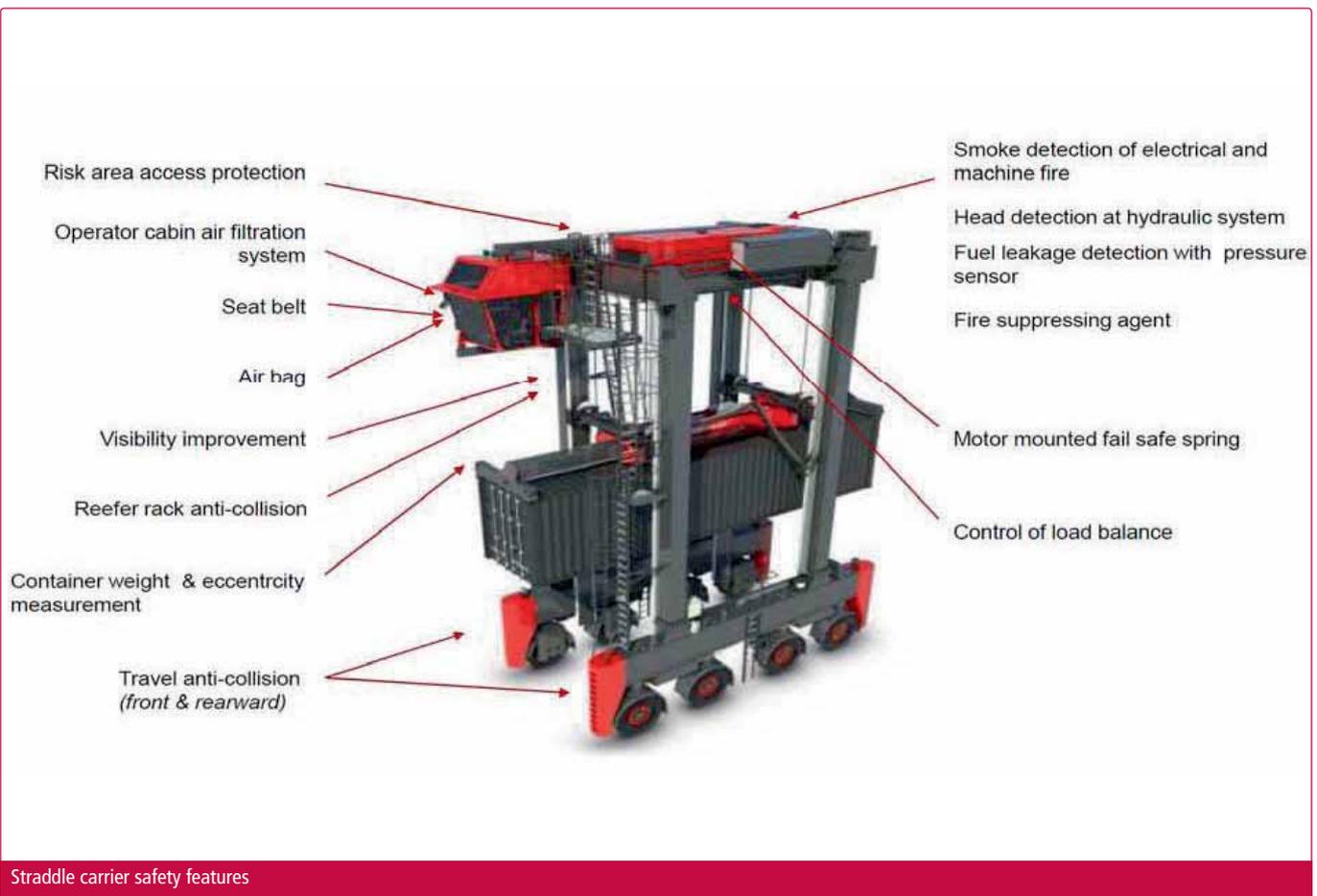
Laurence Jones illustrates the potential positive effect of such measures. “Most fires in yard equipment, for example are caused by fuel or hydraulic leaks in the engine compartment. Efficient servicing and cleaning procedures, the use of only good quality hydraulic hoses and fittings and the installation of effective fire suppression systems can almost eradicate these occurrences. An effective fire suppression system costing from US\$1,000 to US\$5,000 could prevent the write-off of the equipment, such as a lift truck valued up to US\$500,000, and reduce the risk of serious injury.”

An aid to equipment procurement

A principal aim in producing these recommendations is to provide baseline safety features that can be used in the procurement of new yard equipment. Many, if not all, of these

Straddle carrier recommended minimum standard safety features

SAFETY RISK	SAFETY FEATURE	FUNCTIONAL REQUIREMENT
Equipment colliding with reefer racks and objects on tracks or near vicinity.	Travel anti-collision.	A minimum of 2 detection zones: Warning or slow down and stop. Detection range shall be such to allow enough time for the straddle carrier to come to a 'normal' stop. Annual test of stopping distance required due to wear, tear and aging of the braking system.
Drivers adversely affected by emissions or other air pollutants at waterside.	Operator cabin air filtration system.	The cabin shall be provided with a proven positive pressurised air filtration system with high efficiency particulate and gas absorbers or similar to protect the operator from harmful emissions from ship air pollutants.
Uncontrolled movement caused by sudden high wind.	Equipment braking/parking insensitivity against improper use and manipulation as well as environmental aspects and influences.	Equipment braking system shall be designed to hold the equipment with a wind speed of 40m/s wind. Fail-safe spring-applied brake design, where torque is applied by several springs, should be specified.
Overloaded or mis-declared container weights and eccentrically loaded containers.	Measure the weight and eccentricity of each container/load.	System to measure, indicate and record the actual weight and eccentricity of each container/load. Data to be capable of being transferred to the terminal operating system.
Electrical and machine fire.	Temperature and/or smoke detection on the machinery/electrical platform.	A temperature and smoke detection alarm system which give audible and visual alarms in the driver's cabin and on the machinery platform. In case of temperature/smoke detection the information should be transmitted to the maintenance office.
Equipment fire due to hydraulics or fuel.	Protecting equipment against the risk of fires with reliable fire detection and suppression.	For hydraulic systems: a head sensor at the hydraulic system that can stop activities after hydraulic oil reaches 90°C degree to avoid the risk of fire. For fuel systems: a pressure sensor after the fuel pump to warn the operator of fuel leakage and stop the engine immediately. Use of fire detection and suppression system in engine compartments
Falling or jamming between movable parts of the equipment while personnel are entering enclosed non access or operating areas.	Prevent unintended access to risk areas.	Spring set self-closing gates with positive means to open. Any access gates to risk areas shall be interlocked to prevent access when not in parked positions or when in operation and to prevent equipment operation when open. Use of safety relevant door switches is recommended, ideally with locking function until dangerous movement has come to a complete halt.
Tipping of a container.	Control for even load distribution.	Control for load balance on all ropes. Shut-off of lifting engine if load is unbalanced or allowable eccentricity of the centre of gravity is exceeded.
Equipment colliding with reefer rack.	Reefer rack anti-collision.	A minimum of 2 detection zones: Warning or slow down and stop Detection range shall be such that it will allow enough time for the crane to come to a 'normal' stop. Annual test of stopping distance required due to wear, tear and aging of the braking system.
Injury by equipment accidents.	Seat belt provision.	Seat belt protecting driver from intense brake actions or equipment accidents.
Equipment collision in yard.	Driver stability and visibility.	Air bags to prevent serious injury if straddle topples. High visibility reflective stripes on side and rear of legs. Eye level LED brake lights.



Straddle carrier safety features

safety features can also be retrofitted to existing yard equipment and this is equally recommended. A further objective is to encourage suppliers to include some or all of the features listed in the recommendations as standard in all their quotations for new equipment. Terminals and buyers are also encouraged to include them in their tender specifications.

While equipment procurement will always be price sensitive, requiring in many cases a significant budget, buyers will not always be familiar with the most effective safety technologies. Once more the recommendations seek to remedy this. Furthermore, the purchase process is frequently complex: any quote needs to be carefully assessed against the invitation to tender, and subsequent change requests can be costly. For these reasons, the tender specifications should provide a minimum safety baseline. If all equipment suppliers were to adopt these features, it is not anticipated that competitiveness would be affected, nor should it significantly affect the equipment base price.

The resulting safety enhancements would reduce injuries and damage costs over the life of the equipment, and improve the reputation both of the port and container terminal industry and the equipment manufacturers through the increased focus on safety.

Yard equipment manufacturers that include the recommended minimum safety features in their initial quotations, and not as optional, will be entitled to state in their tender quotation: 'This tender quotation includes all the minimum safety features recommended by PEMA, the TT Club and ICHCA International'.

It is important to stress that applicable international, national and local regulatory standards are mandatory, while these recommendations are voluntary. The Machinery Directive, which is mandatory in all EU member countries and also now accepted in many countries around the world, represents one such key regulatory standard which these recommendations seek to support.

Safety feature analysis

The extensive table of information and the graphic below is an example of the level of detail included in the recommendations. This one relates to straddle carriers, one of the eight specific types of equipment analysed.

In conclusion

TT Club's Laurence Jones outlines a typical cause/effect and prevention equation that can occur in container yard operations. "A typical risk in the operation of RTGs, for example is the crane colliding with objects in the near vicinity. Anti-collision sensors are available and should cover a minimum of two detection zones in the direction of travel of the crane. If an obstacle is detected in one of the zones either a slow-down warning to the operator will be triggered or, if the obstacle is closer, an automatic stop will be activated. Detection zones should also be designed for pathway and cross-travel anti-collision eventualities. Finally, annual testing of stopping distance will be required due to the wear, tear and aging of the braking system on the equipment."

While many of the features will be familiar to operators and manufacturers alike, it is unlikely that those that consult the recommendations will be aware of all the technology or operational processes. They will certainly not have encountered such a comprehensive guide to safety in container yard operation. The hope of TT Club and the associations is that these minimum recommended safety features will be adopted generally by equipment suppliers and buyers both on new and existing equipment to improve safety levels at the world's ports. Visit www.ttclub.com if you would like to review the full text of the Recommended Safety Features for Container Yard Equipment'.

ABOUT THE AUTHOR



Peregrine Storrs-Fox, read Law at Southampton University, specialising in the law of carriage and international trade. He has been with the TT Club since 1984, firstly handling claims and providing advice to all types of transport and port until the late 1990s when he was directing claims operations worldwide for the Club.

Since 2002, Peregrine has led the TT Club's internal risk management framework as well as directing its loss prevention services to Members. In this role he is responsible for the Club's publications and briefings on many operational issues and handbooks.

ABOUT THE ORGANISATIONS

TT Club is well capitalised and backed by an AM Best A- (Excellent) financial strength rating. It has four underwriting centres in London, New Jersey, Hong Kong and Sydney and a network of claims offices in a further sixteen countries giving local support when it's most needed. The Club is committed to providing excellent service and has worked with brokers over many years to tailor propositions to the specific needs of their clients. A personalised claims service is supported by a philosophy of being at the members' sides and the Club takes a sympathetic approach to paying claims. The Club also has a dedicated team of risk professionals who run an innovative risk management and loss prevention programme which provides information on good practice, legal and industry developments.

ICHCA International is the only global association dedicated to the promotion of safety and efficiency in the handling and movement of goods by all modes and throughout the supply chain. It operates through a series of local, national and regional chapters, panels, working groups and correspondence groups and through its NGO status represents the cargo-handling world at various international organisations. Members also benefit from consulting services, informative publications dealing with technical matters, best practice advice, and cargo handling news. Members include ports, terminals, transport companies and other groups associated with cargo handling and coordination.

PEMA was founded in 2004 and provides a forum and public voice for the global port equipment and technology sectors. The Association has seen strong growth in recent years, and now has 47 member companies, including crane, equipment and component manufacturers, systems and software providers, consultants and industry experts.

ENQUIRIES

Peregrine Storrs-Fox
Email: Peregrine.Storrs-Fox@thomasmiller.com

safe power...safe data...safe operation...save money

save

Lightweight, durable and energy-efficient: low-friction P4 rol e-chainsystems® for 57% less drive energy consumption + Easy to install and corrosion-free modular aluminium-guide troughs for less system weight + High-speed data transmission with rugged chainflex® fibre optic cables + Easy PPDS 2.0 condition monitoring system for push-pull forces to prevent downtime.

Visit us: TOC Europe, Netherlands – Booth C96 / 11th Asian Ports and Shipping, Vietnam – Booth 19 / 2nd Black Sea Ports and Shipping, Turkey – Booth 47

igus®-cranes.com

plastics for longer life®

igus® GmbH
Spicher Str. 1a

D-51147 Cologne
cranes@igus.com

phone +49-2203-9649-0
fax +49-2203-9649-222

Austria +43-7675-40 05-0
Belgium +32-16-314431
Brazil +55-11-35314487
Canada +1-905-7608448
China +86-21-51303100
Denmark +45-86-603373

France +33-1-49840404
Great-Britain +44-1604-677240
India +91-80-39127800
Italy +39-039-5906-1
Japan +81-3-58192030
Malaysia +603-7880 5475

Mexico +52-728-284-3185
Netherlands +31-346-353932
Poland +48-22-8635770
Portugal +351-22-6109000
Singapore +65-64871411
South Africa +27-11-312-1848

South Korea +82-32-8212911
Spain +34-936-473 950
Sweden +46-42-329270
Switzerland +41-62-3889797
Taiwan +886-4-23581000
USA +1-401-4382200