

Twistlock Handling

The Last Major Port Challenge



By: Cameron Hay & Mani Chellappa

With the top 100 ports in the world now handling more than 700 million TEU's, there is growth in automation and technology to improve productivity, but one key area remains untouched

Twistlock handling...



In this article we discuss the function of the twistlock cone, the hazards of manual handling of cones, and what systems are being used to help improve the task.

There are a number of hazards encountered in manual twistlock handling, that are impossible to avoid in a port.



With the amount of containers being shipped around the world more than 2 billion twistlock cones are removed manually each year.

“2,000,000,000

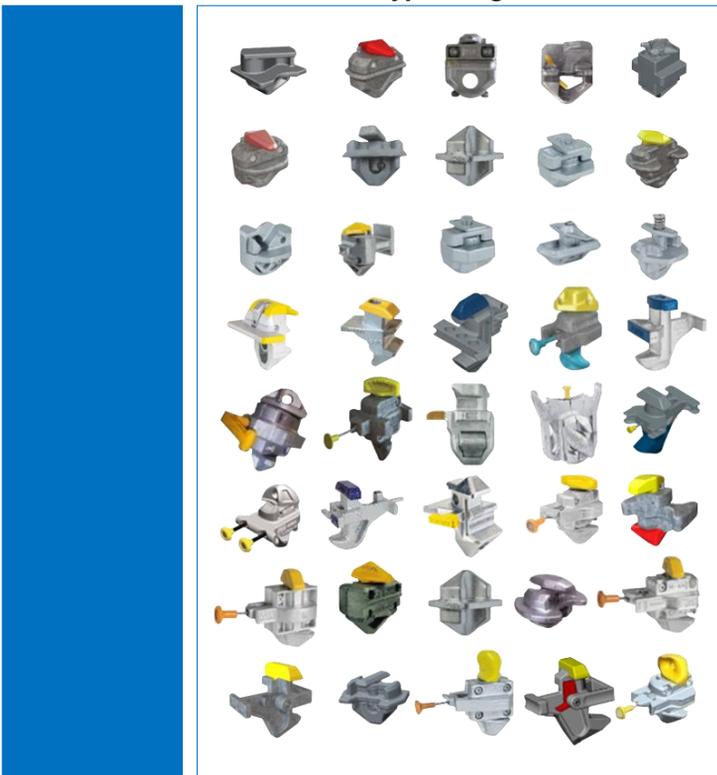
Twistlock cones are removed per year ”

Twistlock Function and Types

Twistlock cones are designed to safely secure shipping containers together on the ship. They are fitted into the containers corner castings at the port during the loading process and are removed at the destination port.

Millions of twistlocks of various shapes and designs are in global circulation today. Each providing their own unique way of locking, with more new designs being developed and circulated.

A selection of twistlock cone types in global circulation



“>50 cone types
are in global circulation”

Hazards of twistlock handling

1. Suspended loads



2. Quayside traffic



3. Manual handling



Taking the strain

Due to the many twistlock cone designs, it is necessary to deploy port workers to carry out this task. Manual handling of twistlock cones impose a great strain on worker safety, productivity and operations management.

Twistlocks handling presents three main hazards:

- 1) Suspended loads
- 2) Interaction with horizontal transport
- 3) Manual handling strains & sprains

For many years, ports have tried to reduce this risk and improve productivity and developed a number of 'sub-optimal' solutions.



Systems to improve the job

Ports, have for many years tried to improve the job of twistlock removal.

These include:

Movable platform under the crane

Used mainly in straddle terminals.

The platform is an intermediate 'point-of-call', to drop the box without the crane having to wait, and workers being near a suspended load.

Remote pinning stations

Designed to remove workers from the dangers of quayside traffic. Consisting of small hut type shelters, located away from the crane, where workers remain until the truck arrives, before taking the cones from the container.

Crane Platforms

A similar way to remove workers from quayside traffic, consisting of a crane based platform, where the container is positioned, and stevedores remove the cones from the container.

Automation Systems



Movable Platform



Remote Coning



Crane Platform Pick Station



Auto Platform



Mobile Pinning Station

Partial Automation

Since the turn of the millennium, for a decade many companies have attempted to partially automate the twistlock handling process, in a number of different ways.

These partially automated systems are similar to an inverted spreader and despite working well, they have faced a number of man/machine interface issues.

They only have limited adoption, in a conservative industry.

This type of system can be seen in operation from the following Vimeo link:

<https://vimeo.com/161193870>



Automatic Twistlock Handling Machine



Physical Demands & Port Challenges

Due to the physical demands and high pressure of work, a higher percentage of workforce turnover is envisaged. This causes ports to face certain challenges which include, higher training and insurance costs, difficulties in managing access to high security areas, and effective monitoring a high turnover off workforce.

The Future

With a significant growth in container volumes, there is a number of mega automated ports being announced. These ports plan to have automation of twistlock cone handling. For it to succeed, the systems need to be capable of fully automating operations, including all twistlock cones, whilst maintaining current productivity as a minimum standard.

“Mega automated ports plan to have automation of twistlock cone handling **”**



In profile



Cameron Hay

Managed RAM PinSmart™, an automatic twistlock handling machine designed to automate the task of twistlock cone handling.

Cameron previously worked in stevedoring for many years and saw the need to improve and automate the task of twistlock cone removal ever since he witnessed one of his colleagues suffering an injury whilst removing twistlock cones.



Mani Chellappa

Who has many years of experience working in PSA stevedoring operations, designed and built a 3D vision aided robotic system, to automate twistlock operations in a proposed remote handling station.

Next Generation of the RAM Automatic Twistlock Handling Machine

With a combined 50 years of experience in handling of twistlock cones, Cameron Hay, Project Manager for PinSmart and lifting specialist Mani Chellappa, have teamed up together to 'close in' the development of a definitive fully-automated twistlock handling machine.

Both Cameron and Mani have teamed up at RAM to build the next generation of automatic twistlock handling with the RAM PinSmart II which is scheduled to be marketed during 2019.

