



Port Machinery

Container cranes:

Container cranes are used to lift containers on and off ships by using a long horizontal arm called a 'boom' that is part of the crane which can reach over the container ship.

The crane has a specialised operator who sits in a glass cabin which is connected under a device called a 'trolley' near the top of the crane. The operator can move the cabin and trolley along the boom to get above the container that it wants to pick up. The crane driver can then lower by wires a device called a 'spreader' onto the top of a container which then locks onto the container using devices called twist locks. This allows the crane to lift and move the container either onto the dock or onto the ship depending on whether the container is being imported or exported into Melbourne.

Container cranes are electrically driven and have a supporting framework that sits steel wheels on rails so that they can move along the wharf to line up with the ship that they are working on. A large container ship may have up to 3 container cranes working on it simultaneously.



Straddle Carriers:

Straddle carriers are unregistered vehicles used to move containers within a container terminal. At Port of Melbourne, straddles work with container cranes to move the containers either to or away from the dock. The straddles are also used to load or unload trucks that bring export containers into the port or the import containers that go by road to businesses in Victoria.

The straddles are operated by a driver who sits in a glass cabin at the top of the vehicle facing the middle so that they can see all around them. Unlike most vehicles the driver sits at right angles to the direction they are heading. The driver uses computers to tell them which containers they need to pick up. They pick up containers by using a device called a 'spreader' which is placed on top of the container and it locks onto the container using specialised twist locks.

Straddles normally stack containers up to 3 containers high for storage in rows that allow the straddle to drive up and down over the stacks while carrying another container. They can also drive right over the top of a truck to place the container onto the back of it.

The straddles at DP World's terminal at Swanson Dock West are powered by bio-fuel to reduce carbon emissions.



Reach Stackers:

Reach stackers are off-road vehicles used to transport containers that are waiting to be moved from one mode of transport to another such as from a rail wagon onto a truck. They are faster and more flexible than forklifts. Reach stackers are operated by a driver who sits in a cabin at the front of the vehicle which has a long arm that reaches over the top of the driver from behind.

Reach stackers can pick up containers by using a device called a 'spreader' at the end of its long arm. The spreader is placed on top of the container and it locks onto the container using devices called 'twist locks'. Reach stackers are able to place containers straight onto the back of trains or trucks or stack containers on top of each other for storage. They can use their long and flexible arm to stack containers up to 4 rows deep.



Empty Container Handler:

Empty container handlers are off-road vehicles used for handling empty containers that are to be stored in container yards. They are able to transport containers and stack them in rows up to 7 containers high. Empty container handlers are operated by specialised drivers who sit in a cubicle in the middle of the vehicle. They pick up containers using a device called a 'spreader' which connects into the corners of the containers using specialised 'twist locks'. The container gets lifted up the long vertical arm of the handler which can be about 20 m high.

These machines are very important for storing containers in areas that have a limited area.



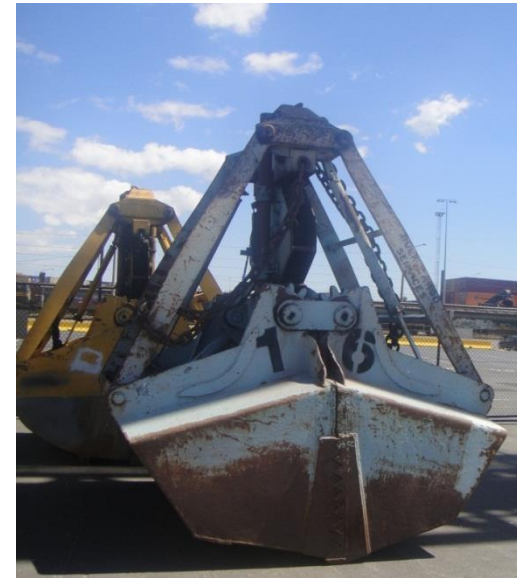
Forklift:

Forklifts are vehicles used to move heavy containers around a terminal. This might be to move them on and off trucks or to move them to storage areas. There are two types of forklifts which pick up containers. One type of forklift uses a device called a 'spreader' which has special 'twist locks' that lock into the corners of a container to keep the container in place. The other type of forklift uses two flat prongs which are placed underneath the container to lift it up.



Bulk grabs

Some types of cranes used in the unloading or loading from ships of certain types of dry, loose, solid material such as sugar or scrap metal use a set of metal jaws called a 'bulk grab' attached to the end of cables from the crane. The crane operator lowers the grab right into the storage compartments called "holds" of a ship carrying the cargo. The grab takes big bites of the material and the crane holding the grab can swing the load around, open the jaws and drop the contents into trucks or storage containers or equipment called 'hoppers'.



Shiploaders:

Some equipment called ship loaders are used to load dry, loose, solid material such as wheat into a ship's hold. Shiploaders have a conveyor belt which leads the material from storage silos to the arm of the shiploader, this extends out over the cargo storage area of the ship. The material then falls into the ships compartments from there.

A shiploader may consist of an extendable arm, a conveyor belt and a mobile structure to support the arm. It is mounted on rails to so that it can move up and down alongside the ship to the various holds of the ship. The extendable arm is operated by a driver who can move the arm upwards and downwards as well as side to side so that it can fill all of the corners of a ship's storage areas.

**Hoppers:**

Hoppers are specialised devices used to assist loading dry, loose, solid material that is being imported in a ship. Hoppers are shaped like a large funnel or chute. Either grabs or conveyor belts place or transport material into the top of a hopper, where the material falls in. When the hopper is filled, trucks drive directly underneath the hoppers, and then a gate can be opened at the bottom of the hopper which allows the material to pour out directly into the back of a truck.



Chiksan arm/ Marine loading arm :

A 'chiksan arm' is a mechanical device like a bendable arm used to load and discharge liquids and gases from ships. A chiksan arm consists of linked steel pipes that connect to a docked ship. It consists of three main parts, a base riser which supports the structure, an inboard arm which is the part of the arm closest to the dock, and an outboard arm which is the section of the arm closest to the ship. The inboard arm has many supporting structures which help to balance the weight of the device; the outboard arm ends with a structure which connects to the ships.

The arm has special swivel joints all along it where the steel pipes link. These swivel joints allow for the arm to automatically adjust itself with the ships movements. If the ship starts to move too much and the stress levels on the swivel joints become too high, an emergency release system operates to close valves within the pipe and disconnect the pipe from the ship to avoid spilling the liquid or gas.

Port of Melbourne has chiksan arms operating at Holden Dock and Gellibrand Pier



Silos:

Silos are for long-term storage of loose, dry, solid material such as wheat awaiting export or cement that is being imported. Grain in silos is brought into the port either by trucks or in special rail wagons.



Tanks

Tanks are mainly used to store liquids that are being imported or exported by ships through the port. The liquids can be of a hazardous type such as petrol or non-hazardous such as palm oils used in the manufacture of soaps and cosmetics. The liquids are transported to or from the ships to the tanks along pipelines that can be connected to the ship.



Trains

Trains with wagons designed to take containers or various other type products such as wheat are used to transport products to the port for export or for those being imported to off port rail terminals.

