LİMAN VE TERMİNAL YONETİMİ

LİMAN OPERASYONLARI

CONTAINER TERMINAL OPERAYONLARI

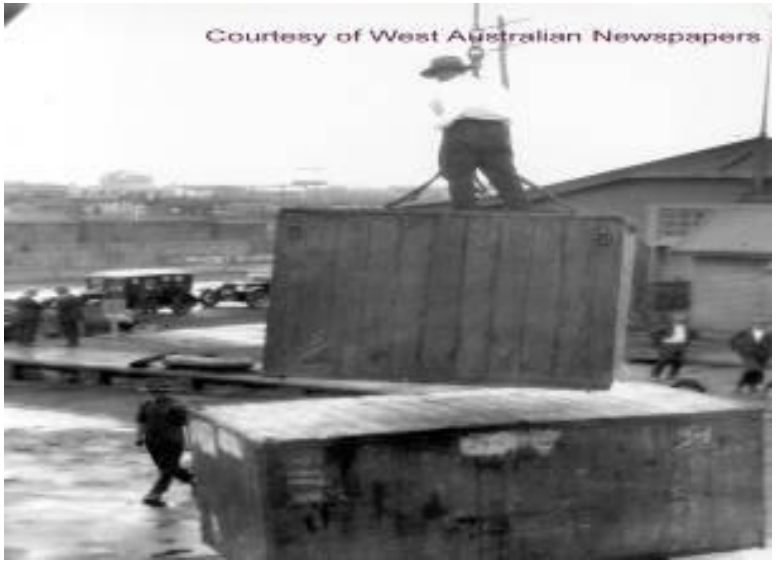



* A container port or container terminal is a facility where cargo containers are transshipped between different transport vehicles, for onward transportation.

* The transshipment may be between container ships and land vehicles, for example trains or trucks, in which case the terminal is described as a maritime container port. Alternatively, the transshipment may be between land vehicles, typically between train and truck, in which case the terminal is described as an inland container port.

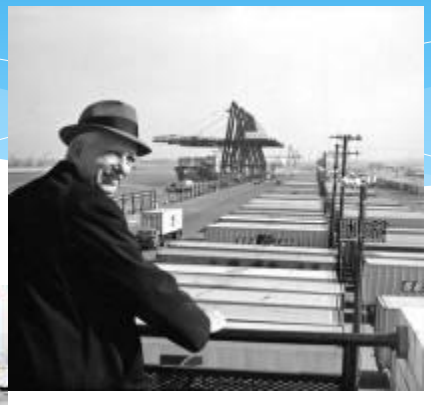
Development of Cargo Handling

* Bulk / Break Bulk
* Unitization
* Lash System
* Palletisation
* Containerisation



* Port Newark-Elizabeth on the Newark Bay in the Port of New York and New Jersey is considered the world's first maritime container port. On April 26, 1956, the Ideal X was rigged for an experiment to use standardized cargo containers that were stacked and then unloaded to a compatible truck chassis at Port Newark.

History of Containerization



White Pass & Yukon claimed the **Clifford J. Rogers** was the first ship specifically designed as a container vessel. The container measured 7' x 8' x 8'.

Many claim to be the first international container operators. This excerpt from a *White Pass Journal* of 1956, supports one claim:

"The world's first ship specifically designed as a container vessel went into service for White Pass, November 26, 1955. The M.V. Clifford J. Rogers was built in Montréal and has a carrying capacity of 4000 tons. She will ply between North Vancouver and Skagway.

The ship is the ocean segment of the new White Pass integrated ship/truck/truck container-land transportation system. The integrated container concept of freight handling was introduced in the Yukon territory by White Pass officials during the early fifties."

* The concept had been developed by the McLean Trucking Company. On August 15, 1962, the Port Authority of New York and New Jersey opened the world's first container port, Elizabeth Marine Terminal (Wikipedia, 2020).

* Both maritime and inland container ports usually provide storage facilities for both loaded and empty containers. Loaded containers are stored for relatively short periods, whilst waiting for onward transportation, whilst unloaded containers may be stored for longer periods awaiting their next use. Containers are normally stacked for storage, and the resulting stores are known as container stacks.

* The evolution of cargo handling equipment has kept pace with the dramatic increases in international shipping activity. As vessel sizes continue to increase, the volume of container and roll-on/roll-off cargo continues to grow. Efficiencies in handling these packaging forms has become increasingly important and marine terminal equipment design and manufacturing continues under the gun to meet the growing challenges.

* Today, many modern container terminals have assigned their longshore staffs to computerized gateways and control towers, locating or positioning containers and guiding truckers - overseeing the cargo via computer and handling it with automated vehicles.
* Technological development has focused upon changing the tools of the trade. It has touched upon larger vessels with dramatically increased cargo capacity. It also has addressed the development of larger, deeper, more sophisticated seaway connections and seaports with deeper channels and berths.

* Automated RTG (ARTG) System
* The ARTG system version 2.0 is equipped with the latest wireless communication technology: control signals and video signals are now wireless. This means that the ARTGs can be diesel-powered, there is no need for cable reels and fiber optics.

* Rubber Tired Gantry Cranes
* A rubber tyred gantry crane (RTG crane) (also transtainer) is a mobile gantry crane used in intermodal operations to ground or stack containers. Inbound containers are stored for future pickup by trucks, and outbound are stored for future loading onto vessels.

* RTGs are often powered by diesel generator systems (gensets) of 100 to 600 kW. The first electrified rubber-tyred gantry cranes (ERTG) in China was unveiled by The She Kou container terminal (SCT) in Aug 2008. The new technology reduces fuel consumption by an estimated 95 percent. The new ERTG system was developed with the help of Konecranes, Conductix-Wampfler and Georgia Power (Wikipedia, 2020).

Automated RMG (ARMG) System

* The ARMG crane design drew upon rail and yard conditions that are the daily reality in container terminals around the world, and brought in the proven technology of our Rubber Tired Gantry cranes.

* Rail Mounted Gantry Cranes
* Rail Mounted Gantry (RMG) cranes. Rail mounted gantry cranes (RMG cranes) are rail mounted bridge cranes which are mainly used for stacking containers. They are available in a variety of different widths and heights. There is space between the supports for approx.

* Ship-to-Shore Gantry Cranes
* A container crane (also container handling gantry crane or ship-to-shore crane) is a type of large dockside gantry crane found at container terminals for loading and unloading intermodal containers from container ships.

* There are two common types of container handling gantry crane: high profile, where the boom is hinged at the waterside of the crane structure and lifted in the air to clear the ships for navigation, and low profile, where the boom is shuttled toward and over the ship to allow the trolley to load and discharge containers (wikipedia, 2020).

Straddle carrier

A straddle carrier or straddle truck is a freight carrying vehicle that carries its load underneath by "straddling" it, rather than carrying it on top like a conventional truck. The advantage of the straddle carrier is its ability to load and unload without the assistance of cranes or forklifts. The lifting apparatus under the carrier is operated by the driver without any outside assistance and without leaving the driver's seat (wikipedia, 2020).

* Similar industrial straddle carriers are used in manufacturing and construction, both for handling oversized loads such as steel and pre-cast concrete and where transportation of special loads such as nitrogen tanks is required in restricted spaces not suitable for trucks. A key advantage of industrial straddle carriers and reach stackers over most forklifts is the ability to load or unload a semi-trailer in a single operation, which can improve efficiency.

* Sprinter Carriers
* Konecranes Noell Sprinter Carriers are ideal for high-speed horizontal container transport between the quayside and container yard. They can also be used for many other applications requiring fast container transport over longer distances. They are also now available as automated versions.

* Automated Guided Vehicles
* Automated container transport vehicles, or Automated Guided Vehicles (AGVs), which are used for rapid and economical container transport between the quayside and the container yard. Konecranes also supplies management and navigation software to operate the AGVs. Konecranes AGVs and Lift AGVs are now available with lithium-ion battery technology.

* Automated Terminal Tractor
* Konecranes is pleased to announce that we now supply automated terminal tractors (A-TT). Terberg will be our partner in this effort, as a certifed supplier of terminal tractors

Classification of Containers

* By Size:
  - 20 Feet
  - 40 Feet

* By type:
  - General Cargo Container
  - Open Top Container
  - Flat Container
  - Liquid / Gas Container
  - Thermal Container

Port Operation Planning
Typical Container Terminal

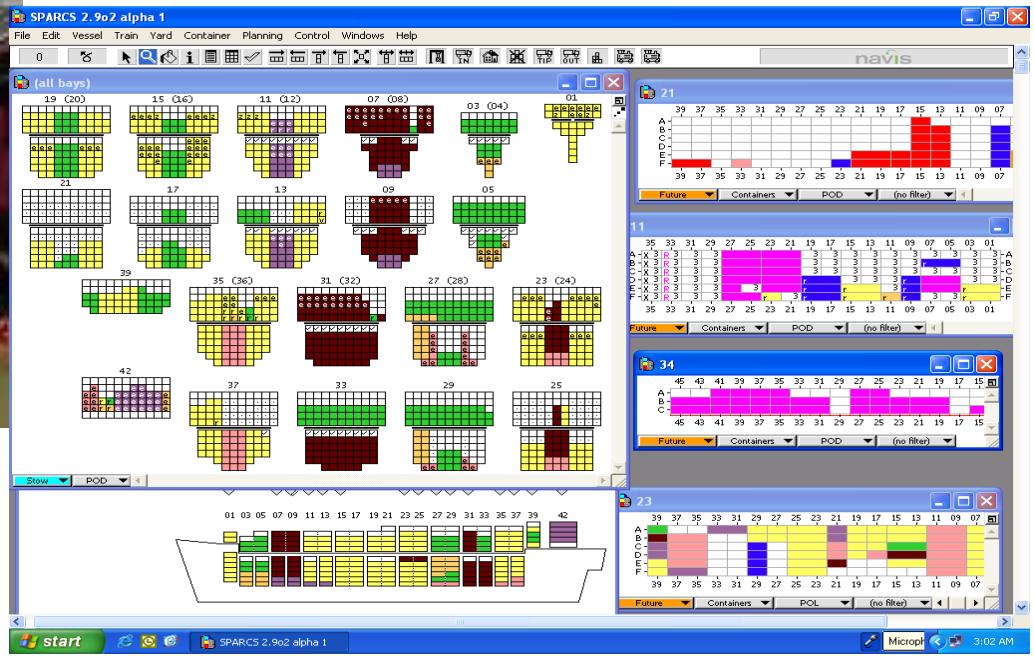
Handling of the Container in Yard

Stowage Planning the vessel in SPARCS

NAVIS

COSMOS

CATOS…



Vessel Movements in Port - Berthing and Sailing

Video 1

Vessel Operations

Video 2

Rail Side Operations

Selection of Yard Equipments

System Features	Tractor/ Chassis System	Straddle Carrier	Yard Gantry Crane System (RTGC,RMGC etc.)	Front End Loaders (Reach stackers, Top Loaders, Fork Lifts etc.)
Load Utilization	Very Poor : 185 TEU / Hectare	Good : 385 TEU / Hectare	Very Good : 750 TEU / Hectare	Poor : 275 TEU / Hectare
Terminal Development Costs	Very Low : High quality Surfacing not Necessary	Medium : Hard Wearing Surface Needed	High : High load bearing surface needed for crane wheels	High : heavy wear on terminal Surface
Equipment Cost	High : large number of chassis required	Moderate : six straddle carriers per ship / shore cranes	High	Moderate : cost effective for low throughputs
Equipment Maintenance Cost	low	High	Low	Medium
Manning Level and Skill	High : more men But low skill Required	Low : less men High Skill Required	High : more men medium high skill required	Medium : Men Medium Skill Requirement
Operating Factors	Good Accessibility, Simple terminal Operation	High Flexibility , Good Stacking	Good Land use, Scope For Automation	Versatile Equipment

Dry Bulk Terminal

* Bulk cargo is commodity cargo that is transported unpackaged in large quantities. It refers to material in either liquid or granular, particulate form, as a mass of relatively small solids, such as petroleum/crude oil, grain, coal, or gravel. This cargo is usually dropped or poured, with a spout or shovel bucket, into a bulk carrier ship's hold, railroad car/railway wagon, or tanker truck/trailer/semi-trailer body. Smaller quantities (still considered "bulk") can be boxed (or drummed) and palletised. Bulk cargo is classified as liquid or dry.

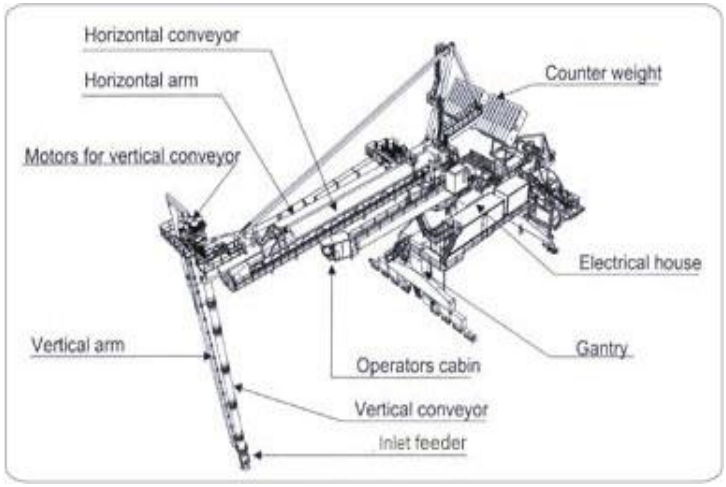
* Bulk material handling is an engineering field that is centered on the design of equipment used for the handling of dry materials such as ores, coal, cereals, wood chips, sand, gravel and stone in loose bulk form. It can also relate to the handling of mixed wastes.

* Bulk material handling systems are typically composed of stationary machinery such as conveyor belts, screw conveyors, tubular drag conveyors, moving floors, Toploaders, stackers, reclaimers, bucket elevators, truck dumpers, railcar dumpers or wagon tipplers, shiploaders, hoppers and diverters and various mobile equipment such as loaders, mobile hopper loaders / unloaders, various shuttles, combined with storage facilities such as stockyards, storage silos or stockpiles.

* The purpose of a bulk material handling facility may be to transport material from one of several locations (i.e. a source) to an ultimate destination or to process material such as ore in concentrating and smelting or handling materials for manufacturing such as logs, wood chips and sawdust at sawmills and paper mills. Other industries using bulk materials handling include flour mills and coal-fired utility boilers (Wikipedia, 2016).

Continuous Screw Type Unloader

- With a totally enclosed conveying line the unloader ensures environment-friendly operation. It is suitable for a wide range of dry bulk cargoes such as cement, coal, grain, derivatives, fertilizers, minerals etc. One and the same unloader unit can be used for such different materials as coal, cement, fertilizers and grain as an example.
- Sumitomo




HEUSSER
GARANT

Mobile Unloader

* Mobile Unloaders are generally using screw type system and used in ports which doesn't have developed systems or if discharging must be done quicker.
* Hamburg port

Pneumatic Dischargers

* Pneumatic Dischargers are second fastest way of discharging bulk cargo and work on a vacuum-suction system.

Euroslide Type

* It is much like the screw type unloader but works backwards, rather than taking in it is giving out and preferred for agricultural products such as grain because it has a soft mechanism which doesn't give any damage or dirty the cargo.

Conveyor Belt Systems

- Conveyor belt is the fastest way of loading bulk cargo, especially ore and grain but pretty much can take use in most bulk cargo. Because the mechanisms connected the harbour area can kept clean. They can load up to 10000 tons/hour, which it is hard for ships to discharge their ballast tanks.

Conventional Systems (For Both Load&Disch.)

* Most commonly used way to both loading and discharging is grab scoop. These scoops are generally attached to the gantry or mobile cranes. Their capacity can be up to 1500 tonnes/hour. Mostly far east and African countries uses this systems because they are cheap, easy to manufacture and easy to maintain.

* The Baltic Exchange is based in London and provides a range of indices benchmarking the cost of moving bulk commodities, dry and wet, along popular routes around the seas. Some of these indices are also used to settle Freight Futures, known as FFA's. The most famous of the Baltic indices is the Baltic Dry Indices, commonly called the BDI.

* This is a derived function of the Baltic Capesize index (BCI), Baltic Panamax index (BPI), Baltic Supramax index (BSI) and the Baltic Handysize index (BHSI). The BDI has been used as a bellwether for the global economy as it can be interpreted as an indicator of an increase or decrease in the amount of raw commodities countries are importing/exporting.

- Bulk Terminal Logistics
- BLU Code
- Bulk Terminal Video I
- Bulk Terminal Video II

Liquid Bulk Terminal

- Liquid bulk and chemical terminals provide an essential link in the supply chain for the Oil & Gas and food industries. This experience includes the design of maritime structures for both storage and distribution facilities for crude oil and oil products, liquid chemicals and edible products.

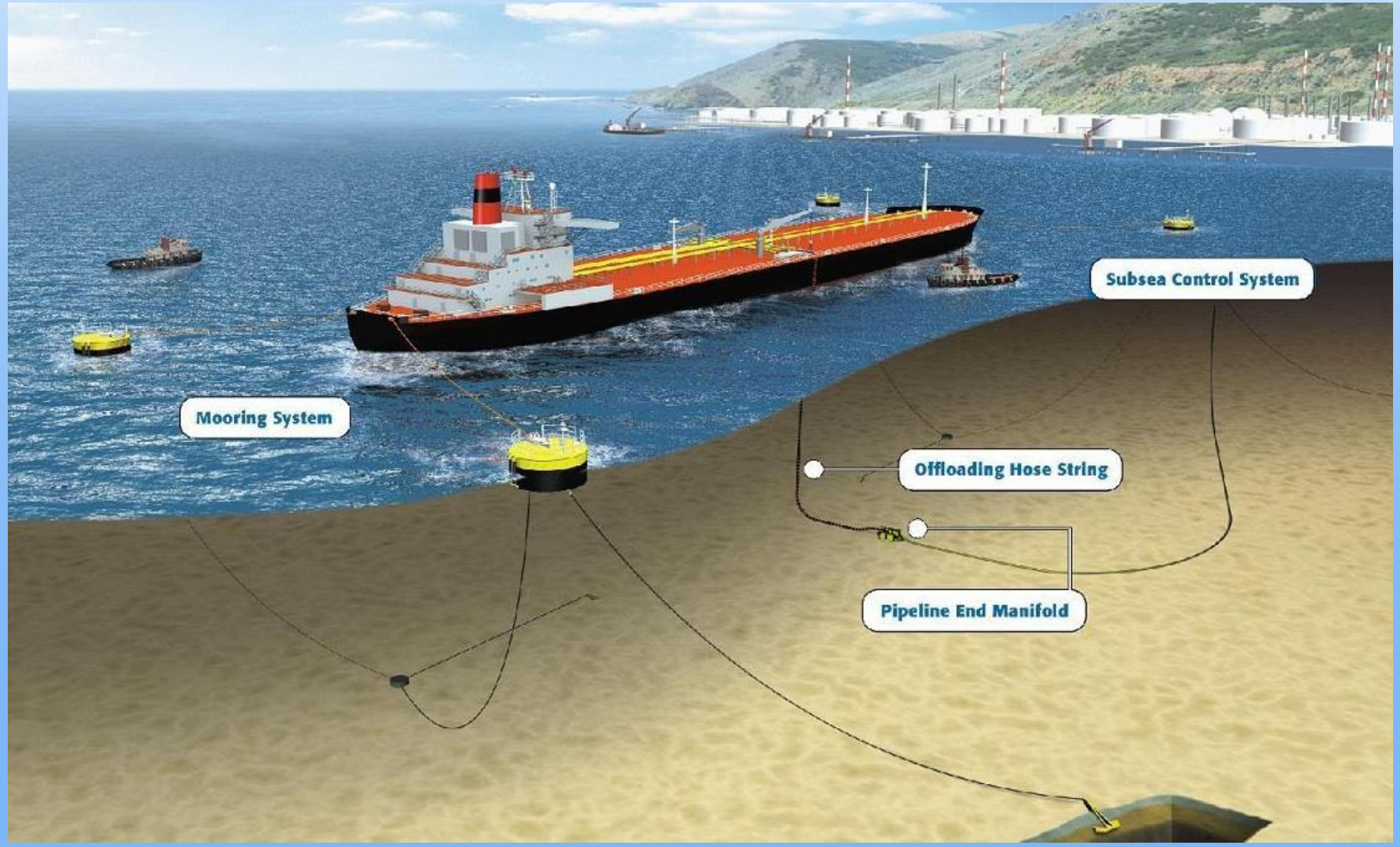
Oil Terminal

- An industrial facility for the storage of oil and/or petrochemical products and from which these products are usually transported to end users or further storage facilities. An oil depot typically has tankage, either above ground or below ground, and gantries (framework) for the discharge of products into road tankers or other vehicles (such as vessel) or pipelines.

Oil Terminal

Island Jetty

Conventional Buoy Mooring (CBM) system



- The Conventional Buoy Mooring (CBM) system includes multiple buoys that are fixed to the seabed by means of mooring lines and marine anchors. The three to six buoys are permanently installed in a rectangular pattern that allows safe mooring of a vessel which is positioned between the buoys with tug assistance.

- The buoys provide the strong points to which the vessel's on-board mooring lines can be attached. These are the same lines that are also used for mooring the vessel along a quay.

- The CBM system is especially valuable when no quay sites are available. It can also be combined with a fluid transfer system that enables connection of (subsea) pipelines to the midship manifold of a conventional tanker. When no tanker is moored, the submersible hose or hoses are stored on the seabed. For cryogenic fluids, the aerial hose is suspended from a tower to the midship manifold of the liquefied gas carrier.

- Some mooring buoys are off-the-shelf products, while others have been specially designed to include features like quick disconnection couplings. The mooring system and layout of the buoys are always specifically designed to match the vessel's requirements and local environmental conditions. Typically these systems are designed for nearshore applications with water depths starting from six metres.

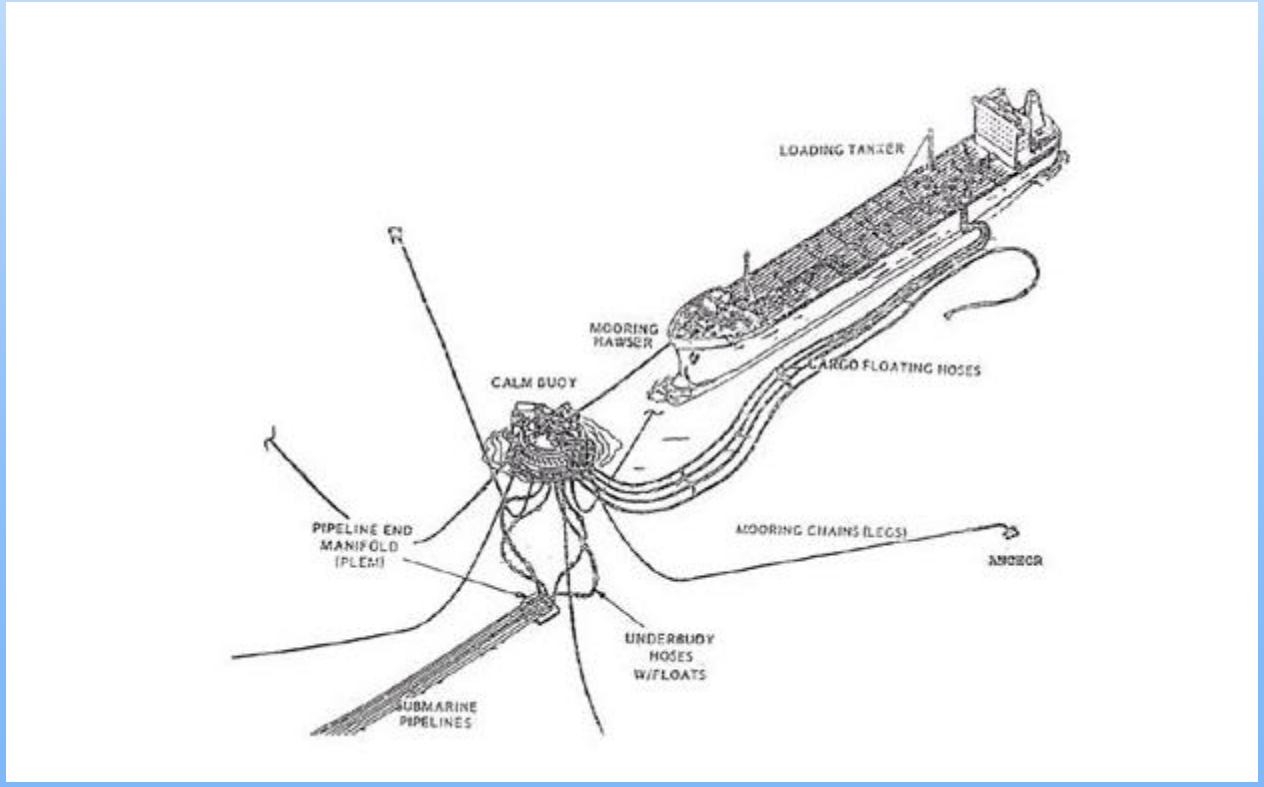
Single Point Mooring (SPM)

- Single point mooring (SPM) is a floating buoy/jetty anchored offshore to allow handling of liquid cargo such as petroleum products for tanker ships. SPM is mainly used in areas where a dedicated facility for loading or unloading liquid cargo is not available. Located at a distance of several kilometers from the shore-facility and connected using sub-sea and sub-oil pipelines, these single point mooring (SPM) facilities can even handle vessels of massive capacity such as VLCC.

- Single point mooring (SPM) serves as a link between the shore-facilities and the tankers for loading or off-loading liquid and gas cargo. Some of the major benefits of using SPM are:

- Ability to handle extra large vessels
- Doesn't require ships to come to the port and thus save fuel and time
- Ships with high drafts can be moored easily
- Large quality of cargo can be easily handled

- The SPM is moored to the seabed using mooring arrangement which includes anchors, anchor chains, chain stoppers etc. The mooring arrangement is such that it permits the buoy to move freely within defined limits, considering wind, waves, current, and tanker ship conditions. The buoy is anchored to the seabed using anchor chains (legs) which are attached to the anchor point (gravity based or piled) on the seabed. Chain stoppers are used to connect the chains to the buoy.

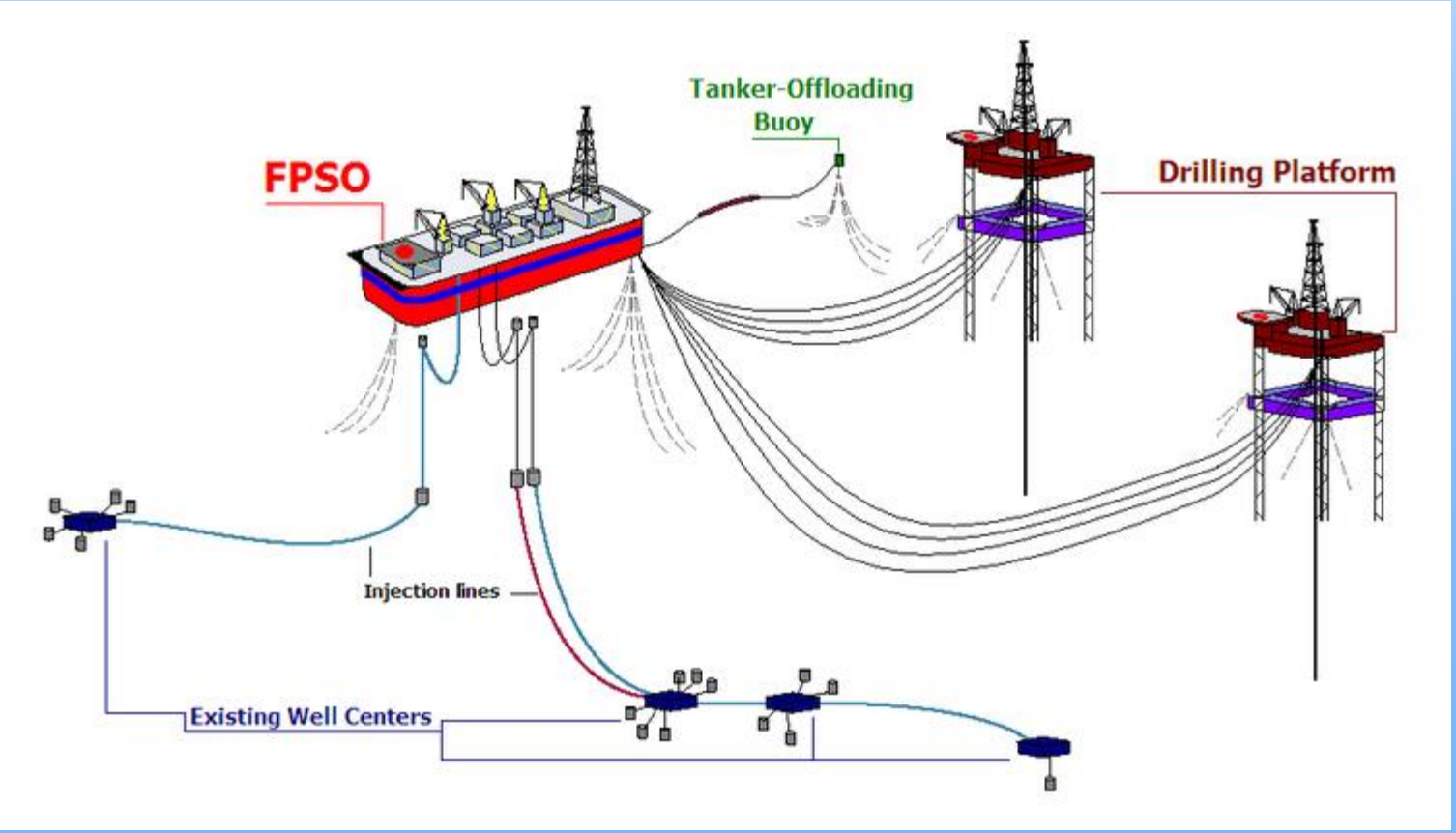

LOADING TANKER
MOORING HAWSER
CARGO FLOATING HOSES
CALM BUOY
PIPELINE END MANIFOLD (PLEM)
MOORING CHAINS (LEGS)
ANCHOR
UNDERBUOY HOSES W/FLOATS
SUBMARINE PIPELINES

- General overview on how single point mooring (SPM) system works

- The tanker ship is moored to the buoy for loading or unloading of cargo.
- A boat landing space on the the buoy deck provides access to the buoy for setting up the connections and securing the ship.
- Fenders are used to protect the buoy from unexpected movement of the ship due to bad weather.
- Lifting and handling equipment on the buoy allows handling of hoses connections and safety tools.
- Once the connections are made, valves are operated from the electrical substation.
- Necessary alarm systems and navigational aids are provided as safety precautions.
- Liquid cargo is transfered from geostatic location (Pipeline End and Manifold (PLEM)) to the tanker using product transfer system of the single point mooring system.

Floating production storage and offloading

- A floating production storage and offloading (FPSO) unit is a floating vessel used by the offshore oil and gas industry for the production and processing of hydrocarbons, and for the storage of oil. An FPSO vessel is designed to receive hydrocarbons produced by itself or from nearby platforms or subsea template, process them, and store oil until it can be offloaded onto a tanker or, less frequently, transported through a pipeline (wikipedia, 2020).


Tanker-Offloading
Buoy
FPSO
Drilling Platform
Injection lines
Existing Well Centers

- FPSOs are preferred in frontier offshore regions as they are easy to install, and do not require a local pipeline infrastructure to export oil. FPSOs can be a conversion of an oil tanker or can be a vessel built specially for the application. A vessel used only to store oil (without processing it) is referred to as a floating storage and offloading (FSO) vessel.

- A Floating Storage and Offloading unit (FSO) is essentially a simplified FPSO, without the capability for oil or gas processing. Most FSOs are converted single hull supertankers. An example is Knock Nevis, ex Seawise Giant, which for many years was the world's largest ship. It was converted into an FSO for offshore use before being scrapped.

- At the other end of the LNG logistics chain, where the natural gas is brought back to ambient temperature and pressure, specially modified ships may also be used as floating storage and regasification units (FSRUs). A LNG floating storage and regasification unit receives liquefied natural gas (LNG) from offloading LNG carriers, and the onboard regasification system provides natural gas exported to shore through risers and pipelines.

- FSO, Floating Storage and Offloading
- FPSO, Floating Production, Storage and Offloading
- FDPSO, Floating, Drilling and Production, Storage and Offloading
- FSRU, Floating Storage Regasification Unit.

Mechanisms

- Oil produced from offshore production platforms can be transported to the mainland either by pipeline or by tanker. When a tanker is chosen to transport the oil, it is necessary to accumulate oil in some form of storage tank, such that the oil tanker is not continuously occupied during oil production, and is only needed once sufficient oil has been produced to fill the tanker.

Advantages

- Floating production, storage and offloading vessels are particularly effective in remote or deep water locations, where seabed pipelines are not cost effective. FPSOs eliminate the need to lay expensive long-distance pipelines from the processing facility to an onshore terminal.

- This can provide an economically attractive solution for smaller oil fields, which can be exhausted in a few years and do not justify the expense of installing a pipeline. Furthermore, once the field is depleted, the FPSO can be moved to a new location (Wikipedia, 2020).

Dynamic positioning

- Dynamic positioning (DP) is a computer-controlled system to automatically maintain a vessel's position and heading by using its own propellers and thrusters. Position reference sensors, combined with wind sensors, motion sensors and gyrocompasses, provide information to the computer pertaining to the vessel's position and the magnitude and direction of environmental forces affecting its position. Examples of vessel types that employ DP include, but are not limited to, ships and semi-submersible mobile offshore drilling units (MODU), oceanographic research vessels, cable layer ships and cruise ships.

- Liquid bulk terminal
- Video 1
- Video 2