



Container ship loading and discharging operations

0.1.2

INTERNATIONAL LABOUR OFFICE

Maritime Industries Branch

PORTWORKER DEVELOPMENT PROGRAMME

UNIT C.1.2

**CONTAINER SHIP LOADING AND
DISCHARGING OPERATIONS**

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UNIT INTRODUCTION

1. Unit Aims

This Unit is designed:

1. To outline the four components of the ship operation, for loading and discharging.
2. To describe the principles followed when planning stowage on container ships and to explain how stowage affects the sequence of loading and discharge of containers.
3. To describe the lifting equipment used in container loading and discharging.
4. To describe the sequence of activities that make up the ship operation, for both lift-on-lift-off and roll-on-roll-off vessels.
5. To describe the work of the personnel involved in the ship operation.
6. To outline the safety procedures that must be followed in the ship operation.

2. Unit Objectives

After completing this Unit, the learner will be able to:

1. List and describe the component activities of the ship operation, for lift-on-lift-off (LoLo) and roll-on-roll-off (RoRo and StoRo) operations.
2. State and explain the major safety principles followed when planning the stowage of containers aboard ship.
3. State and explain the major operational needs taken into consideration when planning container stowage.
4. Describe in general terms the form and use of the ship operation work schedule documents, and outline the principles followed by planners when preparing them.
5. Name and distinguish between the four main types of quayside crane used for handling containers, and their ship-mounted equivalents, and describe their operation in general terms.
6. Distinguish between the five main types of spreader beam used for handling containers and describe their operation in general terms.
7. Describe the sequence of activities performed in a typical LoLo ship operation and the record-keeping requirements associated with those activities.
8. Describe the sequence of activities performed in a RoRo ship operation.
9. Describe the work activities of the personnel involved in the ship operation, both aboard ship and on the quayside.
10. List and explain the safe practices and good 'housekeeping' rules to be followed in the ship operation.
11. Define, recognize the best definition of, or distinguish between true and false statements concerning, the technical terms used in the Unit, as listed in sections 3 and 4 below.

LESSON PLAN

Section 1

1.1

Start by showing OHP 1, which is taken from Unit C.1.1. To remind trainees of how the ship operation fits into the sequences of activities taking place in the terminal operation, ask them to identify the five operational systems illustrated on the OHP. Then confirm and briefly describe the systems by showing OHP 2.

You will recall that there are four main operational systems in the container terminal operation: the ship operation, the quay transfer operation, the container yard operation (including container storage and in-terminal movements), and the receipt/delivery operation. Where the terminal has a container freight station, there is also, of course, a fifth operation: the CFS operation. In this Unit we shall consider in detail the ship operation, which involves the movement of containers between the quayside and the ship. The operation is, of course, the first set of activities in the discharge of import and other inbound containers, and the last stage in a loading operation, for exports and other outbound containers.

1.2

Keeping OHP 2 on the screen, ask the group to list as many activities as they can that occur in the ship operation.

In the ship operation, quayside cranes are moved into position opposite the hatch and bay to be discharged or loaded, containers are lifted off and into the ship, hatch covers are removed and replaced, container securing systems are released and attached, container identification numbers and condition are checked as they are handled, and so on. The operation is carried out by portworkers located on board the vessel, working above deck and (in some cases at least) below deck, others working on the quayside beneath the cranes (including the checkers or tally clerks), and the crane operators, of course, in their cabs.

1.3

Next show OHP 3 — the stages in one crane cycle for a LoLo export (loading) operation. Highlight the stages one by one as you describe them.

It is useful, when observing, analysing and measuring the ship operation, to think of it as consisting of a continuous, repeated sequence of crane movements, often called the **crane cycle**. Each cycle contains four activities. Let's identify those activities for a lift-on-lift-off (LoLo) operation, starting with outbound containers — a ship loading operation:

1. First, the crane's spreader frame is attached to the container between the crane legs, as it sits either on a trailer or on the quay surface, where it has been placed by the quay transfer equipment.
2. Next, the crane lifts the container over the ship's rail to the appropriate cell guide or bay, and lowers the container into its chosen stowage position.
3. When the container is fully and correctly stowed, the spreader is released from the container.
4. Finally, the crane returns the spreader to the quayside, where the next container is already waiting to be loaded.

1.4

Now project OHP 4, showing one crane cycle for a discharge operation. Ask the class to tell you what the four stages consist of in this case.

For an inbound container — a ship discharge operation — the crane cycle's four stages are:

1. The attachment of the spreader frame to the container in its stowed position aboard the vessel;
2. Lifting and transfer of the container from its stowage position, over the ship's rail, to the quayside, to be lowered onto the waiting trailer or directly onto the quay surface (depending on the quay transfer system);
3. The release of the spreader, once the container is safely landed;
4. Finally, return of the spreader over the ship's rail to the stowage position of the next container to be discharged.

1.5

Show OHP 5, a discharge sequence for a StoRo operation, and describe the steps in one cycle of activity for that ship operation.

In a roll-on-roll-off (RoRo) operation there is, of course, no crane, so we cannot speak of a 'crane cycle' as the unit of ship operation activity. It is also in most cases difficult to distinguish separate stages in each operational cycle and to decide where the ship operation ends and quay transfer begins. However, it is possible to identify four steps in each cycle of one type of StoRo discharge sequence — at least in the early stages of discharge:

1. The container (released from its lashings or other securing devices) is lifted from its place of stowage aboard the vessel by some form of lift-truck (typically a front-end loader).
2. The lift-truck transfers the container from its location below deck, via internal ramp(s) or lift(s) and the ship/shore ramp, to the quayside.
3. The lift-truck lands the container on the quay surface, to be picked up by the quay transfer equipment (eg a straddle carrier).
4. The lift-truck returns, via the ramp(s) and internal deck(s), to the stowage position of the next container.

1.6

Using OHP 6, describe some of the alternative RoRo ship operations, including a pure RoRo operation, in which the chassis or complete vehicle is carried aboard the vessel during the voyage. For each alternative, ask the class to comment on how the ship operation and quay transfer can merge together.

In other StoRo and RoRo operations, the steps in the ship operation are not so clear. For example:

- A. The lift-truck may also act as the quay transfer equipment, taking the container all the way to the container yard. In this type of operation, quay transfer and the ship operation are not clearly separable. This is also the case for cassette-type operations, where a tractor towing a special lifting trailer both picks up the container (which has travelled secured on a cassette), conveys it directly to the yard, and places it in a storage slot there. Some specialized low-profile straddle carriers operate a similar 'ship operation cycle'.