

全国交通运输职业教育教学指导委员会规划教材

港口机械专业英语

主编 董 丽

主审 仇桂玲



PROFESSIONAL ENGLISH FOR PORT MACHINERIES

大连海事大学出版社

■ 全国交通运输职业教育教学指导委员会规划教材

Professional English for Port Machinerics

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前言

鉴于优秀的港口机械专业英语教材的短缺,我们精心组织港口机械界的学者与专家编写了这本教材,将它奉献给我们将要工作在一线的学生们以及其他对港口机械英语感兴趣的读者们。

我们在对书中文章的选材上要求做到有一定深度却不艰涩,有必要广度而不繁琐,主次分明,详略得宜;在知识体系上要有一定的针对性;在内容上要有较强的适用性和先进性。从而使本教材更具有科学性、实用性和易读性。

本教材共分四章。第一章为港口机械简介,第二章为港口机械元件介绍,第三章为港口机械维修简介,第四章为港口机械说明书。

第一章包括叉车、装载机、牵引车、挂车、皮带输送机、气力输送机、岸边集装箱起重机、门座起重机、轨道式集装箱龙门起重机、轮胎式龙门起重机、装船机、卸船机、堆料机、取料机和集装箱输送装置结构等方面的一些简单介绍。

第二章包括港口常用的一些机械元件与电气元件的介绍。这些元件包括钢、钢丝绳、联轴器、制动器、减震器、液压元件、内燃机、底盘、电路、蓄电池、发电机、电动机、继电器、PLC、低压开关、主令电器、变频器、接触器等常用元件。

第三章包括发动机维修、底盘维修、起重机维修、叉车操作与安全、液压系统故障诊断、电气系统故障诊断、港口机械日常操作维修注意事项等方面的基本信息。

第四章主要摘自目前正在使用或经常使用的一些港口机械或电气设备方面的说明书。

本教材的第一章和第二章为精读部分,也是港口机械的基础,其中每篇课文之后都配有练习题。第三章和第四章为选学部分,教师可以根据课时的实际情况进行选学。

本教材内容涵盖较广,读者可根据不同专业,选择相应的部分进行阅读。为了便于读者理解书中内容,本教材的大多数课文配有与文字内容相关的插图,做到了图文并茂。

本教材是一本以学习专业英语为主的阅读性教材,对港口机械方面的知识进行了比较全面、系统的讲解。我们的目的是想让读者通过阅读本书,能够

熟悉港口机械方面的英语词汇,掌握阅读专业英语的方法,为将来阅读港口机械方面的英语资料打下良好的基础。

本书的第一章和第二章由青岛港湾职业技术学院董丽编写,第三章由青岛港湾职业技术学院王宝昌编写,第四章由青岛港湾职业技术学院赵秋园和张阳编写。本书由青岛港湾职业技术学院港机系主任仇桂玲教授主审。编者在编写的过程中参考了大量的国内外先进技术与资料,在此,一并表示衷心感谢。

本书可供港口机械或港口电气专业学生使用,也可供相关专业的技术人员和爱好者自学。由于编者水平有限,书中不妥之处,敬请读者批评指正。

编者
2013年7月



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Chapter One



A Brief Introduction to Port Machineries



Lesson 1 The Forklift Truck

The first lift trucks, introduced in the 1920s, were simple pieces of motorized equipment designed to move pallet loads from one point to another point. Today, sophisticated lift trucks are available in a combination of designs, weight capacities and lifting heights and with a variety of safety and ergonomic features.^[1]

Perhaps the only universal characteristics of today's diverse selection of lift trucks are the forks can be used to lift loads and the tires can be used to move them.

A forklift (Figure 1-1) is an industrial vehicle used to lift and move heavy quantities of an item. A forklift has a power operated forked platform in front that can be inserted under loads to lift and move them. Hydraulic systems are used in most forklifts although some companies have developed electric actuator controlled lifts. They are particularly

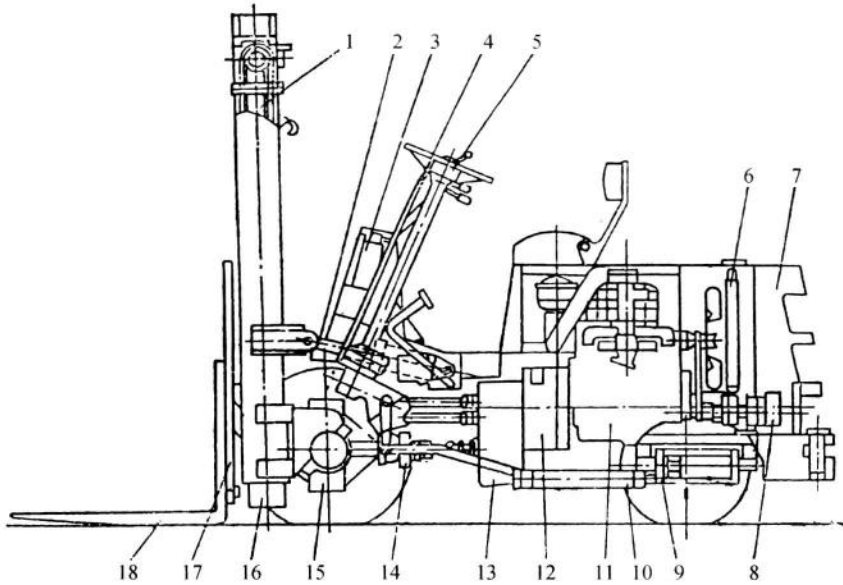


Figure 1-1 A forklift

useful in warehouses, storerooms, construction sites and loading docks. Forklifts are used both indoor and outdoor, on factory floors or in large cooling units. Forklifts typically run on either normal internal combustion engines or on electric motors. The specific fuel used in non electric lifts can be liquid propane, natural gas or regular/diesel gasoline.

Referring to Figure 1-2, it shows what a common forklift truck consists of.

Generally, a forklift truck consists of three parts: power equipment, chassis system and working device. The power equipment can provide power for the truck. The chassis system lets the truck travel. The working device is usually composed of mast, chain, sliding carriage, fork and hydraulic cylinder.



- | | | |
|------------------------------|----------------------|-------------------------------|
| 1—Lifting hydraulic cylinder | 2—Tilt cylinder | 3—Multi-way directional valve |
| 4—Gearshift control lever | 5—Steering wheel | 6—Radiator |
| 7—Balance weight | 8—Hydraulic pump | 9—Steering axle |
| 10—Steering booster | 11—Engine | 12—Clutch or torque converter |
| 13—Gear box | 14—Handbrake | 15—Transaxle |
| 16—Mast | 17—Sliding framework | 18—Fork |

Figure 1-2 The main components of a forklift truck

This lesson provides a brief introduction to some common types of lift trucks:

Counterbalanced lift trucks

The most common type of lift truck, also known as a forklift, is the counterbalanced lift truck (Figure 1-3).

A weight located in the rear of one of these trucks counterbalances the weight of the load, ensuring the truck doesn't tip forward. Such trucks vary in lifting capacity from about 1/2 ton to 60 ton or more and lifting height from 2 m to 6 m. Lifting velocities vary from 7 m/min to 30 m/min, and traveling speed from 14 km/h to 30 km/h, or more.

Counterbalanced lift trucks are powered either by internal combustion engines or electric motors. More than 60% of the counterbalanced lift trucks sold in North America during 2006 were of the internal combustion type. Internal combustion trucks run on a variety of fuels, including gasoline, diesel, and liquid propane gas (LPG) and compressed natural gas (CNG).^[2] LPG is the most common fuel for indoor trucks. Larger lift trucks for outdoor use are typically gasoline-powered or diesel-powered.

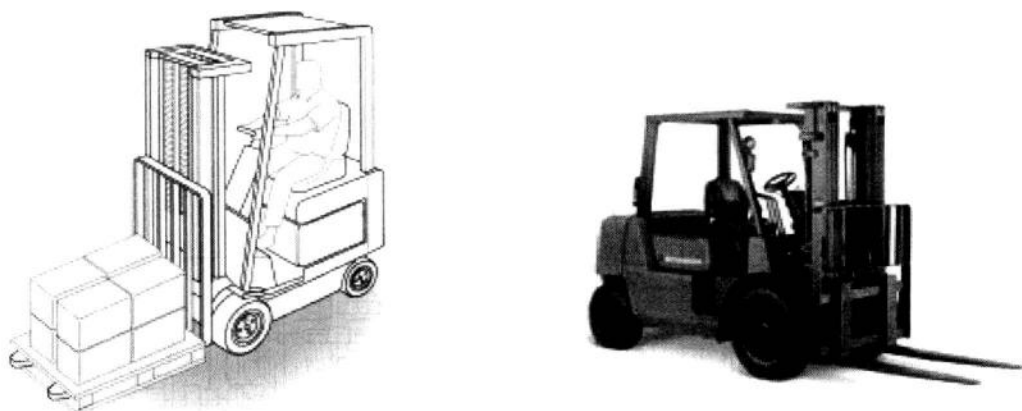


Figure 1-3 Counterbalanced lift trucks

Compared to electric trucks, internal combustion trucks are quicker and easier to refuel, but they must be refueled multiple times per shift. While they also produce noise and air-polluting emissions

Electric trucks get their power from large, heavy lead-acid batteries, which provide much of their counterweight. These trucks are only suitable for indoor use. While they cost more than internal combustion trucks, electric trucks are less expensive to operate. Electric trucks are quiet, produce no emissions and can usually run a full eight-hour shift on one battery charge.

Five companies now dominate the counterbalanced forklift market in terms of worldwide sales. They are:

1. Toyota Industries Corporation
2. KION Group
3. Jungheinrich
4. NACCO Industries, Inc. with Yale and Hyster Brands
5. Crown Equipment

Narrow-aisle lift trucks

At 12 feet wide, standard storage aisles allow a counterbalanced lift truck to turn in the aisle and put away a load. Narrow aisles (Figure 1-4) are typically only 8 feet wide — and some narrow aisles are only 5.5 to 6 feet wide — requiring specialized lift trucks that can put away loads without turning or that are small enough to make tight turns.

Three of the most common narrow-aisle trucks are reach trucks, turret trucks and order pickers.

1. Reach trucks

Reach trucks (Figure 1-5) are the original narrow-aisle lift truck. These trucks are

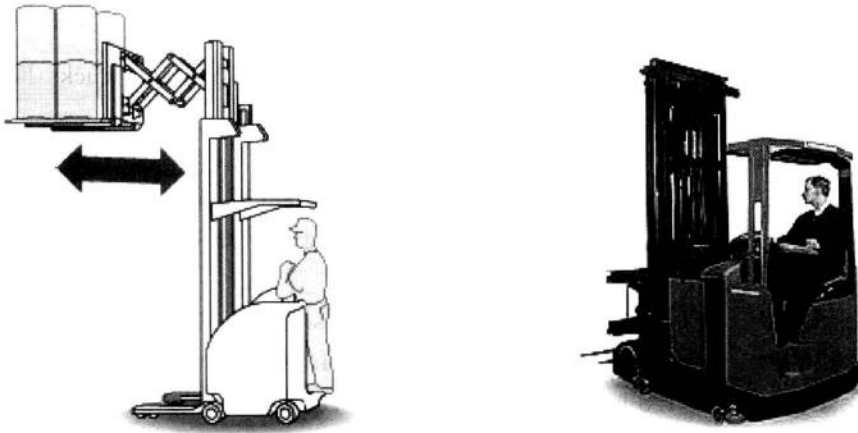


Figure 1-4 Narrow-aisle trucks



(a) Sit-on reach truck



(b) Stand-on reach truck



(c) Side drive reach truck



(d) Pedestrian reach truck

Figure 1-5 Narrow-aisle reach trucks

small enough to turn in narrow aisles because they don't need a large counterweight. Instead, outrigger arms extend in front of the trucks to provide stability. The outrigger arms, however, can prevent the trucks, depending on storage configuration, from getting close enough to the storage rack to deposit and retrieve loads. To overcome this, a reach



truck is designed with a telescoping mechanism — called a pantograph — that allows the forks to reach into storage locations.

Operator training for reach trucks may take longer than for other trucks because of the complexity of the controls.

2. Turret trucks

The lift truck often chosen for work in very narrow aisles is the turret truck (Figure 1-6). These trucks have pivoting forks that turn 90 degrees on either side and traverse from side to side.

To put away a load, an operator drives down the aisle with the load facing forward and then stops at the designated storage location. The forks pivot to the appropriate side and lift the load to the desired height. Then the forks traverse to their full extension, depositing the load. The forks return to their original position before forward travel resumes.

Turret trucks can be completely operator guided or can run on a wire guidance system — an attractive option in very narrow aisles. In man-up trucks, the operator compartment rises with the load. In man-down trucks, operators remain at floor level.

3. Order pickers

While reach trucks and turret trucks are used for storing and retrieving pallet loads, order pickers (Figure 1-7) are used for handling individual items or cases. An order picker, also known as a stock picker or an order selector, lifts the operator on a platform along with the forks. The operator picks items from bulk storage locations and places them directly onto a pallet on the forks of the truck.

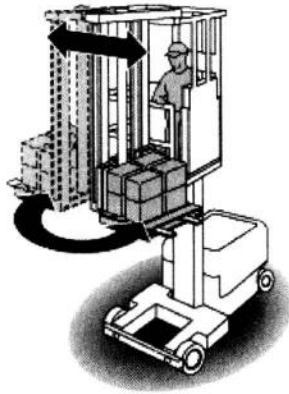


Figure 1-6 Turret truck

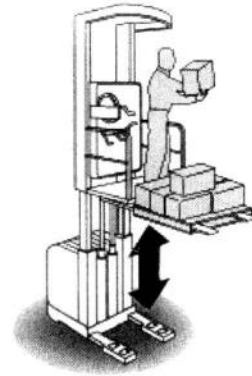


Figure 1-7 Order picker

Order pickers can safely move forward while in an elevated position. They can be completely operator-guided or can run on wire guidance systems.



Low lift pallet trucks (pallet jacks)

The simplest and least expensive lift trucks are non-powered pallet trucks, also known as hand pallet trucks (Figure 1-8) or hand pallet jacks.

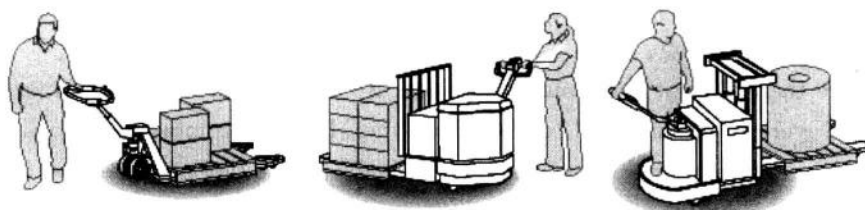


Figure 1-8 Low lift pallet trucks

Non-powered pallet trucks use a lifting device — usually hydraulic — to raise pallets just a few inches off the floor. Operators then grab the truck's handle and pull the load behind them.

New Words and Expressions

fork	叉子
forklift truck	叉车
chassis	底盘
internal combustion engine	内燃机
tilt cylinder	倾斜液压缸
gearshift control lever	变速操纵杆
radiator	散热器
balance weight	平衡重
steering axle	转向桥
engine	发动机
clutch or torque converter	离合器或变矩器
gear box	变速器
mast	门架
lifting capacity	起重能力
counterweight	平衡重



Notes

- [1] Today, sophisticated lift trucks are available in a combination of designs, weight capacities and lifting heights and with a variety of safety and ergonomic features. 现在有许多先进的叉车,在起重能力、起重高度上有不同的设计组合并且有各种安全和人机工程特点。
- [2] More than 60% of the counterbalanced lift trucks sold in North America during 2006 were of the internal combustion type. Internal combustion trucks run on a variety of fuels, including gasoline, diesel, and liquid propane gas (LPG) and compressed natural gas (CNG). 北美 2006 年销售的平衡重式叉车 60%是由内燃机提供动力的。内燃机叉车所用燃料也有不同,包括汽油、柴油、液体丙烷气 (LPG)和压缩天然气 (CNG)。

Exercises

I. Answer the following questions in English.

1. What is the most common type of lift truck?
2. What are the three of the most common narrow-aisle trucks?
3. What is simplest and least expensive lift trucks?

II. Translate the following English sentences into Chinese.

1. Counterbalanced lift trucks are powered either by internal combustion engines or electric motors. More than 60% of the counterbalanced lift trucks sold in North America during 2006 were of the internal combustion type. Internal combustion trucks run on a variety of fuels, including gasoline, diesel, and liquid propane gas (LPG) and compressed natural gas (CNG). LPG is the most common fuel for indoor trucks. Larger lift trucks for outdoor use are typically gasoline-powered or diesel-powered.
2. To put away a load, an operator drives down the aisle with the load facing forward and then stops at the designated storage location. The forks pivot to the appropriate side and lift the load to the desired height. Then the forks traverse to their full extension, depositing the load. The forks return to their original position before forward travel resumes.
3. While reach trucks and turret trucks are used for storing and retrieving pallet



loads, order pickers are used for handling individual items or cases. An order picker, also known as a stock picker or an order selector, lifts the operator on a platform along with the forks. The operator picks items from bulk storage locations and places them directly onto a pallet on the forks of the truck.

III. Recite the following passages.

Generally, a forklift truck consists of three parts: power equipment, chassis system and working device. Power equipment can provide power for the truck. Chassis system lets the truck travel. Working device is usually composed of mast, chain, sliding carriage, fork and hydraulic cylinder. It is working device that makes the truck works.

Three of the most common narrow-aisle trucks are reach trucks, turret trucks and order pickers.



Reading Material

An Introduction to a Forklift

A forklift truck (also called a lift truck, a fork truck, a forklift) is a powered industrial truck used to lift and transport materials.

The modern forklift was developed in the 1960s by various companies including the transmission manufacturing company Clark and the hoist company Yale & Towne Manufacturing. The forklift has since become an indispensable piece of equipment in manufacturing and warehousing operations.

The middle nineteenth century through the early twentieth century saw the developments that led to today's modern forklifts. The Pennsylvania Railroad in 1906 introduced battery powered platform trucks for moving luggage at their Altoona, Pennsylvania train station. World War I saw the development of different types of material handling equipment in the United Kingdom by Ransomes, Sims and Jeffries of Ipswich. This was in part due to the labor shortages caused by the war. In 1917 Clark in the United States began developing and using powered tractor and powered lift tractors in their factories.

Continuing development and expanded use of the forklift continued through the 1920s and 1930s. World War II, like World War I before, spurred the use of forklift trucks in the war effort. Following the war, more efficient methods for storing products in warehouses were being implemented. Warehouses needed more maneuverable forklift trucks that could reach greater heights. New forklift models were made that filled this need. In



1956 Toyota introduced its first lift truck model, the Model LA, in Japan and sold its first forklift in the United States in 1967.

The following is a list, in no particular order, of the more common forklift truck types:

Hand pallet truck — no power system of any kind.

Walkie low lift truck — powered pallet truck, usually electrically powered.

Rider low lift truck — usually electrically powered.

Towing tractor — maybe internal combustion engine or electric powered.

Walkie stacker — usually electrically powered.

Rider stacker — usually electrically powered.

Reach truck — variant on a rider stacker forklift, designed for small aisles, usually electrically powered, named because the forks can extend to reach the load. There are two variants, moving carriage, which are common in North America, and moving mast which are common in the rest of the world, and generally regarded as safer.

Electric counterbalanced truck — comes in stand on end control, stand on center control, and sit down center control, which is the most numerous.

Internal combustion engine powered counterbalanced forklift — comes in stand on end control, stand on center control, and sit down center control, which is the most numerous. Engines may be diesel, kerosene, gasoline, natural gas, butane, or propane fueled, and may be either two stroke spark ignition, four stroke spark ignition (common), two stroke compression ignition, and four stroke compression ignition (common). North American engines come with advanced emission control systems. Forklifts built in countries like Iran or Russia will typically have no emission control systems.

Electric Forklifts — powered by lead-acid batteries, several types of forklifts are electric: cushion tire forklifts, scissor lifts, order pickers, stackers, reach trucks and pallet jacks. Electric forklifts are primarily used indoors on flat, even surfaces. Electric forklift batteries last 6 consecutive hours or throughout an 8-hour shift with 2~3 breaks. Batteries prevent the emission of harmful fumes and are recommended for facilities in food-processing and healthcare sectors.

Sideloader — comes in stand on end control, and sit down end control, which is the most numerous. It may be electrically powered, or have an internal combustion engine. Engines may be diesel, kerosene, gasoline, natural gas, butane, or propane fueled, and may be two stroke spark ignition, four stroke spark ignition (common), two stroke compression ignition, and four stroke compression ignition (common). North American engines come with advanced emission control systems. Forklifts built in countries like Iran or Russia will typically have no emission control systems. Some sideloaders have hybrid drivetrains.

Telescopic handler — comes in stand on center control, and sit down center control, which is the most numerous. Usually has an internal combustion engine. Engines are al-